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UMI®
ECONOMIC PROBLEMS OF AN ADEQUATE DIET IN CANADA

by

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A Thesis Submitted to the Graduate Faculty for the Degree of

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In Charge of/Major Work

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Head of Major Department/

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Dean of Graduate College

Iowa State College

1945
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INTRODUCTION

At no time has interest in national dietary standards been as high as at present. Part of this results from progress in scientific knowledge and medical practices and part from the exigencies of war. The increased demand for certain foods because of greater civilian purchasing power, army requirements and limited sources of supply, focused attention on the relative scarcity of certain foods. Consequently, consumers have more consciously attempted to maximize the returns from food purchases under the influence of rationing and food allocation programs.

The degree to which nutritional value is a factor in consumers' judgment varies with the knowledge, cultural background and intelligence of the purchaser. There can be little doubt, however, that the publicity given to nutrient values as well as recent controls over the food supply have made many consumers more conscious than ever before of differences in nutritive value between alternative foods.

Men in the Armed Forces have been provided with balanced meals. Many of them will carry these influences away with them when returning to civilian life. Some will have tasted foods not known before, old food habits will have been discarded and new ones developed which are likely to have beneficial effects on food choice in the post-war period provided the foods are made available at reasonable prices.
Not only have types of food choices changed, but increased purchasing power and greater physical exertion have increased the total amount of food consumed. Whatever the cause, the war has revealed a greater potential demand for food than was previously acknowledged. It has also revealed nutritional deficiencies in the pre-war diet of lower income groups, bringing the relation of foods to the price structure under close scrutiny. This was led to recommendations by such well known nutritionists as Sir John Boyd Orr of England, that certain essential foods be removed from the normal market price structure and their prices be controlled by the government as a social responsibility.

While the implications of such a move would bear closer study, it is indicative of the thinking which is an outcome of the war and leads one to believe that the nutrition problem will benefit by closer attention of educational, scientific and governmental authorities in the future.

The relation of food habits to health is not clearly definable because of the many variables involved, increasing the difficulty of making broad recommendations. The necessity for some scale of nutritional measurement, however, has resulted in nutritionists setting up minimum and optimum food standards. The minimum standard may be regarded as sufficient to lead a normal life without severe forms of deficiency diseases. The optimum, on the other hand, is an ideal standard which cannot be improved upon and provides the maximum health which foods make attainable.
It is obvious that no set diet can be specified for all people. Habits, tastes and customs vary too much for that. However, a range between minimum and maximum with alternative choices of actual foods can go far toward providing the measurement which is so necessary if talk of food deficiencies is to make sense. It is for this reason and not because of any assumption of rigidity in the composition of adequate diets, that the norms will be used as a measuring device in this study.

By this form of measurement the more obvious deficiencies in Canadian diets can be isolated. It will then be possible to make specific recommendations for their improvement. There will be many deficiencies, however, escaping this type of measurement, and related to the size and distribution of incomes, food distribution and transportation conditions, habits and customs of consumers, education and awareness of relative food values. It is necessary, therefore, to explore these influences, to suggest improvements, and to find ways and means of preventing malnutrition in Canada.

Consumer problems are related to those of producers. Means of encouraging production of the right kind of foods for consumers' benefit must be interrelated with the maintenance of producers' income. This will be discussed in an examination of the relative position of agriculture to the rest of the economy in Canada, the problem of fluctuation in farm income and the continued supply of essential foods. Decisions as to the use of resources may create conflicts between export and domestic demand a possibility in Canada which must be resolved if social product is to be maximized.
4.

While this study will not attempt to solve the many producer problems in Canada, it cannot escape reference to those factors directly concerning producer-consumer relations. Special attention will be paid to the influence of consumers' income on food consumption, and means of overcoming this influence where it is detrimental to health and welfare. Factors affecting the elasticity of supply and the propensity to consume with specific reference to food will lead to a discussion of government responsibility in food distribution.

The whole field of food production and consumption is one sector of the economy which has maintained a "laissez faire" attitude and which consequently lags behind in its recognition of the need for central policy. The unsatisfactory consequences of such an attitude when compared with the results from using certain central directives during the war years strengthen the arguments for a food management policy in Canada. The introduction of this form of interference does not imply a state controlled industry but rather a positive function by government in place of the "police" functions characteristic of the nineteenth century. The need for government interference will decline as non-productive individuals are given greater opportunity to produce. Therefore, any government food program must be accompanied by educational and medical aids in equalizing opportunity and increasing the nation's productive wealth.
REVIEW OF LITERATURE

The publication of a report on nutrition by Burnet and Aykroyd in the Quarterly Bulletin of the Health Organization of the League of Nations, in June 1935, aroused widespread interest. It wasn't that previous to this date scientists had not been aware of the relationship of food and health, but there was a growing consciousness of the social and economic relationship of adequate diets and a country's productive wealth, which found expression in this report.

At a meeting of the League of Nations Assembly in June 1935, the following resolution was adopted:

1

Seeing that nutrition adequate both in quantity and quality is essential to the health and well-being of the workers and their families;

And seeing that in various countries evidence has been brought forward to show that large numbers of persons, both in town and country, are not sufficiently or suitable nourished;

Seeing, moreover, that an increase in the consumption of agricultural foodstuffs would help to raise standards of life and relieve the existing depression in agriculture:

The Conference welcomes the attention drawn by the Director in his report to the problem of nutrition and requests the Governing Body to instruct the Office to continue its investigations of the problem, particularly in its social aspects, in collaboration with the Health and Economic Organizations of the League of Nations, the International

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Institute of Agriculture and other bodies capable of contributing to its solution, with a view to presenting a report on the subject to the 1933 session of the Conference.

This resulted in a final report in 1937 containing a valuable study on food habits, consumption and their relation to food production.

During the same period the International Labour Office (League of Nations)\(^1\) published a study specifically directed towards the relation between workers' nutrition and social policy. At the Nineteenth Session of this organization, a Resolution was adopted laying down three propositions: (1) that adequate nutrition is a basic factor in the health and well-being of the workers and their families; (2) that there is a widespread evidence that large numbers of workers in town and country are not sufficiently or suitably nourished; and (3) that a proper consideration of workers' nutrition would help to solve some of the difficult sound-economic problems of today.

The industrial depression of that period popularized the paradox of poverty amidst plenty. It was apparent that social policy had not developed at the same rate as had technology of production and scientific findings on the nutritive basis for health. Therefore, these two reports were attempts to elucidate the problem in relation to economic welfare and by analysis, to produce recommendations for its solution. Because of the size of the task and because of the many countries involved, the

reports were limited to rather broad recommendations which have proved
invaluable bases for later more specific studies, both in nutrition
and social policy.

Sir John Orr in 1936 wrote a progressive report on food in relation
to the economy of the United Kingdom, "Food, Health and Income". He
recommended broad social changes necessitated by the powerful limitation
of income on food purchases. The health of the nation was primarily
a social responsibility and the provision of adequate diets was to be
in no way interfered with by wage levels and price relationships. This
was followed by "Feeding the People in Wartime" in 1940 and "Food and
the People" in 1943 which followed closely the original thinking on
social responsibility. The pressure of population on food resources was
not so apparent in North America. The consciousness of malnutrition in
various sections of Canada, however, resulted in the organization of a
Canadian Council of Nutrition in 1938 by the Department of Pensions and
National Health. This Council instigated the first large scale survey
of Canadian Nutrition at Toronto, with particular reference to child
health. Deficiencies in calcium, phosphorus, iron and vitamin B, were
found. At the same time Hunter and Pett from a survey in Edmonton,
Alberta, concluded that of the random sample chosen 40 per cent were

   1940.
4 Hunter, G. and Pett, L.B. A dietary survey in Edmonton, Canada.
adequately fed in terms of the standards they had set up, 40 per cent received three-quarters and 20 per cent little more than half of requirements.

McHenry, Young and Pett in further studies showed the presence of intake deficiencies in fats, calcium and ascorbic acid. The relationship of food intake to income was indicated by a study of Young "Food Consumption and Preferences of Families with Low Income in Halifax" showing consumption deficiencies in all nutrients. Compared with this a study by Patterson and McHenry in Toronto of families with an annual income between $1500 and $2400 revealed deficiencies in vitamins, calcium and iron in women and children not entirely explainable by income.

This income and food intake relationship was studied further by Hopper from a series of sample surveys. The results as shown in the text, verified this relationship. Apart from a cost of living study by the Dominion Bureau of Statistics in 1936, there has been no nationwide investigation of nutrition and dietary levels by localities in Canada. The result is that conclusions for the country have to be based on the sample studies available, which are less in number and distribution than would be required for a planned national survey.

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9.

The determination of nutritional status as indicated by McHenry,¹ can be attained in three main ways. These are physical examinations using medical techniques of diagnosis, laboratory procedures with controls and analysis and dietary surveys. While the first two are no doubt eminently satisfactory the cost eliminates them from general use and resort must be made to the survey method. From an economic and social viewpoint this method provides evidence which is invaluable in the finding of causes for certain conditions of food intake.

The same data can be interpreted in many ways, however, depending on the standards chosen. This is shown by Ferguson and McHenry in their "Nutritional Survey in East York."² The need for agreed standards was appreciated early in the war years and resulted in the publication of recommended allowances by the National Research Council, for nutritional measurement purposes. These allowances, however, are not standards in the strict sense of the word and their use as such can be justified only when fully qualified. There is no little danger in the use of standards for small samples, as indicated by McHenry in "Recent Trends in Nutrition".³ Further criticism of the use of recommended allowances as standards was made by Roberts.⁴ Pett has pointed out that the only satisfactory method for the discovery of malnutrition is by detailed medical investigation.

As stated above, however, this is an extremely costly procedure and other cheaper methods must of necessity be resorted to, if progress is to be achieved. Another analytical danger, as pointed out by Semmons and McHenry,\(^1\) is the variation in the nutrient content of foods. The climate, soil and other growing conditions cause variation between localities, as does the method of cooking, storage and the amount of waste.

From the time of Hennebery, who elaborated the method of proximate analysis in 1904 there has been great progress and scientific agreement in the measurement of food values. The greatest recording of proximate analyses of American food materials was made by Atwater in Bulletin 23 of the United States Department of Agriculture. Since that time the picture is beginning to take form, but as stated by Elvehjem:

> We must recognize that there is more to adequate nutrition than the mere combining of the known compounds into a diet and the calculation of these dietary constituents. There are interrelationships, effects of one food upon another, which we may have only begun to realize and which may play important roles in total nutrition.\(^2\)

The measurement of food consumption levels for comparison between countries was attempted by a special Joint Committee set up by the Combined Food Board in 1944. The comparison was based on analyses of supplies of food moving into consumption in the United States, Canada

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and the United Kingdom. 1 While this was subject to a margin of error between the supplies available and the actual consumption, from losses in preparation and on the table, it was a distinct step forward in the study of food and nutrition.

During the war years a Combined Working Party sponsored by the Allies was organized to study consumption levels, indigenous production and minimum food import requirements to maintain certain agreed nutritional levels in the European countries. Again the results have been valuable in bringing together expert advice of many countries, in agreeing on relative food values and in estimating food consumption on the national level.

A still largely unexplored field is the extent to which an evolution of consumers' demand for food would exercise, through the price system, a direct influence on the development of agricultural production. The study of the capacity of agriculture cannot be fully appreciated by a statistical survey of past production. As stated in Workers Nutrition and Social Policy, 2

Have the conditions under which agriculture works allowed it to turn rapidly to raising products for which there is an increased demand, or has such adaptation encountered difficulties due to the complexity of agricultural production and the interdependence of its numerous elements which have finally made adaptation impossible or incomplete?

In other words, there must be clarification of the relative roles played

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1 Combined Food Board (U.S., United Kingdom and Canada). Food Consumption levels in the United States, Canada and the United Kingdom. Vol. 1. 1944.

by economic and by technical factors. The adaptation of production to consumption is easier in a period of economic expansion than in a period of depression. The purchasing power of consumers will closely govern the adaptation of agriculture to changed demands. The period of expansion in Europe up to the first World War permitted European agriculture to develop the production of foods of animal origin, vegetables, and fruits at the expense of the production of cereal crops.

While there have been studies on individual aspects of food and agriculture relations, there has been no comprehensive study in any country which treats the problem in relation to the total economy. Such a study would necessitate an analysis of nutritional levels, the relation of health to food intake, factors governing the demand for food, food habits and purchasing power. It would be necessary to study the effect of adequate food intake in relation to the existing pattern of resource use and adjustments necessary. It would also require a study of the lags in producer response and the obstacles to this response. Questions of trade and trade agreements, export-import relations and comparative advantage in productive capacity within and between countries would have to be answered. Finally some statement would be necessary on the role of government in nutritional welfare through controls or other devices which would maximize returns from human and natural resources of the country concerned.

Such reports that have been made in Canada on this problem, and directives from elsewhere which apply to Canadian problems have been
used in this study in an attempt to evaluate some of the production consumption relations. For example, "Land and Labor"\(^1\) is a description of agricultural-industrial relations in Canada; Elliott's "The Nature and Measurement of the Elasticity of Supply of Farm Products"\(^2\) relates some of the factors affecting farmers' responses and Hope discusses agriculture's share of the Canadian national income.\(^3\) Reference among others has been made to Keynes' "General Theory of Employment",\(^4\) Reid's "Food for People",\(^5\) Shepherd's "Agricultural Price Control"\(^6\) and such statistical information from the Canadian government publications as was considered appropriate.

\(^1\) Haythorne, G.V. and Marsh, L.C. Land and labor. Pub. for McGill University by the Oxford University Press (Toronto) 1941.

\(^2\) Elliott, F.F. The nature and measurement of the elasticity of supply of farm products. J. of Farm Econ. 9:288-302. 1927.


The consumer groups face the question of the existence of food problems and appreciate the value to them of an increased demand for groups see in this situation a partial solution to their production problems and those served if not responsible for public health. The producer question in recent years by those responsible for maintaining farm income

In other periods during the same period, has been the subject of much the

with reduced margins to producers, and in the distribution of surplus in certain areas

The extent of surplus in this area and of an economy have furthered the point of conscription of nutrition and

The interdependence of the agricultural and non-agricultural sections

which have resulted in a distortion of prices and incomes. The every

growth in the supply of and demand for farm produce has created
economic

The work of the part-time country or group of countrymen, unorganized

present a problem which must be solved in terms of the economic frame

efficient of resources or the resources in the common mix of human wealth

Any and the extent of power and market power or the extent to which human satisfaction or human nutrition and public health make

Technological improvements in agricultural production and rapid


dition and Agriculture
The world-wide existence of malnutrition even in countries of surplus food productive capacity was the theme of an interim report by the Mixed Committee of the League of Nations in 1936.\(^1\) It was also the subject of a report on Workers' Nutrition and Social Policy by the International Labor Office during the same year.\(^2\) Disturbed political conditions in the years following delayed further international consideration of the outlines prepared in the above reports. The United Nations Conference on Food and Agriculture met in May 1943 and reopened the series of problems relating to food and agriculture. The declaration of the Conference was that the representative governments should collaborate in raising the levels of nutrition and standards of living of their peoples, and to report to one another on the progress achieved. An Interim Commission was set up to formulate the various recommendations for consideration by the member governments.

Considering that food is only one component of a standard of living, it was apparent that activities of the committees would necessitate close collaboration with other sections of their various economies if any effective rise in levels was to be accomplished. This was in part realized by certain recommendations for industrial development which were closely related to agricultural production.\(^3\)

Areas which have a large agricultural population in

\(^1\)League of Nations, op. cit., p. 5.

\(^2\)International Labor Office, op. cit., p. 6.

relation to their agricultural resources should:

1. Develop industries suitable to the area, particularly for the processing and preserving of the agricultural produce of the country, and, where feasible, for the manufacture of machinery, fertilizer, and equipment needed for agriculture;

2. Be encouraged, wherever it is economically sound, to export processed articles instead of the raw product, and in particular to take advantage of any reductions of trade barriers in the importing countries;

3. Be assisted in securing capital for the development of industrial and transportation facilities and for the development of export outlets for processed products;

4. Be assisted in securing facilities for the importation of machinery and tools where such are necessary;

5. Be assisted in securing and training technical personnel;

6. Undertake programs of public works and, where necessary, be assisted in securing technical advice and access to capital;

7. Develop sources of employment in public and private services.

These recommendations, however, by no means indicate the extent to which continued food production on its present scale depends upon industrial development and increased purchasing power from sectors of the economy not directly related to agriculture. Because of this relation and because of this interdependence, the effectiveness of the Conference was limited in its role of attaining satisfactory answers to both producers' and consumers' problems. It did provide certain recommendations, however, which can be used as framework for a more detailed study of the problem of adequate diets in Canada. With the acreage of improved agricultural land per head of population about twenty times that
of the United Kingdom it is obvious that even after she has put her own nutritional house in order, her productive capacity should enable her to play a big part in international food movements. It is for this reason that maximum use of Canadian food resources is as much a problem of international welfare as national welfare.

The broader problems involved, however, relate not only to methods of increasing nutritional efficiency and production improvements. They refer to the possibilities of a surplus labor force in agriculture accentuated by technological improvements, the changing tastes of consumers and the maintenance of a standard of living in agriculture comparable to the rest of the economy. They refer to industrial employment, international trade and protective tariffs, the mobility of resources between and within countries and the apparent need for intervention by the State.

The path between the production of food with the forces controlling the production of that food and its final consumption is strewn with many difficult and as yet unsolved problems which are as dynamic as economic progress itself.
CONSUMPTION TRENDS

Historical Changes

Since statistical data have been available for observation, certain marked changes in the types of food consumed by Western countries have become obvious. These have not been restricted to one group or to certain income levels but appear to have affected all classes. The most notable changes have been the increased consumption of dairy products, meats, eggs, fruits and vegetables and the decreased consumption of staple products represented by cereals.

In part this is due to occupational changes requiring less energy foods and more satisfaction of tastes. Also variation in foods on the market has been the result of increased trade, education, research and movements of foods within and between countries. This would suggest that a great deal of the change may be due as much to the availability of the goods as to market demand. There is no fine line of distinction which can be drawn between producers' response to consumers' demands and consumers' demands which are the result of supplies actually on the market. The natural resources of an area will influence the types of food produced in many cases and to the extent that they are cheaper than imports will in turn influence consumer choice.

Because nutrients can be obtained from many sources there are inherent difficulties involved in evaluating diets consumed by various
occupational groups of different geographical locations. What is a satisfactory diet for one group of people in a mild climate may be quite inadequate for a group in a more extreme climatic zone. For this reason decisions as to adequacy or inadequacy of diets must be considered on the basis of local conditions. The relationship between resources in the area and foods available has been greatly modified by modern transportation and trade, although custom and tradition are still major influences.

Changes in income distribution and increased national incomes have given many groups an opportunity of selection which they did not possess previously. At the same time education has had the effect of giving more people the ability to evaluate resources in terms of maximizing their own satisfactions from limited means. This together with greater publicity given to nutritive values has undoubtedly had its effect on the type of diets now chosen.

Sufficient evidence is given in the Final Report of the Mixed Committee of the League of Nations to verify the above trends in European countries. As an example the following table shows the evolution of food consumption of agricultural workers in Sweden for the years 1920 and 1935.

The consumption trends in the United States can be regarded as representative of North America in many ways. Early settlers and the agricultural population of the eighteenth and nineteenth centuries used
Table 1. Evolution of food consumption of agricultural workers in Sweden\(^1\) (Consumption per normal household per year)

<table>
<thead>
<tr>
<th></th>
<th>1920</th>
<th>1933</th>
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<tbody>
<tr>
<td><strong>Meat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>88.2</td>
<td>98.8</td>
</tr>
<tr>
<td><strong>Herrings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>23.4</td>
<td>15.5</td>
</tr>
<tr>
<td><strong>Whole milk</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>litres</td>
<td>866.6</td>
<td>395.2</td>
</tr>
<tr>
<td><strong>Skim milk</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>litres</td>
<td>440.6</td>
<td>234.5</td>
</tr>
<tr>
<td><strong>Butter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>25.7</td>
<td>23.2</td>
</tr>
<tr>
<td><strong>Margarine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>6.6</td>
<td>33.4</td>
</tr>
<tr>
<td><strong>Cheese</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>5.0</td>
<td>14.6</td>
</tr>
<tr>
<td><strong>Eggs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>number</td>
<td>264.0</td>
<td>535.0</td>
</tr>
<tr>
<td><strong>Bread, flour, etc.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>562.0</td>
<td>508.5</td>
</tr>
<tr>
<td><strong>Potatoes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>597.3</td>
<td>563.5</td>
</tr>
<tr>
<td><strong>Coffee</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>18.2</td>
<td>17.6</td>
</tr>
<tr>
<td><strong>Sugar</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg.</td>
<td>80.5</td>
<td>120.9</td>
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A larger proportion of the energy foods, grain products and meats in their diets. Later habits show a greater appreciation of the protective foods with a consequent reduction in the consumption of grains.

Education and an early appreciation of food values, abundant resources and assistance by government and commercial advertising are some of the reasons why a rational food consciousness in the United States has been somewhat in advance of European countries. Trends in village and urban diets as shown by the proportion of calories derived from specified groups of food are given in Table 2 for one income group.\(^1\)

domestic total production figures. The net alteration in domestic total production on the national level, the net alteration in total number employed became greater. In order to measure these increases in the productive and the productive access to food production under the existing agricultural system to increased prices and other incentives in a manner which immediately the export demands on the market and production decisions of the war. Export demands determine the market and program production of all food increased greatly in Canada from the outbreak of war and domestic food consumption in Canada.

War and domestic food consumption in Canada.

continued and may be expected to continue in the future. Despite these variations, however, the overall estimate illustrated have been increased by about 15 per cent. In recent years, however, the increase in exports of food products has been more rapid. These factors have been the result of the higher income levels, which have increased demand for food products. The higher income levels have resulted in increased spending on food products. Where fluctuations occur in business depressions and increase fluctuations, the trends in food habits which have occurred were subject to food consumed in a dairy or a poultry farm and so on. If the climate is suitable, milk consumption can be expected to be greater on a dairy farm than on a poultry farm. The type of farm, however, for which food consumption habits or farm population are not so

21
Table 2. Trends in U.S. village and urban dietary patterns as shown by proportion of calories derived from specified groups of food

<table>
<thead>
<tr>
<th>Food expenditure, a person a week and period</th>
<th>Percentage of calories derived from</th>
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<tbody>
<tr>
<td></td>
<td>All</td>
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<tr>
<td>$1.88-2.49:</td>
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<tr>
<td>1885-1904</td>
<td>34</td>
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<tr>
<td>1905-1914</td>
<td>40</td>
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<td>1915-1924</td>
<td>36</td>
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<td>1925-1934</td>
<td>36</td>
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<tr>
<td>1935 &amp; later</td>
<td>31</td>
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</table>


3. Salt side and bacon are included with fats.
disappearance in exports, seed, feed and waste, non-civilian and non-food uses.

The following table gives the basic foods divided into fourteen main commodity groups. Totals for each group have been computed by using a common denominator for the group such as fat content in the case of oils and fats, and fresh equivalent in the case of fruits.

The consumption of milk, milk products and meats has increased steadily since the pre-war period, even though rationing was put into effect in May 1943. The consumption of oils and fats increased but shows a decrease in 1943 due to rationing started in 1942. The variation in consumption of fresh fruits and vegetables is related to variations in weather and growing conditions which affect the supplies available on the domestic market.

In a comparison of the per capita consumption during the pre-war years 1935-1939 with the subsequent war years, the majority of commodities show an increase in consumption. Exceptions to this not explained by rationing are pulses and nuts, other fruits and fruit products and leafy green and yellow vegetables.

As most of the nuts are imported, transportation difficulties and the increased domestic demand in the United States, the chief source of supply, account for much of the decrease in consumption. Broadly speaking people have been eating more and better since the outbreak of war, with the notable exception of fruits and vegetables, which tends to show that in the years prior to the war there was unsatisfied consumer demand for foods. It is essential, therefore to explore why this was so and how such improved eating can be maintained in the post-war years.
Table 3. Summary of per capita supplies of food moving into civilian consumption

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<tr>
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<th>Pounds per head per annum</th>
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<td></td>
<td>1935-39</td>
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<tr>
<td>Milk and milk products,</td>
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<tr>
<td>excluding butter</td>
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<tr>
<td>Total milk solids</td>
<td>54.6</td>
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<tr>
<td>Meats, including cured and canned (as carcass weight)</td>
<td>120.1</td>
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<tr>
<td>Poultry, game and fish (edible weight)</td>
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<tr>
<td>Eggs (fresh equivalent)</td>
<td>30.5</td>
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<tr>
<td>Oils and fats (fat content)</td>
<td>41.2</td>
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<tr>
<td>Sugars and syrups (sugar content)</td>
<td>97.0</td>
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<tr>
<td>Potatoes</td>
<td>191.7</td>
</tr>
<tr>
<td>Pulses and nuts (unshelled weight)</td>
<td>12.6</td>
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<tr>
<td>Tomatoes and citrus fruit (fresh fruit equivalent)</td>
<td>51.1</td>
</tr>
<tr>
<td>Other fruits and fruit products (fresh equivalent)</td>
<td>79.6</td>
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<tr>
<td>Leafy, green and yellow vegetables</td>
<td>43.9</td>
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<tr>
<td>Other vegetables</td>
<td>34.0</td>
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<tr>
<td>Grain products</td>
<td>203.9</td>
</tr>
<tr>
<td>Beverages (tea, coffee, cocoa)</td>
<td>10.8</td>
</tr>
</tbody>
</table>

CONSUMPTION STANDARDS

Nutritional Measures

A measurement of national or international nutritional levels of food intake necessitate the acceptance of some "norm" or "yardstick" from which deviations can be noted. The first step in this process then would be to define an "adequate diet". Obviously, it is not possible to do more than outline the essentials of an adequate diet with due consideration for variations according to activity, age and climate.

Calories

Food energy can be obtained from many sources but is not a sufficient measure of adequacy in itself without consideration of the minimum proportion which should be supplied from proteins and fats. A bulky diet may provide sufficient calories on the assumption that it is adequately consumed and does not provide gastrointestinal troubles. However, there are certain physiological as well as palatability considerations which necessitate the addition to the food of proteins and of certain fatty acids derived from fats. At the same time inclusion of fats will reduce the bulk of food required to meet calorie needs.

Proteins

While there is considerable evidence that protein is essential for
health, studies are not conclusive as to the degree of substitution between animal and plant protein. They do show, however, that certain animal protein sources are also sources of vitamins, calcium, phosphorus and amino acids. Proteins of plant origin concentrates are less efficiently utilized in digestion and if this is the only form of protein in the diet more must be consumed accordingly.

The customs and eating habits of the economically fortunate countries have resulted in the acceptance of meat as a palatable source of protein. Its use cannot be questioned unless the resources used for its production could be employed more efficiently in the provision of cheaper diets for a greater number of people.

Valuable sources of protein are meats, cheese, eggs, milk and legumes.

Minerals

The needs of the body for calcium, phosphorus, iron and iodine are fairly well established, although questions as to the importance of certain factors governing their assimilation and availability from certain foods still remain.

Milk and legumes are valuable sources of calcium and liver, fish and legumes of iron.

Vitamins

There have been great advances in the study of vitamins, particularly in their distribution in the food supply. A great deal has also been learned regarding the losses which occur in processing, storage and cooking.
Most knowledge is available on thiamin, riboflavin, ascorbic and vitamin A, vitamin D and nicotinic acid. Nevertheless there is still an unexplored field in the nutritional values of world food supplies and their vitamin availability. Because the advance of science necessitates the discarding of theories with respect to vitamins or other nutrients, this should not distract from the vital importance of association biological needs with production plans.

Dietary Allowances

Certain dietary allowances were adopted by the Food and Nutrition Board of the U.S. National Research Council in May 1941. Although there were many standards in existence at that time, none had found universal acceptance. Therefore the Board decided to review all the evidence and with the assistance of the best professional advice agree on the various dietary essentials.

Their use has been valuable during the war years by all planning agencies and in fact they have become the universally accepted goals. They have stimulated research in attempts to prove or disprove the standards agreed upon and the findings are subject to future modifications.

The usefulness of the allowances

The allowances were derived for use as guides for individuals or groups. Although the amounts will meet the needs of the average individual, they cannot be absolute for any one group or individual but must be modified as knowledge of each case is developed.
For example, the caloric intake must vary with each individual. The protein standards are reasonable but not excessive. The calcium values for adults and the pre-school age are based on adequate research. For adolescence there is less research available. Iron allowances are in general higher than the actual requirements, and work on the relation of iron to body metabolism is relatively new. Thus the vitamin allowances are only recommendations based on the best available knowledge and are subject to modification. 1,2

The validity of the results of dietary surveys which are used as a means of studying the food intake of consumers is affected by a number of factors. The length of time covered by the survey may not take into consideration seasonal variations of supply. The tables of food consumption are average values and food composition varies over a wide range. The results of such surveys must be evaluated by the standards chosen and the use of the recommended allowances of the Food and Nutrition Board as such standards, has been criticized because they were not intended to be used so. 3 In the first place they were evolved to be used as guides only and secondly, there is a scarcity of scientific evidence of a number of human nutritional requisites, particularly vitamins.


2Roberts, op. cit., p. 9.

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<tr>
<th></th>
<th>Protein</th>
<th>Calcium</th>
<th>Iron</th>
<th>Vitamin</th>
<th>Thiamin</th>
<th>Riboflavin</th>
<th>Niacin</th>
<th>Calories</th>
<th>Fat</th>
<th>Carbohydrate</th>
<th>Water</th>
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<th>3rd</th>
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<td>Under 1 year#</td>
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<td>1-3 years ##</td>
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<td>Girls, 15-15 years</td>
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<tr>
<td>16-20 years</td>
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<td>5000</td>
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<td>1.8</td>
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<td>16-20 years</td>
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*Table 4. Recommended dietary allowances*

Food and Nutrition Board, National Research Council
Established in 1940 to advise on nutrition problems in connection with National Defense in the U.S.A.

*Tentative goal toward which to aim in planning practical dietaries; can be met by a good diet of natural foods. Such a diet will also provide other minerals and vitamins, the requirements for which are less well known.

**1 mg. thiamin equals 333 I.U.; 1 mg. ascorbic acid equals 20 I.U.

***Requirements may be less if provided as vitamin A; greater if provided chiefly as the pro-vitamin carotene.

#Needs of infants increase from month to month. The amounts given are for approximately 6-8 months. The amounts of protein and calcium needed are less if derived from human milk.

##Allowances are based on needs for the middle year in each group (as 2, 5, 8, etc.) and for moderate activity.
A discussion of food consumption on the national level without appropriate stratification by income, occupation and related factors has only limited value. The use of average consumption figures hides malnutrition due to the existing income and food distribution which may be entirely inadequate. This applies equally to per capita or to gross figures. The Canadian economy and cultural pattern is so varied that the limitations of average figures immediately become obvious. The Maritime Provinces differ greatly from the Prairie Provinces and the Quebec French-speaking populace may have quite different food expenditure habits from the English-speaking of Ontario.

Nevertheless, when national problems are to be solved, it is necessary to fix benchmarks for purposes of measurement. Their limitations must be kept in mind, but estimates help to bring human activities within the focus of economic measurement and as such are no less scientific. They should be regarded as dynamic phenomena which will change as scientific discoveries and other evidence become available.
ADEQUACY OF THE CANADIAN DIET

The Sources of Nutrients in Canada

The following table indicates the percentage of each nutrient available for civilian consumption per capita per day in Canada from the main food groups during 1943.

The main source of calories was grain products, and to a lesser extent, meats. Protein was also obtained from grain products, but dairy products and meats provided a large proportion of the total in terms of animal protein. Fat was mostly obtained from meats, milk and visible fats and oils. The major share of calcium came from dairy products, while iron was chiefly provided through meats and grains.

Vitamin A was provided mainly by dairy products and leafy green and yellow vegetables, ascorbic acid by potatoes, tomatoes and citrus fruits, and thiamine by meats. The main source of riboflavin was dairy products, and niacin came largely from meats.

The nutrients in Canadian food consumption were obtained largely from dairy products, meat and grain, with additional vitamins from fruits and vegetables. As the first three are the chief sources of Canada's agricultural income, there is no doubt some relation between resources and the consumption pattern. Countries producing a larger proportion of their agricultural output in grain such as Yugoslavia in pre-war years can
Table 5. Percentage of nutrients available for civilian consumption per capita per day in Canada, from the main food groups, 19431

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Calories</th>
<th>Protein</th>
<th>Fat</th>
<th>Calcium</th>
<th>Iron</th>
<th>Vitamin A</th>
<th>Ascorbic Acid</th>
<th>Thiamin</th>
<th>Riboflavin</th>
<th>Niacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products</td>
<td>18</td>
<td>23</td>
<td>18</td>
<td>79</td>
<td>7</td>
<td>24</td>
<td>16</td>
<td>8</td>
<td>51</td>
<td>3</td>
</tr>
<tr>
<td>Meats</td>
<td>16</td>
<td>24.2</td>
<td>34</td>
<td>1.6</td>
<td>27</td>
<td>11</td>
<td>2</td>
<td>51</td>
<td>21</td>
<td>52</td>
</tr>
<tr>
<td>Poultry, game and fish</td>
<td>2</td>
<td>7</td>
<td>3</td>
<td>.6</td>
<td>4</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Eggs</td>
<td>1.8</td>
<td>4.8</td>
<td>3</td>
<td>2</td>
<td>6.4</td>
<td>6</td>
<td>-</td>
<td>4</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>14</td>
<td>.1</td>
<td>37.2</td>
<td>1</td>
<td>.8</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sugars and syrups</td>
<td>12.3</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Potatoes</td>
<td>5</td>
<td>4.3</td>
<td>-</td>
<td>1.7</td>
<td>9</td>
<td>2</td>
<td>33</td>
<td>3</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Pulses and nuts</td>
<td>1.6</td>
<td>3.2</td>
<td>1</td>
<td>1.5</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Tomatoes and citrus fruit</td>
<td>.8</td>
<td>.7</td>
<td>.2</td>
<td>1.6</td>
<td>2</td>
<td>6</td>
<td>24</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Other fruits</td>
<td>1.6</td>
<td>.4</td>
<td>.2</td>
<td>.9</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Leafy green and yellow vegetables</td>
<td>.6</td>
<td>.8</td>
<td>.1</td>
<td>1.3</td>
<td>2</td>
<td>39</td>
<td>12</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other vegetables</td>
<td>.4</td>
<td>.4</td>
<td>.1</td>
<td>.6</td>
<td>1</td>
<td>6</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Grain products</td>
<td>30</td>
<td>31</td>
<td>2.2</td>
<td>6</td>
<td>28</td>
<td>-</td>
<td>18</td>
<td>7</td>
<td>15</td>
<td>-</td>
</tr>
<tr>
<td>Beverages</td>
<td>.5</td>
<td>.1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1 Combined Food Board (U.S., United Kingdom and Canada). Food consumption levels in the United States, Canada and the United Kingdom. 1:65. 1944.
can be expected to obtain a larger proportion of their nutrients from that source.

The broad trends of Western consumption habits, have been away from grain products and more toward vegetables, meat and milk products, and it is doubtful if these can be related solely to relative prices and levels of income. Therefore, to the extent that malnutrition exists it may be probable that this decrease in grain consumption has not been met by a sufficiently adequate increase in the consumption of the alternative products. This in turn can be related to appreciation of food values and the availability of these foods. Producers, including manufacturers and retailers may have lagged behind also in their adjustments to the overall shifts in taste which have been occurring. Wars, business depressions and general economic unrest are all part of the picture.

Consumption in Relation to Requirements

The Nutrition Service of Canada has adapted the National Research Council Allowances to Canadian conditions and attempted to translate them in terms of specific commodities. The budget is based on the existing knowledge of the type of foods which are both available and acceptable to the Canadian consumer. By taking account of various surveys of food consumption habits the computations were subjected to practical modification
and because of the variety of sources from which the specified nutrients can be obtained, must be regarded as a first approximation but nevertheless a valuable one in bringing the theoretical standards down to a discussion of real commodities.

There has been no attempt at this stage to imply that the commodities represent the production pattern most suited to the domestic agriculture. As it is related to past production, however, any apparent deficiencies can be used as indications of what available supplies are most needed and in this way to isolate the problem areas.

The following table shows estimates of total minimum requirements and disappearance of various food groups. The available foods are for civilian use and are total production and imports, less exports and non-civilian use. This existing disappearance pattern is assumed constant. Modification in this pattern would mean changes in the various foods available. The requirements are based on minimum nutritional requirements or 70 per cent of the maximum levels.

The year 1942 was a particularly good crop year so that any production changes which may have occurred between 1936-39 and 1942 will tend to be exaggerated. More home grown fruits and vegetables were available for civilian use, without any great increase in acreage or labor.

Studying the items in Table 6, total whole milk used in 1942 was short of the minimum requirements by 126 million pounds, and cheese consumption was a third of the translated requirements. What this means in terms of increased production is taken up later, but great changes in consumption
Table 6. Minimum nutritional requirements as compared with domestic disappearance figures for 1935-39 and 1942 (In thousands of pounds)

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Requirements</th>
<th>Net</th>
<th>Use</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>on basis of</td>
<td>civilian</td>
<td>civilian</td>
<td></td>
</tr>
<tr>
<td>Whole milk</td>
<td>4,612,263</td>
<td>4,061,327</td>
<td>4,486,423</td>
<td></td>
</tr>
<tr>
<td>Cheese</td>
<td>139,255</td>
<td>40,997</td>
<td>40,343</td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>2,080,325</td>
<td>2,125,415</td>
<td>2,277,449</td>
<td></td>
</tr>
<tr>
<td>Leafy green vegetables</td>
<td>435,228</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root vegetables</td>
<td>1,427,336</td>
<td>966,123</td>
<td>1,156,760</td>
<td></td>
</tr>
<tr>
<td>Dried vegetables</td>
<td>139,152</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>993,296</td>
<td>203,160</td>
<td>222,918</td>
<td></td>
</tr>
<tr>
<td>Fresh fruits</td>
<td>886,550</td>
<td>725,631</td>
<td>789,737</td>
<td></td>
</tr>
<tr>
<td>Dried fruits</td>
<td>280,242</td>
<td>168,662</td>
<td>173,765</td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>244,107</td>
<td>336,144</td>
<td>419,698</td>
<td></td>
</tr>
<tr>
<td>Lean meat, poultry, fish</td>
<td>658,977</td>
<td>1,694,631</td>
<td>1,900,809</td>
<td></td>
</tr>
<tr>
<td>Bacon and/or salt pork</td>
<td>327,314</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereals, refined</td>
<td>301,574</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>whole grain</td>
<td>872,281</td>
<td>2,300,349</td>
<td>2,185,959</td>
<td></td>
</tr>
<tr>
<td>Bread, white</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>brown</td>
<td>1,193,400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td>353,471</td>
<td>342,156</td>
<td>369,768</td>
<td></td>
</tr>
<tr>
<td>Other fats</td>
<td>242,951</td>
<td>181,620</td>
<td>221,618</td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td>259,155</td>
<td>1,028,280</td>
<td>891,694</td>
<td></td>
</tr>
<tr>
<td>Other sweets</td>
<td>260,763</td>
<td>78,375</td>
<td>86,682</td>
<td></td>
</tr>
</tbody>
</table>


2 Including canned.

3 Consumption of pulses and nuts would increase this figure of converting to oils.

4 Total grain products.
habits with respect to cheese would be necessary in order to meet the
recommended use. Civilian disappearance of potatoes was a little over
the minimum specification but the total of leafy green, root and dried
vegetables was definitely below standard even with good cropping conditions.
Tomato consumption was only a quarter of minimum requirements.

Fresh and dried fruit consumption was less than required by about
one quarter. Butter was the one remaining deficit consumption.

Eggs, meats, and fish were consumed in excess of what was required,
under the assumption that the remaining items were also consumed. Sugars
appeared ample in meeting requirements.

On the basis of these calculations then, the Canadian diet was deficient
in whole milk, cheese, vegetables and fruits or that group known as the
"protective" foods. As the consumption of other foods was above the budget
allowances, this meant that some of the nutrients were obtained from other
sources, and the food deficiencies cannot entirely be regarded as nutrient
deficiencies. Nutrient content is not the only criterion for food values
either, as there are questions of taste, variety, efficiency and cost to
be considered also.

Some measure of the total nutrient consumption can be obtained from
the following table which is a rough comparison of the recommended allowance
with the estimated per capita consumption for the years 1935-39, and 1943.
The apparent result is a deficiency in riboflavin consumption, found in
milk and green vegetables and ascorbic acid found in fresh fruits. If
some allowance is made for cooking losses, waste, and the inaccuracy of
Table 7. National Research Council recommended daily allowances of essential food nutrients and estimated nutritive value of civilian food consumption per capita per day in Canada for the periods 1935-39 and 1945

<table>
<thead>
<tr>
<th>Food nutrient</th>
<th>Unit</th>
<th>Recommended</th>
<th>Estimated consumption per capita</th>
<th>1945</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food energy</td>
<td>Calories</td>
<td>3000</td>
<td>3182</td>
<td>3401</td>
</tr>
<tr>
<td>Protein</td>
<td>Grams</td>
<td>70</td>
<td>90.2</td>
<td>105.7</td>
</tr>
<tr>
<td>Calcium</td>
<td>Grams</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Iron</td>
<td>Milligrams</td>
<td>12</td>
<td>15.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>I.U.</td>
<td>5000</td>
<td>6162</td>
<td>6242</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>Milligrams</td>
<td>2.7</td>
<td>1.93</td>
<td>2.25</td>
</tr>
<tr>
<td>Thiamin</td>
<td>Milligrams</td>
<td>1.3</td>
<td>1.96</td>
<td>2.37</td>
</tr>
<tr>
<td>Ascorbic acid</td>
<td>Milligrams</td>
<td>75</td>
<td>60.1</td>
<td>65.2</td>
</tr>
</tbody>
</table>

transforming per capita data, consumption of calories, and thiamin was not greatly in excess of requirements in the pre-war years. It must be emphasized, however, that this is not sufficient evidence that with the exception of these nutrients Canadian people received adequate nutrients during this period, because of the great variations in consumption according to occupation, custom, nationality, age and income distribution and because the figures used are average for the country.

Dietary Deficiencies

It is now possible to state what the main deficiencies are in Canadian consumption and explore further the causes for these deficiencies. The indication of deficiency as used in the previous analysis is based on average consumption figures. To this extent it is assumed that the available supplies are equitably distributed. Under this assumption, those
commodities in short supply are green vegetables, fruits and milk.

The Supply of Vegetables

Data on the acreage distribution of tomatoes and other vegetables is not complete. The approximations of supply available for domestic consumption when compared with the amount advocated for minimum nutritional requirements in Table 6, is sufficient to indicate that large increases in supply are necessary if the requirements are to be approximated.

Therefore, any desirable future increase must depend on the education of consumers on food appreciation, flexibility of production and the relative prices of other sources of nutrients.

Greater appreciation of vegetables such as beans, peas and lentils as substitutes for meats and milk products would be an example of making the most of existing income distribution and price structure.

Seasonal fluctuations in the supply of vegetables

Many vegetables are subject to fluctuations in supply and price throughout the year. Because of their perishability or cost of storage, producers attempt to market their produce as soon after harvest as possible. This means an increase in supply which lowers the price. As the season progresses local supplies become more scarce, reliance is placed on imports and as a consequence prices tend to rise, or else the particular commodity is not available.

While some seasonal fluctuations in consumption habits can be counteracted by suitable substitutes, the more constant the supply, the greater
possibilities there are of conforming to nutritional standards the whole year round. Such consumption is influenced by distribution, available imports, storage facilities and price.

Some indication of seasonal price variations for vegetables in Canada is given in the following tables. Table 8 indicates the average monthly wholesale quotations for beets, carrots and turnips at Montreal for 1941-42 and 1942-43. Not only is the seasonal variation apparent, but the price variation between years is another variable which will affect consumption habits.

Table 8. Average monthly wholesale quotations for beets, carrots and turnips at Montreal, 1941-42 and 1942-43

(Per hundred pounds)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>1.64</td>
<td>1.46</td>
<td>2.40</td>
<td>2.06</td>
<td>1.80</td>
<td>1.20</td>
</tr>
<tr>
<td>September</td>
<td>1.54</td>
<td>1.02</td>
<td>1.80</td>
<td>1.16</td>
<td>1.36</td>
<td>1.14</td>
</tr>
<tr>
<td>October</td>
<td>1.42</td>
<td>.96</td>
<td>1.55</td>
<td>.92</td>
<td>1.49</td>
<td>1.08</td>
</tr>
<tr>
<td>November</td>
<td>1.58</td>
<td>.94</td>
<td>1.60</td>
<td>.82</td>
<td>1.46</td>
<td>1.06</td>
</tr>
<tr>
<td>December</td>
<td>1.92</td>
<td>1.46</td>
<td>1.76</td>
<td>1.54</td>
<td>1.50</td>
<td>1.60</td>
</tr>
<tr>
<td>January</td>
<td>2.04</td>
<td>1.66</td>
<td>2.58</td>
<td>2.25</td>
<td>1.76</td>
<td>1.64</td>
</tr>
<tr>
<td>February</td>
<td>1.88</td>
<td>1.36</td>
<td>2.70</td>
<td>2.94</td>
<td>1.32</td>
<td>1.81</td>
</tr>
<tr>
<td>March</td>
<td>1.98</td>
<td>1.46</td>
<td>2.68</td>
<td>3.03</td>
<td>1.45</td>
<td>2.60</td>
</tr>
<tr>
<td>April</td>
<td>2.16</td>
<td>2.00</td>
<td>3.16</td>
<td>3.50</td>
<td>1.80</td>
<td>3.41</td>
</tr>
<tr>
<td>May</td>
<td>2.46</td>
<td>2.38</td>
<td>3.42</td>
<td>-</td>
<td>2.38</td>
<td>5.03</td>
</tr>
</tbody>
</table>


The inter-annual variation of the wholesale price of potatoes is particularly obvious in Table 9 which gives the monthly average quotations per 100 pounds of potatoes at Montreal for 1940-41 and 1941-42.

Wholesale average quotations of field tomatoes is given for the pre-war year 1938 at Montreal in Table 10 for Canadian-grown produce.
Table 9. Monthly average quotations of potatoes
Table stock at Montreal for 1940-41, 1941-42
(Per hundred pounds)

<table>
<thead>
<tr>
<th>Month</th>
<th>1940-1941</th>
<th>1941-1942</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td>.84</td>
<td>1.18</td>
</tr>
<tr>
<td>October</td>
<td>.81</td>
<td>1.24</td>
</tr>
<tr>
<td>November</td>
<td>.83</td>
<td>1.29</td>
</tr>
<tr>
<td>December</td>
<td>.82</td>
<td>1.49</td>
</tr>
<tr>
<td>January</td>
<td>.87</td>
<td>2.07</td>
</tr>
<tr>
<td>February</td>
<td>.84</td>
<td>2.18</td>
</tr>
<tr>
<td>March</td>
<td>.81</td>
<td>2.12</td>
</tr>
<tr>
<td>April</td>
<td>.85</td>
<td>2.12</td>
</tr>
<tr>
<td>May</td>
<td>.82</td>
<td>2.29</td>
</tr>
<tr>
<td>June</td>
<td>1.19</td>
<td>2.36</td>
</tr>
<tr>
<td>July</td>
<td>1.09</td>
<td>2.49</td>
</tr>
</tbody>
</table>

\[1\text{Ibid., No. 9.}\]

Table 10. Wholesale average quotations on field tomatoes at Montreal for 1933
(per 11 quarts)

<table>
<thead>
<tr>
<th>Month</th>
<th>July 8</th>
<th>15</th>
<th>22</th>
<th>29</th>
<th>August 5</th>
<th>12</th>
<th>19</th>
<th>28</th>
<th>September 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.63</td>
<td>1.65</td>
<td>1.11</td>
<td>.35</td>
<td>.34</td>
<td>.21</td>
<td>.21</td>
<td>.19</td>
<td>.18</td>
</tr>
</tbody>
</table>

\[1\text{Ibid., No. 41.}\]
From these examples of the price range of certain vegetables on the Canadian market, it can be seen that prices tend to be highest when the market supply is lowest. For beets, carrots and turnips this is in May; for potatoes and tomatoes it is July. The rapid fall in price of tomatoes as shown in Table 10 means in effect that from being a scarce commodity in July, by September the supply is in excess of demand and returns to growers are reduced accordingly.

The effect on consumers is that the majority who are price responsive will refrain from buying vegetables during the last months of the domestic crop year in anticipation of the fall in price. Some buy at low prices and store for later use by canning or otherwise, but this percentage of the total population is relatively small due to ignorance, lack of facilities and inability to forecast needs. The nutritional effects of such seasonal variation of consumption are such that in the periods when vitality and resistance to disease are lowest, the right foods are not available to any but the higher income groups. In the case of certain green vegetables this seasonal distribution is a handicap to meeting national minimum nutrition standards.

A similar problem in the Canadian consumption pattern is explained under the following section on geographical differences.

Geographical differences

Not only are there seasonal fluctuations in the price of home-grown foods, but there are also considerable price differentials between
geographical areas. This is tantamount to variations in the real wage level for communities across Canada. For the group with income fixed at a national level, high food prices will mean either a larger percentage of income spent in foods or else a reduction in dietary levels to meet certain accepted social standards.

Table 11 shows the wholesale price of carrots, a valuable food for improved nutrition, in Montreal, Winnipeg, Edmonton and Vancouver markets. Not only are the seasonal fluctuations high, but also the prices at the Edmonton market are considerably above the others and Vancouver has an obvious advantage.

Table 11. Comparison of wholesale quotations of carrots at four markets in Canada for the season 1941-1942

<table>
<thead>
<tr>
<th></th>
<th>Montreal</th>
<th>Winnipeg</th>
<th>Edmonton</th>
<th>Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>2.40</td>
<td>2.34</td>
<td>3.25</td>
<td>1.50</td>
</tr>
<tr>
<td>Sept</td>
<td>1.80</td>
<td>1.29</td>
<td>2.65</td>
<td>1.50</td>
</tr>
<tr>
<td>Oct</td>
<td>1.55</td>
<td>1.37</td>
<td>2.45</td>
<td>1.50</td>
</tr>
<tr>
<td>Nov</td>
<td>1.60</td>
<td>1.24</td>
<td>2.25</td>
<td>1.50</td>
</tr>
<tr>
<td>Dec</td>
<td>1.75</td>
<td>1.85</td>
<td>2.95</td>
<td>1.50</td>
</tr>
<tr>
<td>Jan</td>
<td>2.58</td>
<td>2.75</td>
<td>3.16</td>
<td>1.62</td>
</tr>
<tr>
<td>Feb</td>
<td>2.70</td>
<td>3.12</td>
<td>3.56</td>
<td>1.88</td>
</tr>
<tr>
<td>Mar</td>
<td>2.68</td>
<td>3.03</td>
<td>-</td>
<td>2.00</td>
</tr>
<tr>
<td>Apr</td>
<td>3.16</td>
<td>3.50</td>
<td>-</td>
<td>2.12</td>
</tr>
<tr>
<td>May</td>
<td>3.42</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1Ibid., No. 14.

Similar price variations and differentials are shown for market quotations of No. 1 grade yellow onions at Montreal, Winnipeg, Calgary and Vancouver in Table 12 for 1938-59.
Table 12. Average monthly market quotations for No. 1 grade yellow onions at four markets in Canada for 1938-1939 (Per hundred pounds)

<table>
<thead>
<tr>
<th></th>
<th>Montreal</th>
<th>Winnipeg</th>
<th>Calgary</th>
<th>Vancouver</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>2.52</td>
<td>-</td>
<td>4.00</td>
<td>2.50</td>
</tr>
<tr>
<td>August</td>
<td>1.86</td>
<td>1.28</td>
<td>2.95</td>
<td>2.50</td>
</tr>
<tr>
<td>September</td>
<td>1.98</td>
<td>1.10</td>
<td>2.25</td>
<td>2.12</td>
</tr>
<tr>
<td>October</td>
<td>1.92</td>
<td>1.28</td>
<td>2.25</td>
<td>2.20</td>
</tr>
<tr>
<td>November</td>
<td>1.75</td>
<td>1.09</td>
<td>2.35</td>
<td>2.19</td>
</tr>
<tr>
<td>December</td>
<td>1.82</td>
<td>1.00</td>
<td>2.35</td>
<td>2.15</td>
</tr>
<tr>
<td>January</td>
<td>1.82</td>
<td>1.03</td>
<td>2.35</td>
<td>2.07</td>
</tr>
<tr>
<td>February</td>
<td>1.89</td>
<td>1.29</td>
<td>2.35</td>
<td>1.89</td>
</tr>
<tr>
<td>March</td>
<td>2.12</td>
<td>1.51</td>
<td>2.41</td>
<td>2.05</td>
</tr>
<tr>
<td>April</td>
<td>2.66</td>
<td>1.70</td>
<td>2.50</td>
<td>2.35</td>
</tr>
<tr>
<td>May</td>
<td>-</td>
<td>1.61</td>
<td>3.19</td>
<td>2.42</td>
</tr>
</tbody>
</table>

1 Ibid., No. 15.

Much of these price differentials is due to transportation and proximity of markets to low-cost sources of supply. It is also a good indication of the lack of local production. It may be argued that carrots are cheaper in Vancouver because of the lower cost of production through a source of cheap labor supply. It may also be argued that in cities such as Regina climatic conditions are not suited to the development of such seasonal crops. These and many other local problems are the basis of high prices and poor supplies.

Surveys of the supply conditions around the larger centers across Canada would reveal problems which might require little positive action to overcome. If, on the other hand, it is found that local deficiencies cannot be overcome, and imports from more favored areas is the solution, transportation costs are likely the cause of wide price differentials between areas.
If consumption habits are developed for the protective foods by awareness of their nutrition value of for other reasons, then the elasticity of demand can be expected to decrease and small price changes will not cause wide demand fluctuations. Where the price changes are such, however, that total food expenditures vary greatly in relation to total earnings, then nutrition ideals are likely to go by the board and recourse will be made to the cheap energy foods. This applies particularly to the lower income levels where purchases will be influenced by smaller price changes than for the higher income groups. It is these differences in elasticity of demand for protective foods that give basis for thinking in terms of group subsidies or food price levels related to income.

Fluctuations in supply

An effective demand for vegetables does not always mean that supply will respond accordingly. Acreage sown is not a sufficient guarantee that the desired crop will be harvested. The greatest cause of this uncertainty is weather and is not easily controlled. Most vegetables cannot be stored as fresh vegetables from one year to the next as in the case of grains. This adds to the difficulty of keeping the markets supplied at all times. Recourse can be and is made to imports, but due to the irregularity of import demand and tariffs, foreign supplies may not have been readily available.

Given a domestic crop sufficient to meet demand for the year, this does not mean that it will move on to the market in response to demand.
It is generally moved onto the market as a fresh vegetable as soon as possible after harvest. The reason for this is that to hold a crop back necessitates the expectancy of a price sufficient to cover the risk of spoilage, labor and storage expenses. There is no such guarantee on the open market where price is dependent on consumer preference and the availability of imports of superior stock. Therefore, not only does this uncertainty reach the producer who is not prepared to make the capital investment for a storage system, but also the wholesale dealer, who will not take the risk.

This argument applies to cabbage, beets, parsnips, turnips and carrots. The group known as leafy green vegetables presents a different problem. They are not easily stored but foreign supplies, chiefly from the United States, are readily available in the off season. The price must cover the additional haul necessary, however, and demand is limited.

The imports into Canada of fresh vegetables take on a seasonal pattern with the low period in July, August, September and October. The month of greatest imports appears to be in May, or just previous to the local crop moving on to the market. Table 13 shows the imports of several fresh vegetables in 1939. The demand for lettuce changed the least, with a low point in July.

The demand for imported fresh fruits given in Table 14 reached the high point during the summer months with the low point in January and February. The fall in imports of oranges, lemons and bananas in January and February may have been due to eating habits, or control of domestic
Table 13. Seasonal pattern of imports of fresh vegetables into Canada for the year 1939\(^1\)  
(In thousand dollars)

<table>
<thead>
<tr>
<th></th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabbage, fresh</td>
<td>16</td>
<td>26</td>
<td>56</td>
<td>64</td>
<td>90</td>
<td>30</td>
<td>.4</td>
<td>.3</td>
<td>.1</td>
<td>-</td>
<td>-</td>
<td>.1</td>
</tr>
<tr>
<td>Carrots</td>
<td>20</td>
<td>36</td>
<td>62</td>
<td>61</td>
<td>95</td>
<td>75</td>
<td>21</td>
<td>2</td>
<td>.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Celery</td>
<td>65</td>
<td>106</td>
<td>121</td>
<td>80</td>
<td>111</td>
<td>54</td>
<td>15</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Lettuce</td>
<td>92</td>
<td>76</td>
<td>151</td>
<td>106</td>
<td>186</td>
<td>45</td>
<td>2</td>
<td>25</td>
<td>38</td>
<td>30</td>
<td>107</td>
<td>55</td>
</tr>
<tr>
<td>Onions</td>
<td>13</td>
<td>10</td>
<td>13</td>
<td>43</td>
<td>65</td>
<td>44</td>
<td>15</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total fresh vegetables</td>
<td>467</td>
<td>517</td>
<td>819</td>
<td>770</td>
<td>1160</td>
<td>1102</td>
<td>288</td>
<td>91</td>
<td>71</td>
<td>109</td>
<td>324</td>
<td>432</td>
</tr>
</tbody>
</table>

\(^1\)Canada. Dept. of Trade and Commerce. Trade of Canada, 1939.
Table 14. Seasonal pattern of fruit imports into Canada for the year 1939
(In thousand dollars)

<table>
<thead>
<tr>
<th></th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oranges</td>
<td>641</td>
<td>473</td>
<td>695</td>
<td>494</td>
<td>475</td>
<td>557</td>
<td>412</td>
<td>385</td>
<td>361</td>
<td>282</td>
<td>351</td>
<td>1066</td>
</tr>
<tr>
<td>Lemons</td>
<td>87</td>
<td>64</td>
<td>149</td>
<td>69</td>
<td>111</td>
<td>139</td>
<td>154</td>
<td>149</td>
<td>99</td>
<td>114</td>
<td>107</td>
<td>125</td>
</tr>
<tr>
<td>Bananas</td>
<td>89</td>
<td>74</td>
<td>164</td>
<td>113</td>
<td>264</td>
<td>365</td>
<td>343</td>
<td>310</td>
<td>196</td>
<td>186</td>
<td>167</td>
<td>171</td>
</tr>
<tr>
<td>Total fresh</td>
<td>1023</td>
<td>761</td>
<td>1223</td>
<td>917</td>
<td>1480</td>
<td>1815</td>
<td>1496</td>
<td>1642</td>
<td>1004</td>
<td>1143</td>
<td>1216</td>
<td>1665</td>
</tr>
<tr>
<td>fruits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fruits</td>
<td>1290</td>
<td>1057</td>
<td>1615</td>
<td>1128</td>
<td>2372</td>
<td>3578</td>
<td>2031</td>
<td>2445</td>
<td>1987</td>
<td>1854</td>
<td>2185</td>
<td>2418</td>
</tr>
</tbody>
</table>

\(^1\)Canada, op. cit., p. 47.
supplies. As the prices vary very little during the period imported, then it can only be suggested that demand falls off for the season because of alternative food prices or consumption habits.

The December increase in oranges indicates the demand related to the Christmas season.

The relatively lower consumption of fresh citrus fruit and canned citrus juices and other fruit in Canada as compared with the U.S.A. is given below.

Table 15. Total supplies of citrus fruit and non-citrus fruit moving into civilian consumption

<table>
<thead>
<tr>
<th></th>
<th>Supplies pre-war</th>
<th>Supplies 1945</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.A.</td>
<td>Canada</td>
</tr>
<tr>
<td>Fresh citrus fruit</td>
<td>42.6</td>
<td>25.0</td>
</tr>
<tr>
<td>Canned citrus fruit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and citrus juices</td>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Total fresh fruit</td>
<td>151.3</td>
<td>79.6</td>
</tr>
<tr>
<td>other than citrus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Similarly the per capita supplies of all vegetables moving into civilian consumption in the U.S.A. were twice as high as in Canada. The main factors affecting the supply of vegetables in Canada are: (1) the seasonal production pattern, (2) imports, (3) local production, (4) the tastes and awareness of consumers of the nutritional value and (5) inadequate use of technological advances to even out the domestic supply through the year.

1 Combined Food Board, op. cit., p. 33.
Milk Supplies and Consumption

Whole milk is acknowledged to be one of the most complete foods within reach of the average consumer. It contains fats, proteins, calcium, phosphorous, Vitamin A and riboflavin in greater proportion per unit consumed than other foods of comparable palatability or price.

Dietary surveys made in Canada have shown great variation in the daily whole milk consumption. Canada's Food Rules as specified by the Nutrition Services state that, as a minimum, adults require one-half pint of whole milk per day and children more than one pint. A survey of 1,384 families across Canada showed the following percentages having less than the recommended frequency of milk during one week of December 1942.  

<table>
<thead>
<tr>
<th>National average</th>
<th>Maritime</th>
<th>Quebec</th>
<th>Ontario</th>
<th>Prairie provinces</th>
<th>British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>41</td>
<td>36</td>
<td>36</td>
<td>31</td>
<td>38</td>
</tr>
</tbody>
</table>

A Gallup Poll taken in December 1942 of one day's menus showed that 5 per cent of the children and 25 per cent of the adults had no milk or cheese.

Six per cent of the children and 41 per cent of the adults had no milk to drink.

Seventy-three per cent of the children and 60 per cent of the adults had no cheese.

As to be expected there is some difference of whole milk consumption due to occupation. Farmers, being at the source of supply, and professional

---


2Ibid.
groups with greater purchasing power, are the greatest consumers per capita. The relationship of milk consumption and occupation from a survey made in 1935 is given on the following page.

Table 16. Whole milk consumption in relation to occupation in Canada (1935)

<table>
<thead>
<tr>
<th>Occupational status</th>
<th>Number of families</th>
<th>Per capita daily consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All uses (pints)</td>
</tr>
<tr>
<td>Professional</td>
<td>315</td>
<td>0.82</td>
</tr>
<tr>
<td>Large business executive</td>
<td>268</td>
<td>0.82</td>
</tr>
<tr>
<td>Small business executive</td>
<td>157</td>
<td>0.75</td>
</tr>
<tr>
<td>Salesman</td>
<td>191</td>
<td>0.75</td>
</tr>
<tr>
<td>Clerical work</td>
<td>308</td>
<td>0.75</td>
</tr>
<tr>
<td>Skilled labor</td>
<td>855</td>
<td>0.68</td>
</tr>
<tr>
<td>Unskilled labor</td>
<td>484</td>
<td>0.67</td>
</tr>
<tr>
<td>Farmer</td>
<td>333</td>
<td>1.04</td>
</tr>
</tbody>
</table>

Data collected by Department of Agriculture, Ottawa, from Quebec, Ontario, and Alberta. The classification excludes 302 families of occupational status "retired". In Marsh, L.C. Health and unemployment, p. 33. Pub. for McGill University by the Oxford University Press, (Toronto) 1938.

From a survey made in 1935 the following is quoted:

It should be noted particularly that many teen-age children in cities did not drink milk. Nutritionists point out that teen-age children require more milk than younger children except those under one year of age. Approximately one-third of the children in the age group of 13 to 16 years on the average drank no milk. In low-income families having less than $1000 a year, from 40 to 60 per cent in this age group drank no milk.... The amount drank by children who drank the milk was less in the lower income than in the higher income households.1

1Hopper, op. cit., p. 9.
A large percentage of householders, while realizing the value of milk, said that it was the relative price which prevented them from buying more. There is every indication that since the outbreak of war, the consumption of whole milk in Canada is greater than ever before. \(^1\)

Income increases and full employment together with controlled milk prices have no doubt influenced the demand. If we can assume that the higher income groups obtained all the milk they required previous to the war, then much of the increased demand is related to the new purchasing power in the hands of the lower income groups.

Preliminary estimates by the Department of Agriculture show also that in certain areas surveyed, a two cent reduction in the retail price of whole milk has increased consumption at a greater rate than that attributable to income increases. Contrary to belief then, neither the price nor income elasticity of demand for milk is less than one. Stated otherwise, the demand for milk is elastic and much of the deficiencies in consumption of the past can be directly related to income and price.

Not only have non-civilian uses for whole milk and milk products developed, but also the export of cheese has more than doubled over the 1935-39 average. If present production is maintained in the post-war period and non-civilian uses discontinued, then the total milk available for domestic consumption will depend in part on the export demands until long-time adjustments are effected.

\(^1\)The per capita consumption of fluid whole milk increased from 345 lbs. (1935-39) to 390.5 in 1943, fluid cream from 12.7 lbs. to 15 lbs., evaporated whole milk from 6.1 to 11.5 lbs., and milk in ice cream from 15 lbs. to 24.2 lbs.
The additional whole milk flow to meet the per capita consumption considered adequate by the Nutrition Council means either more milk cows or greatly increased output per cow. The strain on resources to meet war demands means that under peacetime conditions it is more than likely that the milk cow population will have to increase in order to produce the additional whole milk deemed necessary.

To measure the required increase, two limits can be set. The lower limit is based on the assumption that the export of cheese will return to the pre-war level, thus releasing milk resources for use as whole milk. The upper limit is based on the assumption that the wartime exports will be continued in the post-war period. Calculations show that the lower limit will mean an increase in total milk cow population of 15 per cent. The upper limit will necessitate an increase in total milk cow population of 28 per cent.

Where these increases should occur is a matter for some speculation but as transportation is such an important part of production costs in Canada, some relation to the population density would seem logical.

Taking the five most densely populated provinces, an approximation of the absolute increases considered necessary would be the following.

Table 17. The number of milk cows on farms necessary to meet nutrional aims as compared with the actual population in 1943

<table>
<thead>
<tr>
<th>Province</th>
<th>Milk cows on</th>
<th>Lower limit</th>
<th>Upper limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova Scotia</td>
<td>104,000</td>
<td>139,751</td>
<td>170,515</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>111,000</td>
<td>39,300</td>
<td>165,782</td>
</tr>
<tr>
<td>Quebec</td>
<td>997,000</td>
<td>1,204,110</td>
<td>1,586,674</td>
</tr>
<tr>
<td>Ontario</td>
<td>1,150,000</td>
<td>1,384,554</td>
<td>1,686,674</td>
</tr>
<tr>
<td>British Columbia</td>
<td>93,000</td>
<td>143,485</td>
<td>187,069</td>
</tr>
</tbody>
</table>
Any of the increases which may be absorbed by the remaining provinces would lower the limits shown above.

This calculation in no way considers the problem of incentives which will call forth the necessary capital investments. Neither does it consider the problems of distribution and movement through consumer channels.

**Cheese and milk products**

Net domestic consumption of cheese has increased very little during the war period. To what extent the large export increases could be absorbed on the domestic market as cheese, would depend a great deal on changes in consumption habits. Even if the exports were continued and the milk cow population increased, the above calculations allowed for normal diversion to milk products leaving sufficient for increased domestic cheese production.

Cheese is one of the foods shown in Table 6 which would require a consumption rate four times the 1942 level if it were to come up to the specified requirements.

As a concentrated source of energy, proteins and calcium, the value of cheese has not been appreciated sufficiently by the lower income groups in Canada.

**Dried milk**

The handicap of transportation in whole milk consumption can be partly overcome by greater appreciation of the dried and evaporated milks
and other milk products. The domestic disappearance of evaporated whole milk more than doubled during the war period and the dried milks have proved invaluable for army and relief use. The nutritive value of these products is high and education in their use would help to take advantage of the processing plants which have grown up as a consequence of war demands in Canada.

**Skimmed milk**

Contrary to general impression, skim milk stands next to whole milk in the nutritive value of foods and differs only in fat content and vitamins A and D. Calcium deficiencies can be remedied as well by skim milk consumption as by whole milk. There is wide scope for its use in cooking, and any obstacles in the way of its distribution to consumers would be a negation of nutritional improvements. Its use by farmers as animal feed can be reduced by appropriate adjustment of relative prices and the provision of substitute protein feeds. The dried form is more easily transportable and is probably a more convenient form for general use.

The same arguments apply to buttermilk and whey which, while not as complete in nutritive content as skim milk, would prove valuable additions to national diets.
AGRICULTURAL PRODUCTION

It is safe to state that the productive capacity of Canadian agriculture is sufficient to meet domestic nutritional requirements, with the exception of citrus fruits. This by no means implies, however, that this capacity is being used to attain the end of adequate diets for Canadians. With due consideration for the effects of income distribution on demand and the distribution of food within the country, some discussion of the prevailing production pattern is in order.

The Maritime and Central Provinces and some parts of British Columbia are areas climatically suitable for mixed farming. This means that dairy, fruit and vegetable production are the main source of farm income. This can be illustrated by the following tables giving the acreage seeded to potatoes and the number of fruit and vegetable farms in Canada by areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>1931</th>
<th>1942</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maritime provinces</td>
<td>134</td>
<td>138</td>
</tr>
<tr>
<td>Central provinces</td>
<td>314</td>
<td>279</td>
</tr>
<tr>
<td>Prairie provinces</td>
<td>115</td>
<td>104</td>
</tr>
<tr>
<td>British Columbia</td>
<td>20</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 15: Number of Fruit and Vegetable Farms

<table>
<thead>
<tr>
<th>Province</th>
<th>Area in 1941</th>
<th>Area in 1942</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prairie Provinces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maritime Provinces</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 20: Average corn to wheat in Canada and Great Britain

Show in the following table is the average percentage of wheat and feed grains to corn hereafter referred to as the bread-grain ratio. The Prairie Provinces, on the other hand, have developed a more

<table>
<thead>
<tr>
<th>Province</th>
<th>1941</th>
<th>1942</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prairie Provinces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maritime Provinces</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 21. Acresage sown to feed grains\(^1\) in Canada by area for 1931 and 1942 in thousand acres\(^2\)

<table>
<thead>
<tr>
<th>Area</th>
<th>1931</th>
<th>1942</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maritime provinces</td>
<td>500</td>
<td>499</td>
</tr>
<tr>
<td>Central provinces</td>
<td>5,791</td>
<td>5,657</td>
</tr>
<tr>
<td>Prairie provinces</td>
<td>12,300</td>
<td>17,300</td>
</tr>
<tr>
<td>British Columbia</td>
<td>101</td>
<td>96</td>
</tr>
</tbody>
</table>

\(^1\)Oats, barley, rye, mixed grains.

\(^2\)Ibid.

The existing Canadian production pattern is closely related to the historical development of a nation relying on the export of agricultural products as its main source of income. The country has always been able to produce more of the basic foods than it could domestically consume.

The proceeds from the sale of agricultural goods abroad were used to purchase the products of other countries, without which the development of the country would have been slower. The Canadian economy was thus greatly dependent on economic conditions in the importing countries.

The growth of nationalism and protective tariffs during the last twenty years has meant a decline in the flow of world trade of agricultural commodities. The development of agriculture in European countries, and exportable surpluses in the new countries of South American have been most significant for Canada.

The proportion of agricultural export value to total export value of Canadian produce has been declining. Some of this is normal such as the
gain in importance of iron and non-ferrous metals, wood products and paper. Some of it is due to man-made obstacles such as protective tariffs which interfered with the benefits of comparative advantages, and some to a general decline in the significance of agricultural exports to the economy. The following table shows the value of agricultural exports in relation to the value of total exports from Canada between 1927 and 1941.

<table>
<thead>
<tr>
<th>Year</th>
<th>Agricultural products</th>
<th>Total</th>
<th>Canadian</th>
<th>Per cent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1927</td>
<td>711</td>
<td>1,218</td>
<td></td>
<td>58</td>
</tr>
<tr>
<td>1928</td>
<td>614</td>
<td>1,350</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>1929</td>
<td>571</td>
<td>1,182</td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>1930</td>
<td>408</td>
<td>886</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>1931</td>
<td>281</td>
<td>605</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>1932</td>
<td>260</td>
<td>494</td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>1933</td>
<td>257</td>
<td>528</td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>1934</td>
<td>261</td>
<td>579</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>1935</td>
<td>313</td>
<td>757</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>1936</td>
<td>344</td>
<td>549</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>1937</td>
<td>369</td>
<td>997</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>1938</td>
<td>309</td>
<td>838</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>1939</td>
<td>352</td>
<td>925</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>1941</td>
<td>488</td>
<td>1,621</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>


There has been a steady decline in the value of total agricultural exports, but the period between 1931 and 1934 was abnormally low. The exports of 1941 were the highest since 1929. Despite the increase in total
agricultural exports between 1939 and 1941 its per cent of total exports declined from 39 to 30 per cent. This decline in the relative proportion of agricultural exports to total exports from Canada, is indicative of the repercussions on agricultural producers in a maturing economy and the economic effects on their historical production methods. While it is true greater exports of any kind mean greater purchasing power in the hands of Canadian consumers with an increased demand for domestic agricultural produce and a greater opportunity of meeting nutritional requirements, this will not be sufficiently adequate to defer the necessity for extensive production adjustments.

The war has caused great industrial expansion in Canada with the export of non-agricultural commodities increasing at a greater rate than agricultural. Under wartime conditions agricultural exports are also exceeding the pre-depression level, but this cannot be expected to continue as European production increases.

Population and Farm Land

As part of the problem of food distribution and to show something of the relationship between population distribution and the location of farm land in Canada, the following table shows the acres of farm land per head of population in Canada and the provinces at the time of the 1941 census.

The population density in relation to agricultural land is much greater in the Eastern Provinces and British Columbia than for the Prairie Provinces. Particularly is this true in Quebec and Ontario. On the other
Table 23. Acres of farm land per head of population in Canada and the Provinces

<table>
<thead>
<tr>
<th>Area</th>
<th>Acres per head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>15.3</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>12.5</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>6.7</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>8.8</td>
</tr>
<tr>
<td>Quebec</td>
<td>6.8</td>
</tr>
<tr>
<td>Ontario</td>
<td>6.0</td>
</tr>
<tr>
<td>Manitoba</td>
<td>23.4</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>67.7</td>
</tr>
<tr>
<td>Alberta</td>
<td>54.3</td>
</tr>
<tr>
<td>British Columbia</td>
<td>5.0</td>
</tr>
</tbody>
</table>

1 Canada Bureau of Statistics, Census of Agriculture, June 11, 1943.

In general, the larger acreage per head in Saskatchewan and Alberta indicates the more extensive type of agriculture practiced.

This relationship, however, gives little indication of the productive ability of the various types of farm land as related to soil type, growing season and other physical limiting factors. It indicates what are most likely to be the food export and the food import areas, and where food distribution problems are likely to be more acute, with greater dependence on sources other than the province in question. It also suggests the probable wide variation in agricultural practices consequent of markets and physical variations.
Agricultural Workers

Despite an increase in area in farms, the population gainfully employed in agriculture declined between 1931 and 1941. There have been decided shifts in occupational distribution in Canada, but of most significance for our purposes is the movement away from agriculture. The percentage of gainfully occupied in agriculture of the total gainfully occupied in Canada declined from 40 per cent in 1901 to 24 per cent in 1941. The greatest regions of decline have been in Ontario and Quebec, 1 (See Table 24).

Table 24. Gainfully occupied in agriculture compared with total gainfully occupied in Canada 1901, 1911, 1921, 1931 and 1941 1

<table>
<thead>
<tr>
<th>Year</th>
<th>A Gainfully occupied in agriculture</th>
<th>B Gainfully occupied in Canada</th>
<th>Per cent A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>717</td>
<td>1,785</td>
<td>40.2</td>
</tr>
<tr>
<td>1911</td>
<td>934</td>
<td>2,174</td>
<td>34.5</td>
</tr>
<tr>
<td>1921</td>
<td>1,042</td>
<td>2,717</td>
<td>32.9</td>
</tr>
<tr>
<td>1931</td>
<td>1,132</td>
<td>3,027</td>
<td>23.8</td>
</tr>
<tr>
<td>1941</td>
<td>1,067</td>
<td>4,445</td>
<td>24.0</td>
</tr>
</tbody>
</table>

1Canada Bureau of Statistics. General Statistics Branch, Unpublished manuscript. 1943.

2Including gainfully occupied prior to enlistment.

Agricultural occupations are not the only ones that have been declining.

The most striking phenomenon is the steady decline in the relative importance of the physical production occupation groups and the compensating increase in the importance of the servicing occupation groups.\(^1\)

The data given in Table 22 being at the dates of census do not show the fluctuations in and out of agriculture during the intervening periods. The long-run tendency for agriculture to absorb a smaller part of the national labor force, however, continued in spite of business fluctuations.

This was by no means accompanied by a decrease in agricultural output. Technological and managerial technique advanced sufficiently during this period to enable greater output per man-hour labor.

Examination of such detailed figures as are available reveals increases in the number specializing in dairy farming, market gardening, fruit culture and livestock; the losses - or transfers - appear to have been greatest from the largest group, that of grain and general farmers.\(^1\)

In broad terms, this means that as the Canadian economy advances less labor will be required to produce the foodstuffs necessary for domestic and export consumption. It has been said that agriculture has suffered in the past from over-population resulting in decreased returns per worker. To what extent this is true must vary with the type of farming, the progress of technology and the demand for food. It is true that in the past agriculture has been used as a safety valve for unemployed industrial workers, but such a flexibility must not be denied any economy. The

\(^1\)Hurd, op. cit., p. 62.
significant feature is that the trend to maturity has meant relatively
less employment in agriculture and that interference with this trend
can be prevented only by the provision of alternative opportunities and
reduction in fluctuations of non-agricultural employment.

Greater land settlement may have to be faced in the post-war period.
This will mean a revision of the problems of a saturated agricultural
labor force. To maintain returns to agriculture, a coincident increase
in non-agricultural labor employment will increase demand for foods and
retain the balance. Otherwise future land settlement without industrial
development will be detrimental to the growth of the economy unless
export demand takes on new proportions.

Farm Income and Difficulties of Agricultural Adjustment

One of the greatest disturbing influences both in the agricultural
industry and in its relation to the national economy has been the great
variation in returns to farmers from year to year. The uncertainty
associated with this variation has nutritional, sociological, and production
effects. Rural life becomes unstable, capital investment spasmodic and
capital maintenance neglected. A low price one year instead of resulting
in decreased production the following season is followed often by
increased production in an attempt to raise individual income. This may
be due not only to rigidities in the farm enterprise but also to lack
of suitable alternatives. The attempt by the farm operator to stabilize
his income in this way frequently results in a still further increase
in supply on an already loaded market. The surplus food distribution programs, the nutritional adequacy of which has been criticized, are an outcome of this condition.

The productive activities in agriculture are by their nature essentially rigid. Once the seed has been sown and once the cow has been bred, production decisions have been made. Therefore, price changes which may occur during this period can find little response from the operator. The rigidity will vary with the type of farm. A mixed farm with several enterprises affords greater security of income than a single-enterprise farm, yet not every farm in the country has the capital investment and size necessary to bear its own risk. It is only by a pooling of this risk that some insurance can be retained. The Canadian farm economy has shown little of this pooling to date, with consequent fluctuations in returns and all its social implications.

In periods of industrial depression not only are prices low because of decreased demand, but also there is some flow of labor back to the farm, which further depresses the per capita returns in agriculture. Agricultural prosperity is tied up with industrial prosperity and fluctuations in one will cause fluctuations in the other. Nevertheless, without introducing rigidity into the farm price schedule some form of control may be necessary to prevent wide variations in returns due, among other things, to the relatively free competitive nature of farming.

National Agricultural Income

As with trade the share of agriculture in the national income while
increasing absolutely has been decreasing in relation to the total
national income. There has not been an even trend to this decreased
proportion. Between the years 1929 to 1933 there were distinct fluctua-
tions. During the period between 1930 and 1935 agriculture's share
was decreased more than proportionately to the total decrease. This is
another illustration that during depressions agriculture has borne a
disproportionate share of a decreased national income, reasons for which
have been suggested above.

<p>| Table 25. Agriculture's share of the national income of Canada 1926-40 |</p>
<table>
<thead>
<tr>
<th>Year</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1926</td>
<td>26.1</td>
</tr>
<tr>
<td>1927</td>
<td>24.6</td>
</tr>
<tr>
<td>1928</td>
<td>25.4</td>
</tr>
<tr>
<td>1929</td>
<td>22.0</td>
</tr>
<tr>
<td>1930</td>
<td>17.4</td>
</tr>
<tr>
<td>1931</td>
<td>15.9</td>
</tr>
<tr>
<td>1932</td>
<td>15.1</td>
</tr>
<tr>
<td>1933</td>
<td>15.2</td>
</tr>
<tr>
<td>1934</td>
<td>17.4</td>
</tr>
<tr>
<td>1935</td>
<td>17.6</td>
</tr>
<tr>
<td>1936</td>
<td>18.9</td>
</tr>
<tr>
<td>1937</td>
<td>16.1</td>
</tr>
<tr>
<td>1938</td>
<td>16.1</td>
</tr>
<tr>
<td>1939</td>
<td>19.7</td>
</tr>
<tr>
<td>1940</td>
<td>17.9</td>
</tr>
</tbody>
</table>

1 Hope, op.cit., p. 13.

The outstanding feature of the 1930's was the reduction of purchas-
ing power through unemployment.

During the worst depression years anything from 250,000
to 500,000 urban families in Canada have suffered from
the lack of jobs for the principal earners. At a moderate
estimate this represents something like a loss of purchas-
ing power of seventy-five to a hundred million dollars a
year.... For Canada it is a safe estimate that at least
one-third of all urban families during the last decade have
been living on less than $1,000 a year, and many of them are
much lower levels. On these incomes food expenditures can
hardly exceed $2 a week per person without serious inroads on
other areas of the budget; and the number of families at the
$1-a-week level has been continuously near 20 per cent.1

While relief payments may have modified this income loss somewhat,
the amount of money spent on food undoubtedly shrank, accounting for much
of the fall in agricultural income. Farm income from domestic sales is
dependent on industrial activity in Canada. If wage levels are low or
rents and the prices of non-food items are high, then the proportion of
income spent on foods will be kept as low as possible in order to purchase
other essential goods which are often subject to more rigid prices.

Therefore, it is just as much in the interest of agriculture that
c consumer purchasing power be retained by increased industrial activity
as it is to urban populations.

But the gain to domestic markets from new industries (along
with their wage levels) depends on the general efficiency of
their production. If by superior technique they add to the
real wealth of the country, they provide means for the spread
of more varied or better quality diets, and more diversified
agriculture. If they are unstable or over-competitive, if
they are sustained only by a tariff which has adverse effects
on the external demand for Canadian export-products, or if there
are other drawbacks of similar kind, they may be indifferent or
even harmful to the welfare of agriculture. In short, in-
dustrialization, like urbanization, is neither good nor bad per se.
The decision to promote industrial development or agricultural
settlement, accordingly, is not a simple one determined by the
separate claims of the rural or urban way of life alone, but by
their mutual relations and reactions within the national economy
as a whole.2

1 Haythorne and Marsh, op. cit., p. 15. p. 414.

2 Ibid., p. 418-420.
Problems of Distribution and Supply

The Canadian political boundary provides rather peculiar transportation problems. The vast productive area of the Prairie Provinces finds an outlet for its products by rail and water routes via the Eastern seaboard to the export markets which play so prominent a part in this economy. As the majority of these markets have been in Europe, the greatest movement has been in an easterly direction, even from the Western province of Alberta. If Pacific markets should develop in the future, then the western port of Vancouver is likely to play a much greater part in the handling of agricultural commodities than heretofore.

Just as the cost of these long hauls must be added to the cost of production and reflected in the price to the final consumer, so must the price of commodities imported into these inland areas include transportation costs. The result is that the type of agriculture practiced and the welfare of these areas are particularly dependent on market conditions both in the eastern provinces and overseas.

While the population and market structure is more closely woven in the eastern provinces, the agriculture is also mainly the extensive type. The area of land in farms is large in proportion to the labor and capital combined with it, and the volume of agricultural goods carried is small in proportion to the distance travelled.

In comparison with other countries,

... the dairy cow population of New Zealand is not so much smaller than that of Canada. The total area devoted to dairying in this country is only four million acres, an area but slightly larger than the ten most eastern counties of
the province of Ontario. As a result of this degree of density the cost of collecting and transporting New Zealand's milk and cream to manufacturing plants is extremely low. This means ... that the manufacturing of cheese and butter can be carried on a large scale and therefore a low cost per unit basis. In Canada we have five and a half cheese factories and creameries for everyone in New Zealand.1

High costs of transportation are also the result of the pronounced seasonality of agricultural production and marketing. The costs of idle equipment in certain periods must be spread over the year's traffic. The perishable nature of many farm products necessitates specially designed transportation facilities to retain food value and quality which again must be reflected in the price.

For eastern farmers to take advantage of the grains produced in the prairies, to the western local price must be added the transportation charges. If the western provinces are to take advantage of the vegetables and fruits produced in both the eastern provinces and British Columbia, then transportation facilities and costs may be marginal factors in their maximum distribution.

Foods produced close to their consumption centers can be supplied at a lower price to the consumer. Therefore, the question of transportation and distribution charges must bear a close relation to the problem of adequate diets for Canadian people. Because of the long distances between centers and the variation in productivity of the

1Drummond, W.M. Transportation and Canadian Agriculture. O.A.C. Unpublished manuscript. 1940
agricultural land across the country necessitating movement between areas, the transportation of foods and feeds may have to be regarded as a social responsibility in compensation for the retention of existing political boundaries. In fact, the problem of adequate diets can be regarded in great measure as one of distribution.

From this brief survey of the relation of Canadian agriculture to that economy certain points affecting nutritional health become apparent.

Consequent to the growing importance of industrial and servicing occupation groups, the proportion of food producers is becoming relatively smaller. The diets of a greater number will be dependent on their money income, and prices and the distribution of food.

A falling export demand for agricultural products, if continued, means that per capita farm income can be maintained only by an increased domestic demand and a reduction in the number producing mainly for the export market. As malnutrition is prevalent amongst farmers producing for the fluctuating export market, the maintenance of their net income available for the purchase of food which climatic limitations or other reasons will not allow them to produce at home, is important.

Because there are such obvious regional differences in capacity to produce, full advantage of the national ability to produce can only be taken by Canadian consumers, if the flow between areas is expanded and facilitated.

Farm income fluctuation not only prevents adequate farm diets, but affects the types and quantities of food available for non-farm
consumers. Continuous production can be maintained only by a reduction in farm income fluctuation.

Increased industrial activity will not only draw off the surplus agricultural labor force but will provide an extended domestic demand for farm products.
Factors Affecting Supply

There are many factors affecting the production of food in response to changes in demand. Prices have been relied on in the past to reflect consumer demand to producers. In this industry, such response has not been and cannot be expected to be other than slow, as compared with industrial response. Some of the problems to be considered are discussed here in terms of elasticity of supply of farm products.

The elasticity of demand\(^1\) for a commodity does not differ greatly in the long run from the short run, on the assumption that consumers' tastes do not change. Exceptions to this occur when the commodity whose price has fallen requires complementary commodities which remain expensive, or in the case of durable goods, shifts in demand await the wearing out or using up of the commodity concerned. Another exception is imperfect knowledge of the consumer with respect to price changes. Likewise habit or custom may interfere with immediate price response and time must elapse to budget for the necessary readjustments and evaluation of alternative purchases.

Elasticity of supply on the other hand can be more clearly differentiated between short and long run. Short run supply elasticity refers

\[\text{Elasticity of demand } = \frac{p}{x} \frac{dx}{dp} = \frac{d}{(\log x)} \]

measures the rate of proportional demand for proportional changes in price from the price and demand in question.
to market response, or the movement of supplies already produced. This can be further differentiated between stocks on the market on a particular day and stocks which are made available from day to day, depending on the dealers' response both to the existing price and the expected price. It is understood, of course, that such a source of supply will only refer to those commodities which it is economically feasible to stockpile. Perishable goods, therefore, would have to be classified separately.

The long run elasticity of supply introduces a time lag of response which raises the most pertinent problems. Factors other than price take on added importance. Particularly is this true in agriculture. The unknown factors which will affect the degree of response by producers to price changes in the long run sense makes forecasting not only difficult but subject to a high margin of error. In the first place, the degree of price responsiveness must vary between producers and between the types of enterprises involved. The biological and natural limitations with which agricultural production must be concerned necessitate a consideration of factors not present in industry. The great difference between the two is the control over input-output relations. While technological improvements have increased this control in agriculture, the weather is still a major factor in the supply of many crops, which in turn may affect the production of livestock and subsequent plans.

The production period varies between enterprises. The elasticity of expectation of beef prices must differ from hog prices, and production response will vary between perennial and annual crops. Relative prices
may reflect changed demands, but the climatic limitations may prevent
the supply changes which would maximize profits. The result could be
an increased supply in the face of a fall in price, in an attempt by
producers to overcome the limited flexibility in their production pattern.

Relative Prices

An increase in prices does not always reflect an increase in demand.
A short supply may cause an increase in price with demand decreased.
On the other hand, an increase in the velocity of circulation of money
may raise the general price level without any change in relative prices.
Under competitive conditions it is relative product prices which are
used by producers in considering their production plans. Their estimates
of the continuity of existing price relationships, or the elasticity of
price expectations, are considered in the light of the production period
involved, and the cost of change. The expected income from the new output
must be at least equal to the returns expected from a continuation of
the old output plus the cost of the change in terms of money and un-
certainty, before producers will take action. Therefore, short run price
changes through competitive bidding on existing stocks will not affect
the long run elasticity of supply unless a trend is obvious.

Price Responsiveness

Producers are not all equally price responsive. Custom and inertia
may interfere with the profit motive. Some producers, on the other hand,
are alert to relative price changes and shifts in demand and respond more quickly to market opportunities than others. Interpretation of a particular price at a particular time is one of the reasons for this difference in supply response. A price may be the result of competitive bidding, short supply or a shift in demand.

Producers may be limited in their production adjustments by lack of capital or their current state of indebtedness. The landlord-tenant relationships may interfere with the freedom of choice of either party, so that decisions are different from what they would have been with no restraint.

**Statistical Limitations**

It is very difficult to construct a curve either of demand or supply because prices and production are separate values arranged in a time series. The observable is the actual market price at a single point in time associated with a single visible supply and a single visible demand. Forecasting of future supplies given certain prices is more than extrapolation of observed data, as has been indicated above. According to a theory advanced by E.S. Working\(^1\), it is possible to make a reasonable approximation of either the demand curve or the supply curve, but not both. The construction of such curves depends on the stability of the demand or supply curve to each other. If the demand curve is fixed

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or varies little, while the supply curve shifts with changing production, then the observed price would be the intersection of the supply curve with the demand curve, as shown. If both supply and demand vary, however, the construction of such a curve would be more difficult.

**Historical Studies**

Early studies in agricultural production response attempted to evaluate the "necessary price" or the price required to induce producers to bring forth the supplies necessary. John Stuart Mill said "the cost of production together with the ordinary profit may, therefore, be called the necessary price; or value of all things made by labor and capital".¹ The average cost of production was assumed to be the best indication of "necessary price", and was the basis of a series of studies of individual commodities. A price equal to average cost, however, would leave about half the growers producing at a loss. Therefore, further studies developed the "bulk line cost" concept. The difficulties encountered here, however, were that while the price might cover the costs of seventy per cent of producers one year, the following year costs would vary between farmers, and the price might cover only fifty per cent. The data resolved from

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¹Elliott, op. cit., p. 13.
these studies is historical and does not answer the problem as to what
would happen to production if the price were increased ten points or
decreased ten points, which is what the concept of supply elasticity
means.

Statistical studies of historical data are subject to a great deal
of error in forecasting. In the first place, there are secular and
seasonal influences. Secondly, changes in the value of money will be
reflected on the price at any time. The production of one commodity as
related to the change in price of other commodities and the study of
relative prices influences, increases the difficulty of statistical
analysis. Finally producers' price expectations will differ from actual
price changes, so that the resulting supply demand relationships may be
different from such relationships based on forecasting.

Input-output Cost Ratios

Much of the variation in supply off the farm is related to the
input-output cost ratio. In the case of hogs this would be the corn-hog
ratio, the skim milk-hog ratio or the barley-hog ratio, depending on the
area studied and the main feed used in hog production. A study by
O.V. Wells\(^1\) concluded that farmers increase or decrease their hog produc-
tion in response to the corn ratio, the same year and one year before
the change in production is made. For example, the average weight of hogs

\(^1\)Wells, O.V. Farmers' response to price in hog production and marketing.
marketed in the United States is determined by the corn supply per hog at the beginning of the year and the corn-hog ratio of the preceding summer. To the extent that these two factors are known, then the direction and general degree of the coming major changes in hog production can be forecast.

It is possible to construct estimates of production response by the budgetary method. This is based on the relative profitability of the various farm enterprises and entails estimates of the expenses and receipts of alternative resource organizations. This method is limited in its use for deriving supply schedules because it assumes that what is most profitable will be done, whereas what farmers will do may be far removed from such rationale.

Weather

As the production of feeds is dependent to a great extent on weather, the whole problem of supply elasticity of farm products appears to revert to this uncontrollable factor. Therefore as measures proceed to divorce the supply of crops at any one time from current changes in the weather by storage, the elasticity of supply of farm products becomes more measurable.
FLEXIBILITY IN THE FARM ORGANIZATION

The type of demands which have existed in the past and the length of time which these demands have been sustained will be reflected to a great extent in the degree of flexibility which has been built into the farm organization. With specialization, the operator will have developed production techniques related to a particular pattern which might not immediately relate to a new type of enterprise. This would create some rigidity to be considered as an additional cost of change.

Physical and biological factors will govern the alternative choices to some extent, but not to the extent that the rigidities grown out of specialization tend to accentuate.

Prior to the outbreak of war, the Canadian agricultural pattern was the result of historical trends in export and domestic demands. The population in the Eastern provinces provided incentive for development of dairy, vegetable and fruit farms and a greater proportion of mixed farming. While there was some export of dairy products from these areas, with the exception of fruits the type of commodities produced were closely related to domestic demand. The mixed farming provided flexibility which allowed response to changes in consumer demand at reduced cost.

In the Maritime Provinces, the production of potatoes and fruits has been dependent on demand outside the area, both in Quebec, Ontario and abroad. Specialization introduced rigidities which were reflected in income variations consequent of weather hazards and fluctuations in
the prices of these crops. The production period for fruits is long so that increases in demand must appear reasonably permanent before investments are made and also before the product finally reaches the market. Weather conditions and marketing facilities have been responsible for fluctuation in the production of potatoes, returns to producers, and the supply to consumers.

The settlement and subsequent development of the Prairie Provinces were based on the export wheat market. The Winnipeg Grain Exchange became the center of a network of commercial enterprises and elevator systems for the handling and sale of the wheat crop. New wheat varieties were bred suited to the physical conditions. Above all, single crop farming became the accepted custom in the plains area and wheat was sown as the main cash crop regardless of expected price changes. Rigidity in the farm enterprises meant greater fluctuations in income consequent of price changes and weather, than would have been the case if alternative sources had been available. Uncertainty was an accepted feature of western farming.

With the outbreak of war, new markets became available. Contracts with Britain switched the demand from wheat to hog and poultry products and cheese. The effect of this change on producers' habits was interesting. Stimulated by subsidy payments to quicken the process, the seeding of coarse grains suitable for feeding hogs was encouraged in the west. It became obvious that the older hog-producing areas in the Eastern Provinces did not have the capacity for the expansion required. Hog raising became more general in the Western Provinces. Farms which were once considered
capable only of producing wheat were soon turning out finished hogs and poultry products. The ready market for coarse grains and meats meant that the rigidity of single crop farming was broken and the choice of alternatives broadened.

In the apple areas the investment in trees meant fixed costs were a greater proportion of total costs and disinvestment was not considered desirable for the long run market demand prospects. Flexibility was not an outcome of the depressed export demand for apples, to the same extent as in the wheat areas. The original flexibility which existed in the Ontario mixed farms, however, proved invaluable for response to increased demands for cheese and dairy products.

It is necessary to consider the factors which controlled the response by producers to changed or increased demands on the international and national markets. The number of variables which have to be considered in any such measurement at the national level are much more numerous than for those of a single firm or enterprise. Much of the response in the war period has been assisted by favorable weather conditions as the yields of 1942 would indicate. The feeling of a national emergency may have given greater incentive to producers than price increases in peacetime could have done. On the other hand, the decrease in labor supply may have lowered the output from what it otherwise might have been. Particularly is this the case in vegetable and fruit enterprises which require much seasonal labor at the right time. Lack of capital for investment may have delayed the response in many areas.
One thing is apparent, however, the majority of shifts did not come about by the usual market procedure. An emergency condition existed and because the usual production period for agricultural commodities is one year or more, the market response would have necessitated a longer wait for the products than was actually the case. Centralized control by the Dominion and Provincial governments was introduced with the aid of subsidy and incentive payments.

As a preliminary move, a Central Committee on Food Requirements and Production Capacity was set up under the existing Agricultural Supplies Board. For the first time, certain agricultural production objectives were outlined for the coming year, based on studied appraisals of domestic and export requirements. These objectives computed with the aid of local authorities were then used as guides for individual farmers.

On the basis of these objectives additional payments were made for the crops, livestock, and livestock products considered necessary to meet the new demand situation. Consumer rationing of certain scarce foods supplemented the resource allocation program. Centralized control over returns to farmers and the type of commodities produced was an experiment for Canadian agriculture.¹

It was successful in that export commitments were met, domestic consumption was increased and above all greater flexibility in the agricultural industry was attained. This in itself is valuable because changed consumption demands were interpreted by producers effectively

and with a minimum of delay. There are several qualifications to these results, however.

The consumers' demands were not expressed by the usual market procedure of willingness to pay by the individual. For many food groups this function was taken over by the government and on the basis of scientific appraisal, producers' actions were directed outside the normal price framework.

Secondly, the increased cost was considerable and in no way can be ignored when the benefits are assessed. Then again, under conditions of war many controls and directives were accepted by both producers and consumers which would find no sympathy in peacetime.

The success of the methods used, however, are sufficient to show that this experience can be used in the post-war period so that dietary deficiencies can be remedied and producers shall not suffer the price fluctuations which have had such sociological and economic significance in the past. The consumption-production relationships can be made to function more smoothly by organized direction, so that consumers' preferences receive the minimum interference.

Flexibility in the farm business not only provides greater elasticity to the total supply function but the alternative sources of income provide a security to the producer which a single crop unit cannot do. Therefore, to the extent that the individual farmer may want security in the form of a somewhat reduced but steadier income flow, and to the extent that he wishes to take advantage of changes in market demand, and thus provide consumers with the nutritionally desirable foods, flexibility in the production plant and centralized directives are a partial answer.
Cost of Flexibility

A diversified farm economy normally requires a heavier capital investment than one composed of single enterprise farms. There will be individual exceptions to this condition, but where the variable factors of production are indivisible as in certain types of machinery, the addition of another enterprise requiring a different set of capital goods will not do away with the need for the first set of variables, provided the substitution of fixed factors is not too great. The more alternative enterprises there are then, and the less the substitution between the use of the variable factors of each enterprise, the greater the total investment is likely to be.

For example, where the alternatives are various types of field crops than some substitution of machinery is possible. If the alternatives are field crops and one or more livestock enterprises, however, substitution of capital goods becomes less possible and the total investment tends to be greater.

Because of the fluctuating weather conditions in the west, different field crops are less likely to give flexibility than additional livestock projects. The capital investment will be greater and the short-run marginal and average costs of each firm will probably be higher than under the single enterprises arrangement.

The same argument would apply wherever mixed farming is considered advisable. The demand for investment on each farm will increase wherever this change takes place. Agriculture will become more capitalized, which
may lead to the additional risk of over-capitalization. This can be
counteracted, however, by an increase in the size of farm by tech-
nological improvements and by an increase in the demand for food. The
implications that less labor will be required in the production of at
least the same total quantity of foods is borne out by historical trends.

The demand for capital funds by the individual farmer cannot always
be met from savings or current turnover. Especially will this be true
where lack of capital investment has meant operation at less than maximum
capacity in the past. Therefore, the provision of short-term credit
will be a necessary part of changes in the farm organization.

The need for greater stress upon the use of credit as an
instrument of government policy in the solution of agricul-
tural difficulties has become apparent, particularly in
relation to problems arising from the presence of mal-
adjustments in production and the existence of imperfections
in competition.

Provision of cheap credit to an industry is only a partial solution
of the conditions responsible for the demand for the credit. There is
always the danger that it will result in an unsatisfactory form of subsidy
without attainment of the long-run adjustments leading to greater stability.
The problem of farm credit in Canada needs to be solved before a satis-
factory solution of production consumption relationship can be attained.

It is now possible to list those factors which figure most prominently
in the supply of agricultural products.

---

1 Easterbrook, W.T. Farm Credit in Canada, p. 160. The University of
   Toronto Press. Toronto, Canada, 1938.
(1) The stocks on hand or the ability to hold the commodity in storage from periods of plentiful supply to periods of scarcity.

(2) The market sense of producers.

(3) The physical or biological limitations of the production plant.

(4) The relative factor costs.

(5) The cost of change in output and the uncertainties involved in such a change.

(6) The availability of capital for new investment.

(7) The price expectations of producers.

(8) The weather.

(9) Incentives other than price, such as subsidies or appeals through outlook information or planning assistance.

(10) The elasticity of demand for the product.
If income are expected to change in the future, then consumer expenditure decreases.

Current satisfaction compared with consumption at a later point in time and of future prices may cause an increase or decrease in the desire for the preferences may also change. The expectation of future income causes:

- An increase in current expenditure when income increases. On the other hand, a reduction in current expenditure when income decreases. The short-run consumer function of the consumer is subject to change, the short-run consumer function depends on habits of the consumer and may be altered in real income which increases the expenditure for expenditure.

- Certain fixed costs such as capital expenditures or increased savings for the purchase of more consumer goods or for decreased savings. When there is a real increase of the consumer's income, any factors, whether anticipated expenditure or consumption price account for most fluctuations in consumer expenditure.

On the other hand, there are certain short-run influences on consumption and social factors which tend to change the proportion of expenditure on food to income. Foods are characterized by a given level of income and the expenditure of consumer goods on food is those proportionate to the proportion to consume in the functional relationship between the relation between price, income, and expenditure.
will be affected accordingly. The fiscal and taxation policy of the
government as they affect death duties and inheritance gains, and the
likelihood of future change will undoubtedly influence the rate of
current expenditure.

All these motives will vary with the race, conventions, habits,
institutions and distribution of wealth within an economy. This con-
sumption function or propensity to consume in studies by Hansen\(^1\) is also
related to the phase of the business cycle in which the income occurs.
From one phase of the business cycle to another there appears to be a
pattern in the relationship of consumption to income. At very low levels
of income, consumption may exceed income. On the other hand, in pros-
perous years the relation of consumption to income is relatively low
and once a fairly high income level is reached, further increase will
widen the gap between income and consumption. "Men are disposed as a
rule and on the average, to increase their consumption as their income
increases, but not by as much as the increase in their income."\(^2\)

The term consumption used above refers to all consumer goods. There
is a minimum below which consumption expenditure will not fall. Of these
expenditures a certain proportion is for food and any variation which
occurs as income changes will also be reflected in the amount spent on
food. The nutritional implications of this then are in effect that a
decrease in income will cause readjustments in the types of food purchased.

---

\(^1\) Hansen, H.H. Fiscal policy and business cycles. W.W. Norton and Co.,
Inc. New York, 1841.

Cheaper foods will be substituted for the more expensive, and the food intake will be related in some way to the relative costs of production, monopolistic control of prices and the redistribution of income which changes in the national income may introduce. Fixed costs such as rent, or those related to social standards, replacement of semi-durable goods, and the upkeep of capital goods or financial commitments such as life insurance will delimit the area of expenditures for food.

Food Consumption and Income

An approximation of the domestic disappearance of manufactured foods in relation to the net national income for Canada is given in the following table. The per cent disappearance of national income remains fairly constant, and while this only refers to foods moving into trade, indicates that total food expenditures fluctuate directly with income changes, which in turn are tied closely to income and maintenance of full employment. It is not possible to illustrate the proportion of national income which would be spent on foods with further increases. However, it can be assumed that a maximum point would be reached beyond which the proportion will decrease. This maximum point had not been reached at the time of this study.

Food habits and food purchases are influenced by climate, custom and tradition, nationality, education in food values, choices of alternatives or substitutes, prices and income. It would be difficult to draw up any rule which would apply to all consumers, but there is one item which bears
Table 26. The relation of domestic disappearance of manufactured foods to total national income paid out to individuals in Canada for the years 1929, 1933, 1937, 1939, 1940 and 1941 in millions of dollars.

<table>
<thead>
<tr>
<th>Year</th>
<th>Imports</th>
<th>Total Exports</th>
<th>Domestic National</th>
<th>Disappearance of Manufactured Foods</th>
<th>National Income</th>
<th>Per cent Domestic Disappearance of Manufactured Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929</td>
<td>606</td>
<td>664</td>
<td>76</td>
<td>596</td>
<td>4,727</td>
<td>12.4</td>
</tr>
<tr>
<td>1933</td>
<td>415</td>
<td>434</td>
<td>42</td>
<td>342</td>
<td>2,641</td>
<td>14.3</td>
</tr>
<tr>
<td>1937</td>
<td>636</td>
<td>664</td>
<td>89</td>
<td>575</td>
<td>3,824</td>
<td>15.0</td>
</tr>
<tr>
<td>1939</td>
<td>660</td>
<td>692</td>
<td>89</td>
<td>603</td>
<td>4,040</td>
<td>14.9</td>
</tr>
<tr>
<td>1940</td>
<td>752</td>
<td>787</td>
<td>112</td>
<td>675</td>
<td>4,590</td>
<td>14.7</td>
</tr>
<tr>
<td>1941</td>
<td>956</td>
<td>1,018</td>
<td>142</td>
<td>876</td>
<td>5,600</td>
<td>15.6</td>
</tr>
</tbody>
</table>

1. List of commodities included: biscuits, confectionary, cocoa, bread and other bakery products; foods, breakfast; ice cream, cones; macarons, vermicelli, etc.; rice mills; fish, curing and packing, fruit and vegetable preparations; sausages and sausage casings; slaughtering and meat packing, butter and cheese; cheese processes; condensed milk; dairy products, other; animal oils and fats; sugar refineries, coffee, tea and spices; food; miscellaneous; starch and glucose.

2. From calculations by Canada Department of Finance.


a close relation to the other choice influences. That is the income of the individual.

In a homogeneous group of families differing only in respect of income, the excess over (or defect from) the average of expenditures on any budget item bears a constant proportion to the excess over (or defect from) the average income. In the case of some goods, which may be described as necessaries, this rule results in a diminishing proportion of expenditures as income rises. In the case of other goods, which may be described as luxuries, the proportion of expenditure rises as income rises.¹

The amount of certain foods consumed by the higher income groups is shown to be greater than the amounts consumed by the lower income groups. There are reasons to believe in the long run that with an increase in incomes a low income group would adjust its pattern of consumption to conform to that of the higher income group. While this may be true it is by no means certain that the resulting food expenditures would provide an economical and nutritious diet.

Assume prices constant for all groups, then the consumer with a higher income has a greater opportunity of varying his food purchases than a consumer with a lower income. This does not mean, however, that the higher income consumers will take advantage of the greater choice of foods. There may be expenditures which have preference over food in the budget. Retaining a social standing or preference for living in a district where rents are high may even lower the food expenditures below those of a lower income receiver living in less pretentious surroundings.

The type of food chosen by the higher income receiver may not be as nutritious or as beneficial to health as the food chosen from a narrow range by a consumer with a lower income, even though on the whole higher income families eat better as well as more than low-income families.

Similar circumstances must modify any statement with regard to income and food expenditure. The following examples are chosen from studies made in Canada to show the relation between consumption of certain foods and the income of that group. They may be used to indicate deficiencies in certain groups below the average or below the consumption of the highest income group.

Consumption of whole milk

Table 27. Daily per capita consumption of milk as related to family income, 3207 rural and urban families in the provinces of Quebec, Ontario and Alberta (1935) and 1082 households in Vancouver (1926) \(^1\)

<table>
<thead>
<tr>
<th>Family income</th>
<th>Per capita consumption per day, Quebec, Ontario and Alberta (pints)</th>
<th>Per capita consumption per day, Vancouver (pints)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $1000</td>
<td>0.69</td>
<td>0.60</td>
</tr>
<tr>
<td>$1000-$2000</td>
<td>0.78</td>
<td>0.68</td>
</tr>
<tr>
<td>$2000-$4000</td>
<td>0.81</td>
<td>0.71</td>
</tr>
<tr>
<td>$4000 and over</td>
<td>0.95</td>
<td>0.78</td>
</tr>
<tr>
<td>Average</td>
<td>0.74</td>
<td>0.65</td>
</tr>
</tbody>
</table>

12600 were in cities.

2Hopper, op. cit., p. 8.
The families in the lower income groups consumed only about fifty per cent as much as the higher income groups. According to Canada's Food Rules the minimum per capita consumption for a family of four should approximate about one pint per day, indicating the inadequacy of milk consumption in the lower income groups shown above.

The following is a study made in Vancouver by the Dominion Department of Agriculture in 1936.

Table 28. Average daily consumption of milk by children of different ages drinking milk in 1082 households in various income groups, Vancouver 1936

<table>
<thead>
<tr>
<th>Per capita income</th>
<th>Children under 6 years of age (pints)</th>
<th>Children 6-12 years of age (pints)</th>
<th>Children 13-18 years of age (pints)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relief</td>
<td>1.04</td>
<td>0.85</td>
<td>0.71</td>
</tr>
<tr>
<td>Less than $300</td>
<td>1.39</td>
<td>0.87</td>
<td>0.90</td>
</tr>
<tr>
<td>$300-$599</td>
<td>1.29</td>
<td>1.18</td>
<td>1.11</td>
</tr>
<tr>
<td>$600-$699</td>
<td>1.38</td>
<td>1.35</td>
<td>1.12</td>
</tr>
<tr>
<td>$900 or more</td>
<td>2.00</td>
<td>1.50</td>
<td>1.83</td>
</tr>
<tr>
<td>Average</td>
<td>1.16</td>
<td>0.98</td>
<td>1.00</td>
</tr>
</tbody>
</table>

1 Ibid.

On the basis of 1½ to 2 pints per day being advisable for these age groups, deficiencies in the lower income families are again apparent.

Consumption of butter

As family income increased, purchases of butter increased; according to a study made by the Dominion Bureau of Statistics in several Canadian cities, weekly purchases varied from 0.52 of a pound per person in families
with annual income per person of $100 to $199 up to 0.70 of a pound per person with individual incomes of $400 to $499.

Consumption of eggs

The relation between egg consumption and income is illustrated in the following results of a survey of 4,662 city households in various Canadian cities.

Table 29. Annual consumption of eggs per person by household income groups in Saint John, Quebec City, Montreal, Ottawa, Calgary, Vancouver 1935-36

<table>
<thead>
<tr>
<th>Household income</th>
<th>Number of households</th>
<th>Average number in household</th>
<th>Consumption per person (dozen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relief</td>
<td>367</td>
<td>4.9</td>
<td>13</td>
</tr>
<tr>
<td>Less than $1000</td>
<td>1,594</td>
<td>4.3</td>
<td>19</td>
</tr>
<tr>
<td>$1000 to $1999</td>
<td>1,615</td>
<td>4.5</td>
<td>21</td>
</tr>
<tr>
<td>$2000 to $3999</td>
<td>870</td>
<td>4.5</td>
<td>23</td>
</tr>
<tr>
<td>$4000 or more</td>
<td>214</td>
<td>5.4</td>
<td>22</td>
</tr>
<tr>
<td>Total or average</td>
<td>4,662</td>
<td>4.5</td>
<td>20</td>
</tr>
</tbody>
</table>

1 Ibid.

Consumption of meat

From the results of a survey made in 1936, meat consumption in city households as shown in Table 30 increased with income increases from 81 pounds per person for relief families up to 170 pounds per household with per capita incomes of $800 or more.
Table 30. Annual per capita consumption of various kinds of meat in each per capita income group in Saint John, Montreal and Vancouver 1938

<table>
<thead>
<tr>
<th>Per capita income</th>
<th>Number of households</th>
<th>Consumption of all meat in pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relief</td>
<td>187</td>
<td>81</td>
</tr>
<tr>
<td>Less than $300</td>
<td>154</td>
<td>109</td>
</tr>
<tr>
<td>$300 to $599</td>
<td>673</td>
<td>141</td>
</tr>
<tr>
<td>$600-$899</td>
<td>312</td>
<td>151</td>
</tr>
<tr>
<td>$900 or more</td>
<td>134</td>
<td>170</td>
</tr>
</tbody>
</table>

1Ibid.

Details of the various kinds of meat show that the consumption of lamb, bacon, ham and poultry were related to income. The consumption of beef did not show any relation to income above the $300-$599 group, while salt pork consumption decreased with income increases.

Further information revealed that the high quality cuts of beef were used to a greater extent by the higher income households. Pot roasts, (rump, shoulder and chuck) generally considered of lower quality were purchased more by the lower income than higher income families who showed greater purchases of porterhouse, sirloin and rib, the more expensive cuts.

Therefore, while a quantity change may not be apparent with income increases, the quality of meats consumed improved.

Consumption of fruits and vegetables

What information there is available on the consumption of fruits and vegetables in Canada shows that more is consumed at the higher income levels.
The results of a study made by the Dominion Department of Agriculture in cooperation with the Provincial Department of Agriculture in Nova Scotia is given in Table 31.

Table 31. Seven months per capita consumption of apples, citrus fruits and bananas in three income groups in Nova Scotia, 1940-41

<table>
<thead>
<tr>
<th>Income group</th>
<th>Number of households</th>
<th>Apples (pounds)</th>
<th>Bananas and citrus fruit (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower income wage earners</td>
<td>108</td>
<td>47</td>
<td>35</td>
</tr>
<tr>
<td>Clerical workers and skilled laborers</td>
<td>366</td>
<td>52</td>
<td>44</td>
</tr>
<tr>
<td>Professional and business executives</td>
<td>138</td>
<td>67</td>
<td>57</td>
</tr>
</tbody>
</table>

1 Ibid.

The rate of change in the consumption of a product with change in income ceteris paribus is a measure of its income elasticity. This income elasticity varies with different commodities, according to their relative value in the minds of the consumer to the total purchases. Table 32 shows the types of food purchased at varying income levels from the combined studies of 42 cities in the United States.

The purchase of citrus fruits and vegetables increases with the higher income levels. A higher proportion of expenditure is given to grain products in the lower income groups.
Table 32. Percentage distribution of expenditure for food to be prepared at home of 14,469 families in 42 cities in the United States combined, by groups of items (Data cover 12 months within the period 1934-1935).

<table>
<thead>
<tr>
<th>Type of food</th>
<th>All families</th>
<th>Under $400</th>
<th>$400 to $600</th>
<th>$600 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual per capita expenditure</td>
<td>$128.11</td>
<td>$96.76</td>
<td>$139.11</td>
<td>$180.90</td>
</tr>
<tr>
<td>Meat, fish, and poultry</td>
<td>24.1</td>
<td>22.4</td>
<td>24.3</td>
<td>25.6</td>
</tr>
<tr>
<td>Eggs</td>
<td>5.6</td>
<td>5.9</td>
<td>5.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Milk, cheese, and ice cream</td>
<td>12.7</td>
<td>13.7</td>
<td>13.0</td>
<td>11.2</td>
</tr>
<tr>
<td>Fats</td>
<td>10.8</td>
<td>11.0</td>
<td>10.7</td>
<td>10.8</td>
</tr>
<tr>
<td>Grain products</td>
<td>15.6</td>
<td>18.2</td>
<td>15.0</td>
<td>15.1</td>
</tr>
<tr>
<td>Citrus fruits</td>
<td>5.0</td>
<td>4.1</td>
<td>5.2</td>
<td>5.9</td>
</tr>
<tr>
<td>and tomatoes</td>
<td>7.4</td>
<td>6.6</td>
<td>7.6</td>
<td>8.3</td>
</tr>
<tr>
<td>Green leafy and yellow vegetables</td>
<td>3.4</td>
<td>3.7</td>
<td>3.4</td>
<td>3.1</td>
</tr>
<tr>
<td>Sugars and sweets</td>
<td>7.6</td>
<td>6.8</td>
<td>7.4</td>
<td>8.6</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Are Higher Incomes Enough?

While the illustrations given are not conclusive evidence, they do indicate that in Canada the higher income groups consume more per person of eggs, meat, milk products and fruit. While the prices of protective foods is generally higher than the basic cereal foods, prices are not always in proportion to nutritional value and because of this, less efficient but cheaper sources of nutrients may be overlooked when prices alone are used as measures of this value. Thus while it is safe to say that the higher income groups spend more for foods, this does not necessarily imply that they must always be better fed than the lower income groups. Appreciation of adequate diets composed of foods available at any particular income level cannot be over-emphasized.

For example, in Tables 28 and 29 the consumption of whole milk is less in the lower than the higher income groups yet this does not indicate that the lower income groups cannot obtain their nutrients from other sources. Appreciation of the food value of skim milk which has been neglected due to custom and other causes may provide the low income groups with the nutrients for which milk is mainly consumed. Below are the chief constituents of 100 gallons of skim milk and 100 gallons of whole milk.1

<table>
<thead>
<tr>
<th></th>
<th>Calories</th>
<th>Protein</th>
<th>Fat</th>
<th>Carbo-hydrates</th>
<th>Calcium</th>
<th>Thiamin</th>
<th>Vitamin A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk</td>
<td>69</td>
<td>3.5</td>
<td>4.0</td>
<td>5.0</td>
<td>.12</td>
<td>45</td>
<td>200</td>
</tr>
<tr>
<td>Skim milk</td>
<td>37</td>
<td>3.4</td>
<td>.5</td>
<td>5.1</td>
<td>.12</td>
<td>50</td>
<td>2</td>
</tr>
</tbody>
</table>

It is obvious that if fats, calories and Vitamin A are made up from some cheap source, then there is little to choose between the two milks in the provision of nutrients. There is, however, a great difference in market price for equivalent quantities.

A recommended shopping list\(^1\) for a family on a weekly basis was estimated at approximately $12.00.\(^2\) The percentage of male wage earners who earned less than $950 July 1940 to June 30, 1941 was as follows: \(^3\)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All occupations</td>
<td>54.0%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>42.5%</td>
</tr>
<tr>
<td>Construction</td>
<td>56.6%</td>
</tr>
<tr>
<td>Transportation and communication</td>
<td>48.4%</td>
</tr>
<tr>
<td>Trade</td>
<td>39.7%</td>
</tr>
<tr>
<td>Service industries</td>
<td>46.0%</td>
</tr>
</tbody>
</table>

If 35 per cent of the income is spent on food,\(^4\) then a large section of the population is prevented from obtaining the recommended diet. Assuming that half of these wage earners support families, then about 25 per cent of such wage earners' families are prevented from having an adequate diet because of the income factor.

Prices and Consumption

A change in the price of a commodity may be due to either a change in demand or a change in supply. The price elasticity of demand measures

\(^1\) Toronto Welfare Council. Cost of living revised 1944. Toronto, Canada.

\(^2\) Average prices prevailing at May 1, June 1, and July 1, 1944.

\(^3\) Canada. Wartime Prices and Trade Board. Statistics Branch, Research Division, unpublished manuscript on wage payments. 1944

the relationship between relative changes in the quantity of a product purchased to the relative change in price, incomes and other prices assumed constant. Unit elasticity means that a change in price is accompanied by a proportionate change in the quantity purchased. An elastic demand is one in which a small change in price will bring a relatively large change in the quantity purchased. Likewise, an inelastic demand is one in which price change brings a relatively small change in the quantity purchased.

The study of consumer price elasticity or the relation of changes in consumer expenditures to changes in price has not received the same attention as that awarded to the study of the supply schedule. It is closely governed by custom, habit, education and market conditions which vary within all sectors of the economy. Where substitutes are available and the habit is not too deeply ingrained, then consumer demand is likely to be more elastic than where this is not the case. For example, the demand for one type of fruit can be expected to be more elastic than the demand for bread.

The main factors affecting the price of foods to the consumer given the demand, are the primary production costs, the marketing costs, subsidies such as protective tariffs or controlled production, and taxation policy.

Production costs may be reduced by technological improvements in the input factors. Where the individual firm is operating under increasing returns, an increase in output or size of farm may lower costs. Shifts
information

Domestic consumption increased in the current period and food to restore the food output of the
Government with the result that the reserves are becoming depleted. In order to raise the prices in the home market or to attempt national
In order to raise the prices in the home market or to attempt national
integrations, the government may be expected to defend the price of rice produced more cherrylike
In order to raise the prices in the home market or to attempt national
integrations, the government may be expected to defend the price of rice produced more cherrylike

The government can attempt to maintain the price of rice by controlling production

May enact measures to prevent them from the production

Moreover, controlled over supply to the consuming or demand from the producers

Producers under conditions of imperfect competition

In the absence of competitive market, reduced costs of production will be

Have the same effect

In the absence of competitive market, reduced costs of production will be

101
The power of consumers - some reflection of consumer's welfare to resource

Another method would be a dual-pricing system, one set of prices would be

the dual-pricing method on the basis of the best available knowledge.

The dual-pricing method would be applicable, however. By subjecting the con-

It is apparent that such coordination do not exist in the modern economy.

maximizes the satisfaction of nutritional requirements. The price would be one at which consumer demand would direct resource use to

of foods, given complete knowledge of nutritional values. By the lower income groups.
SPECIAL NEEDS AND GOVERNMENT RESPONSIBILITY

Adequate Diets for Children

The need of adequate diets for children and the effect of dietary habits of children on their health in maturity have long been discussed by medical and nutritional experts. Surveys in Canada have shown the great variations in nutrients received by children, varying with family incomes, location and occupations. There is no comprehensive program in effect in Canada which aims at solving this problem.

A well organized plan to ensure that children of all ages and income groups receive an adequate diet is a social responsibility which has not been fully borne in Canada. The present school system is a medium which can be used to reach many sections of the child population. The provision of one good meal a day and milk at recess, together with some teaching of nutritional food values, would have far-reaching consequences both on the home life of the children and on their eating habits.

Such a scheme, however, should not be dependent on existing surpluses, but should be a government-guaranteed demand on producers for certain nutritionally valuable foods. Distribution and financial contributions by the recipients are matters of administrative detail.
This will by no means answer all the many child nutrition problems, but if instituted will be of great assistance to the development of other family welfare aids.

The Farm Family and Nutrition

In most discussions of family diets in Canada, attention appears to be focused on urban and city dwellers. The likelihood of there being dietary deficiencies and malnutrition amongst individuals of the agricultural industry where the food is produced deserves more consideration.

In the older settled areas where physical and tenure conditions have enabled the development of a stable agriculture, the problem is not so acute. Here the main staples and many protective foods such as milk, eggs, butter, green vegetables and fruit are available for family consumption. Home life is built around good food and a comfortable home.

There are many parts of Canada both east and west, but particularly in the west, where conditions are entirely different. Adaptation to climate has meant single crop systems on a cash basis. Pastures are poor and conditions are not conducive to diversified farming. Except in the rare years when rainfall is plentiful, gardens are unreliable sources of green vegetables and fruit. In the winter time particularly, local markets are poorly supplied with these commodities and a limited selection of canned goods is the only available supplement to a diet of "meat and potatoes".
Even in the mixed farming areas, attempted self-sufficiency in foodstuffs often means too great a reliance on the staple foods to provide the diet for maximum health.

Some indication of the distribution of foods purchased and furnished on the farm is given in the following table. They are the result of a survey made in 1934 of the average consumption of specified foods amongst farm people of Alberta, Saskatchewan and Ontario.

Potatoes, milk and eggs were excluded from the analysis on the assumption that they were furnished by the farm, as were also all goods which might be described as luxuries.

Table 33. Percentage Values of Leading Food Groups Furnished and Purchased, 1934, among Alberta, Saskatchewan and Ontario Farm Families

<table>
<thead>
<tr>
<th></th>
<th>Alberta</th>
<th>Saskatchewan</th>
<th>Ontario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Purchased</td>
<td>Purchased</td>
<td>Purchased</td>
</tr>
<tr>
<td></td>
<td>nished</td>
<td>chased</td>
<td>nished</td>
</tr>
<tr>
<td>Meats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter and cheese</td>
<td>87</td>
<td>13</td>
<td>90.9</td>
</tr>
<tr>
<td>Flour</td>
<td>43</td>
<td>57</td>
<td>26.9</td>
</tr>
<tr>
<td>Canned goods</td>
<td>10</td>
<td>90</td>
<td>6.3</td>
</tr>
<tr>
<td>Sugar</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Tea and coffee</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1</td>
<td>99</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>64.0</td>
<td>36.0</td>
<td>63.0</td>
</tr>
</tbody>
</table>

1Data from farm correspondents, 523 in Alberta, 512 in Ontario and 639 in Saskatchewan. Canada. Dept. of Pensions and National Health. The National Health Review. 4: 84, 1942.
The survey indicates the relative self-sufficiency of farm families in meats, butter and cheese with a greater proportion purchased in Ontario. The reliance on purchases for canned goods is some indication of the effect prices, selection and distribution of these commodities is likely to have on variation in farm diets. Likewise, a decrease in farm purchasing power will mean less spending on these commodities and greater reliance on home production. As has been stated above, this often means a very limited choice of foods, and not only monotony but deficiency in food intake.

Measures to remedy deficiencies in farm diets require a broader knowledge of dietary needs and the availability of the right kind of foods. If milk is provided to rural schools together with teachings on food values, the influence will spread to the home. This, together with radio and adult group education will create an interest in the value of balanced diets.

An interest, however, is not enough unless the foods are available. In areas where vegetable gardens are insufficient for an annual supply, then local storage centers might be set up for vegetables and fruits which will distribute these items at regular intervals to dealers, or direct to the farmers at a price related to the returns from cash crops in that area. The aim should be a steady supply but a flexible price so that farm families as well as urban and city families would be able to obtain foods at all times independent of business fluctuations and industrial or agricultural depressions. A great deal of farm family
nutrition depends on education both as consumers and as producers. Extension workers can do much more in all provinces to relate production technique to home dietary requirements, and as deficiencies become apparent, distribution and local storage plans will be facilitated.

Food Habits

"Food habits are seen as the culturally standardized set of behaviors in regard to food manifested by individuals who have been reared within a given cultural tradition. These behaviors are seen as systematically interrelated with other standardized behaviors in the same culture."1 The environment of the individual with respect to food production and distribution will no doubt be a strong influence in the type of food normally consumed but no less important are resistance and habits developed through childhood and inherited from certain cultural patterns. If these habits are to be changed then there are certain bases for consideration. A change in availability of food may necessitate a change in the type or the amount consumed. Substitutes may become more easily available, or necessity may encourage a psychological change.

Certain changes may occur as the frame of reference is changed, such as health foods or foods which were originally saved for celebrations

becoming part of the every day diet. Group eating such as school lunches or factory meals may institute new habits. Education and advertising will eventually influence those concerned. The values of food choice are governed by four main frames of reference, money, health, taste and status, according to a study by Kurt Lewin. In the high income group health is predominant. In the middle group and low income group money is predominant with the difference between money and health the greatest in the low income groups. Education in adjustment of meals to the resources available rather than on moral or health grounds has been found more effective. Suggestions of reform tend to antagonize rather than assist reasoning.

The aim of influencing food habits is to introduce and maintain flexibility to respond to new scientific findings.

The decision must finally rest with the homemaker and for this reason her independent choice is the controlling factor in dietary patterns. Consciousness of relative food values, the breakdown of elementary biases and awareness of the gains to be attained by particular habits are essentials for the continuity of recommended food consumption.

Education

The existing system of public schools can be used to introduce the problem of food in relation to health, the meaning of adequate diets.

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known deficiency diseases and other pertinent questions suitable for that level of education. The responsibility for instituting and enforcing such a program would be with the provincial school authorities and the local municipalities. This influence would no doubt be carried into the home. At the same time, however, adult education both rural and urban by food preparation demonstrations, discussion of retail marketing problems and lessons on relative food values should be part of an established national program coordinating the efforts of public and private organizations.

**Factory meals and cooperative societies**

The longer hours and the increased numbers employed in factories and other wartime enterprises have given impetus to institutional feeding. The increased efficiency of workers by regular feeding has been sufficient incentive for employers to institute facilities for the provision of meals. Some control over the types of food used and the cooking methods followed, provides workers the opportunity to obtain balanced meals at a reduced cost. Likewise cooperative societies can bring the benefits of reduced costs to the householder.

**Distribution**

The long distance between settlements and the high cost of transportation relative to the cost of production of farm products places a limitation on the real incomes of Canadian consumers. This is particularly true of those commodities which either cannot be produced at all
in a particular area, or which can be produced only at a cost which delimits consumption. When a food is produced locally the same food produced elsewhere and transported into that area can only compete on the local market at the same price. The cost of producing the imported food must be less by at least the cost of the transportation before it will be profitable to ship to this market. The extent to which it will move, however, depends on the demand for the product which again is determined by the demand for substitutes, and the net income of consumers. If there is insufficient production in an area to meet nutritional requirements, this may be due to a price too low to attract local production or one at which it would not pay to import. A slight price rise may either attract imports, or increase local production depending on the comparative advantage of the two areas in the production of this particular good. If the productive resources of the country were so distributed that marginal social net products were everywhere equal, then production would be organized in accordance with the principle of social comparative advantage. In other words, the supply of the necessary food would be a function of demand. Resources distributed according to private comparative advantage, however, may not be compatible with social comparative advantage. Imperfect competition in the distribution of a good is a case in point.

The fruit producers of Canada located in the Eastern provinces and British Columbia have a comparative advantage in the production of this product, and to a large extent control the distribution. Citrus fruit is not produced in Canada and restrictions on its import in order to
encourage the use of domestically produced substitutes such as apples and tomatoes lower social net product. Such fruits are grown in areas of the United States at low production costs. Their sale in Canada should be a function of transportation costs, yet in addition to this there is a tariff on most fresh, canned and dried fruits, from the U.S.A. varying from 10 per cent ad valorem to 22.5 per cent ad valorem. The tariffs extend to dried and fresh vegetables also.

If consumption of essential food is restricted in Canada by a tariff, then such a tax has the bad characteristics of inequity possessed by a sales tax, and should be abolished. If the tax is used as a protective device for domestic producers of substitutes or near substitutes, then there is all the more reason why it should be removed. Many of the Canadian import taxes are part of an Empire Preference scheme granting concessions to other exporting countries of the British Commonwealth of Nations. The latest trade agreement in 1939 between Canada and the U.S.A. granted concessions to U.S. exporters on many foods, and was a distinct step forward. The restricted imports are not made up from Empire sources, therefore, private comparative advantage is in conflict with social comparative advantage. The cheap source of fruits in the U.S.A. should be exploited to the full if Canadian consumers are to gain from the comparative advantage of that country in the production of those products. The displayed lack of fruits and vegetables in the Canadian diet can be remedied in several ways. All import restrictions should be removed so that domestic producers and distributors must compete on the open market. Increased
efficiency may expand their market by lowered prices, but on those commodities which when imported could be sold at lower price, the choice should remain with the consumer and to that extent price will guide the use of resources.

Canning

Whether done in the home or factory, canning is a valuable means of distributing supplies of fruits and vegetables through the year. Some loss of nutrients is to be expected, but advances is known techniques will reduce this loss. Urban dwellers do not always have the means to can sufficient quantities for their families. Rural dwellers do not always have the supply. Therefore, factory canning will fill this gap. Its growth as an industry will depend on the demand for the product but the initial encouragement of both demand and supply by advertising, education and the availability of cheap capital may provide the necessary incentive.

Dehydration

The drying of milk and other foods for wartime uses has necessitated investment in plant which will provide peacetime supplies. The compact form of dehydrated foods will lower transportation costs and their use should be invaluable in opening up great possibilities for expanded consumption. Particularly will they be useful in communal feeding and in isolated rural areas where local production of such foods is negligible.
Frozen foods

Vitamin losses incurred in the freezing process are relatively small. Given the necessary storage and freezing facilities, this method is the most nutritionally acceptable of storage methods.

Income

One of the strongest influence on the diet of consumers is net income or net wage earnings available for food expenditures. This net income will vary with the gross earnings and the cost of non-food essentials, such as housing, clothing and certain fixed costs. Net real income available for food expenditures can be increased by (a) reducing the cost of non-food items such as rents, manufactured capital and semi-durable goods, and non-food consumer goods, (b) increasing gross income by higher wage levels, longer working time, and continuous employment, and (c) by lowering the cost of food to the consumer.

The following table indicates the extent to which high rents can make inroads into the consumer purchasing power available for food. This is on the assumption that twenty per cent of the family income for rent is a desirable goal.

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1 Overhauling the tariffs on imported manufactured goods established under the Infant Industry Protective Policy.
2 A large proportion of this cost is in distribution, processing and handling charges.
3 Advisory Committee on Reconstruction, Canada. Unpublished manuscript on Housing. 1943.
Table 34. Average annual family earnings, proportionate and actual rent paid, and percentage of families showing disproportionate rent, for wage-earner tenant families in the low income group, principal metropolitan areas, 1941

<table>
<thead>
<tr>
<th>Metropolitan area</th>
<th>Average annual family earnings</th>
<th>Proportion of families paying actual rent</th>
<th>Proportion of actual paying disproportionate rent</th>
<th>Rent from disproportionate rent</th>
<th>Percentage of families paying disproportionate rent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halifax</td>
<td>$735</td>
<td>$12.25</td>
<td>$18</td>
<td>$6.75</td>
<td>66.5</td>
</tr>
<tr>
<td>Saint John</td>
<td>579</td>
<td>9.65</td>
<td>14</td>
<td>4.35</td>
<td>61.8</td>
</tr>
<tr>
<td>Quebec</td>
<td>612</td>
<td>10.20</td>
<td>17</td>
<td>6.80</td>
<td>89.5</td>
</tr>
<tr>
<td>Montreal</td>
<td>652</td>
<td>10.87</td>
<td>17</td>
<td>6.15</td>
<td>90.4</td>
</tr>
<tr>
<td>Ottawa</td>
<td>780</td>
<td>12.68</td>
<td>19</td>
<td>7.55</td>
<td>86.0</td>
</tr>
<tr>
<td>Toronto</td>
<td>826</td>
<td>13.77</td>
<td>25</td>
<td>11.35</td>
<td>91.8</td>
</tr>
<tr>
<td>Hamilton</td>
<td>866</td>
<td>14.45</td>
<td>21</td>
<td>6.57</td>
<td>85.0</td>
</tr>
<tr>
<td>London</td>
<td>775</td>
<td>12.92</td>
<td>20</td>
<td>7.06</td>
<td>89.5</td>
</tr>
<tr>
<td>Windsor</td>
<td>943</td>
<td>15.72</td>
<td>21</td>
<td>6.28</td>
<td>75.3</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>614</td>
<td>10.23</td>
<td>18</td>
<td>7.77</td>
<td>92.0</td>
</tr>
<tr>
<td>Vancouver</td>
<td>574</td>
<td>9.57</td>
<td>16</td>
<td>6.43</td>
<td>89.5</td>
</tr>
<tr>
<td>Victoria</td>
<td>701</td>
<td>11.68</td>
<td>19</td>
<td>7.32</td>
<td>79.2</td>
</tr>
<tr>
<td>Total 12 Areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan</td>
<td>705</td>
<td>11.72</td>
<td>19</td>
<td>7.28</td>
<td>88.7</td>
</tr>
</tbody>
</table>

1 Low income group comprises first third of tenant families.

2 Computed by taking twenty per cent of family income.

3 Rounded to nearest dollar.
Additional food purchasing power would broaden the choice of alternative foods. It will also enable the total food purchases to increase, as in Table 3 the consumption of certain foods is shown to have increased during the war period. There is no guarantee, however, that given an increase in income available for food consumption, it will all be so spent. There is no forcing consumers to follow a certain spending pattern if freedom of choice is to be retained. For this reason the income effect on nutritional efficiency cannot be considered in isolation from non-food expenditures. The relative cost and availability of consumers goods and luxuries and the social standing of the consumer are additional factors to be considered. Similarly, the shift from one income group to another does not necessitate adoption of the eating habits of that group, even though the opportunity to do so may exist.

That the income of the family or individual does affect the purchase of certain foods considered essential for adequate diets has been shown, and is generally agreed. Therefore, given the existing price structure, an increase in net incomes to equalize the food purchasing power of individuals within the group under consideration would remove the obstacle. This must be considered as only a partial solution.

While the desired effect may develop in the long run, the short run problems are related to eating habits, custom, inertia, availability, production, relative costs, standard of living and international trade amongst others.
The relation between income received and expenditure on food means that the total food bill is dependent on the total wage bill. In periods of relatively full employment the absolute amount spent on foods is in excess of the amount spent on foods in periods of less employment. In Canada, full employment is closely related to world market conditions, and domestic industrial and agricultural activity is dependent on the export-import trade. To the extent that world demand for Canadian products falls, the domestic purchasing power is decreased and the total demand for food falls. Considering the agricultural productive capacity of Canada in relation to her population, it is somewhat ironical that there should be malnutrition because of fluctuating industrial activity in other countries. Therefore, fluctuations in trade should not be allowed to cause similar fluctuations in domestic food purchases. The same argument would apply to fluctuations in domestic industry and total wage payments.

The Canadian national income increased from the peak year of 1929 at 4.7 billion dollars to over 6 billion dollars in 1943. Unemployment except of the seasonal or transition type was non-existent in 1943 and the total food consumption increased. It is not possible to estimate the extent to which malnutrition decreased during these years but considering the effective price control, the supply of food and the demand for labor, income was not a strong limiting factor. The maintenance of industrial activity and export trade, similar to the war years would go far to removing one of the prime limiting factors of nutritional efficiency.
Subsidized Consumption

The problem of counteracting the fluctuations in food purchasing power due to industrial or trade conditions has far reaching implications. In a competitive economy, price is a measure of demand in relation to supply at a point in time. If prices fall in the same ratio as wages fall, then real income will not be affected by the price change. A fall in wages with a disproportionate fall in price or a change in relative prices will introduce both an income and a substitution effect. Consumers will attempt to substitute the lower priced foods for the higher and the demand for certain preferred foods will be decreased.

The important factor is not so much the fall in money income as the fall in real income. Therefore, if the real food income can be maintained during periods of reduced wage payments, much of the malnutrition from food intake variations will be removed. It is obvious, however, that to attain such ends, food would have to be removed from the market process or else some form of subsidy payments to consumers relative to market prices would have to be resorted to.

If food is purchased by one group and given to another group without any other than nominal commitments, then it can be said to be removed from normal price relations. Under such classification would come relief feeding programs or school lunch programs.

To the extent, however, that consumers choice in foods is maintained
and producers plans are related to market prices which are not free
competitive prices, then the real income of consumers may have to be
maintained by modifications of the existing prices, or by additions
to consumers money incomes.

Prices have the dual function of directing resource use and of
reflecting consumers choice. If this process is interfered with,
resource use and consumer demand are separated, creating what is
referred to as misuse of resources. Production of certain goods
beyond the stage where they are of immediate value to consumers may be
the result of a price policy aimed at retaining if not increasing pro-
ducers incomes. Such a conflict between the use of resources and
producers welfare must reflect on the rest of the economy or for our
purposes, on consumers real income.

Basically the two questions of agricultural producers and con-
sumers welfare are part of the same problem. Given a national income
and a distribution of that income which will enable consumers to pur-
chase adequate food, then an increased demand will be reflected in
increased incomes to producers. To the extent that producers exceed
that demand, it is a producers problem and refers to the use of
resources in agriculture relative to their use in other forms of economic
activity. If, however, the national income and its distribution is
below this level, and the purchasing power of money in terms of food is
reduced, then any attempt to bolster producers income by price controls
may well reduce further the real incomes of consumers. For this reason,
if price is used as a means of aiding producers welfare, a supplementary
price policy may be necessary to protect consumers welfare.
On the other hand, a monetary outlay aimed at maintaining food purchases in a period of falling wage payments, would also if efficiently handled retain that portion of the producers income which came from the sale of domestically consumed foods. To this extent directly subsidized producer prices would be less necessary, and resource use would tend to reflect consumer demand. Of course that portion of farm income derived from the sale of export goods would still be dependent on overseas demand, and create a separate problem. This is particularly true in Canada, and for this reason, subsidized consumer food purchasing power will not materially affect the income of a large proportion of the producers, as would be the case in a country which consumed the greater part of its own production.

The use of feeding plans to solve the problems of surpluses, which has been the main characteristic of many such U.S. schemes has only limited possibilities in Canada. The relative gains to Canadian producers of maintaining an adequate domestic diet is likely to be less than the gains to consumers. This does not imply that there would not be absolute gains to many producers from such a scheme, but it could not be regarded as more than a partial solution of the problem of maintaining producers income.

Given the productive capacity and given the need for the food, it is the responsibility of the government to prevent obstacles in the movement of this food to consumer channels. Efficient marketing distribution and grading of food is the responsibility of the Dominion and
provincial governments which might well reduce costs over handling charges to the ultimate consumer. If the ability to pay is one of the obstacles, then a decision will have to be made by the government as to whether it is prepared to assume the responsibility of subsidizing consumption on a national scale.
POLICY RECOMMENDATIONS

Canada's food resources have not been within reach of all consumers in that country. The most obvious deficiencies in diets are milk and milk products, green vegetables, fresh and citrus fruits.

Pre-war studies indicated the restrictions on food consumption imposed by the scale of family earnings. During the war years, however, conditions of relatively full employment and increased earnings of the previously low income groups were reflected in the demand for "protective" foods. The money wage increases were accompanied by real wage increases from effective price controls and subsidy payments at the retail level on milk and imported fruits. Greater export and domestic demands for food were accompanied by increased production particularly in the west, encouraged by a centralized price subsidy policy, which directed the use of resources. The rationing of certain foods to maintain equity of distribution also created a greater food consciousness on the part of consumers to relative nutritive values.

The major influence on the purchase of foods is the net income of consumers. As the Canadian national income increased, the proportion spent on food remained fairly constant, and total food consumption increased. It appears that much of this increase came from the income groups which before the war were deprived of the ability to purchase certain of the "protective" foods.
Prevention of future fluctuations in food consumption due to this cause can be attained in major part by the maintenance of relatively full employment. Under the existing pattern of resource use, this will necessitate a continued high level of exports, consequent of a positive government assisted trade policy and the maintenance of a high domestic wage bill which will allow greater consumption expenditure by wage earners and the lower income groups. Full employment in itself, however, is no guarantee of adequate food consumption by all Canadians. There will still be members of the economy whose productive capacity is not sufficiently adequate to earn an income which will buy the preferred foods. Consequently, while every effort should be made to maintain full employment, supplementary programs should be instituted in the short run to ensure adequate consumption by this group. In the long run efforts should be made to put these people on a self sustaining basis by education and adequate medical care.

As far as possible what is tantamount to the physical health of the nation should be removed from the effects of fluctuating industrial activity and export trade. One method of accomplishing this is by subsidizing consumer incomes for the specific purpose of food purchases during periods of reduced employment and falling wage payments. The proposal will serve the dual purpose of maintaining that portion of producers, processors and distributors income derived from domestic food sales, and allow Canadians to eat the foods necessary for maximum health.
One shortcoming to such a scheme as indicated by G.S. Shepherd is "No provision is made to ensure that the food money will be spent for the adequate diet."\(^1\) The benefits to Canadian producers would be limited to the extent that production was for domestic consumption. Therefore, the scheme should be extended to rural as well as urban consumers. Especially is this true where natural resources necessitate specialized cash crop production. It is essential, however, that any such scheme should be tied in with a long run plan of resource use aimed at maximizing social product. In other words it should not be used to maintain status quo when readjustments in the production pattern would be beneficial to economic welfare. "Over a period of years, if farm incomes are increased by a subsidized consumption program...agricultural production is likely to increase. This increase...would lessen the adverse effects on non-participating consumers. It would also lessen the effects of the program on farm income."\(^2\)

A further means of reducing sharp changes in food consumption because of income fluctuations would be to institute and expand a school lunch program in all sections of the economy. In this way children would receive additional benefits, and carry the influence into the home.

The net income available for food expenditures is greatly depend-ent on the prices of certain non-food items. Of these one of the most

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\(^1\) Shepherd, G.S. Agricultural Prices After the War. Iowa State College. Dept. of Econ. and Social. Wartime Farm and Food Policy. Fam. No. 11, p. 82. 1945.

matters concern nutrition, while in the earliest stages has great
should be encouraged. The development of new breeds of plants to
in the quantities of foods which support reference to the nutrition component
be added an important part. The data and studies show that are general transported to the case in point. To this end cooperative
a national program to lower deterioration costs. The use of drip
innovation in transportation and retail distribution should be part of
registration. Increased attention to and the operator of transportation
be intensified and where necessary brought under other government
the price or essential foods above the level in the case of case it was
Any études bases or other means would reduce consumer distrust in
Any product that presents in Canada necessitates great emphasis on food distribution
The participation in produce can work at the long distance between

Local Grocers
Through the schools and by public education through radio and
through the schools and by public education through radio and
This can be expanded.
other education in food values and the education
with the responsibility of education in food values and the education
with the responsibility of education in food values and the education

Waste

Food habits, distribution, nutrition and undernutrition are custom and
directly would reduce the extent of Subjacent problems are custom and
other influences affecting food preferences which I propose

Important to read and there should be established conditions feasible
The fluctuation in supplies of domestically produced seasonal crops such as fruits and vegetables can be reduced by more extensive use of recent technological improvements in canning, dehydration, freezing and refrigeration such as cold storage lockers. Much wastage and income loss can be prevented by some regulation of the flow of supplies to market. As fresh crops of small fruit, or green vegetables are harvested, the domestic market is generally glutted by the attempts of producers to market as soon as possible. The prices fall and even then supplies are often not absorbed. The rapid growth of canneries and food processing plants before and during the war are indications of the potentialities of these enterprises as a new source of investment outlet.

The construction and expansion of these industries in all surplus producing areas can be encouraged by publicity and the provision of cheap credit by the government.

All obstacles to the increased import of vegetables and citrus fruit, such as tariffs, should be removed and imports from cheaper sources of supply in the United States encouraged.

The use of prices to maintain producers' income is uneconomic unless related to consumer demand and the use of resources consistent with national progress. Producers will be greatly helped in their resource plans for meeting total domestic requirements if production goals and prices are announced in advance of the production period. This in turn should be related to the provision of credit and advice on production problems and the maintenance of flexibility in the farm enterprise.
wherever it is economic to do so. In this way much of the variations
in supply resulting from price and demand uncertainty will be removed.
If international commodity agreements gain in importance similar forward
announcements of prices and quantities might be used for export pro-
duction.

The organization and direction of the food program as outlined
above enlarges the sphere of government assistance and control. For
this reason a Canadian Ministry of Food or its equivalent, should be
established. This Ministry should assume the responsibility of ensuring
adequate diets for all Canadians. Its functions will necessitate close
 collaboration between the Department of Agriculture, the Department of
Trade and Commerce, the Department of Finance and Provincial Govern-
ments for the forward announcement and fulfillment of production goals,
prices, purchasing power guarantees, tariff policy, and the general
formulation of a national food policy. Its influence shall extend to
education, food distribution, transportation, storage and the mainten-
ance of supply lines.

It is a social responsibility that Canadians should at no time
suffer from malnutrition and that economic development should be coin-
cident with the maintenance of health and welfare of the nation's people.

Only by such an accomplishment can the aims of the International
Food and Agriculture Organization be accomplished in the less fortunate
countries of the world.

1 An alternative might be a Ministry of Welfare to develop and
coordinate public health, social welfare and food policy.
SUMMARY AND CONCLUSIONS

The dietary allowances adopted by the Food and Nutrition Board of the U.S. National Research Council in May 1941, are used as standards for measurement of the adequacy of Canadian food intake.

The main deficiencies in the Canadian diet are milk and milk products, green vegetables and fruits.

Factors affecting the supply of vegetable, fruit and milk in Canada are the seasonal production pattern, imports, local production, the knowledge by consumers of their nutritive value, and the inadequate use of technological advances to even out the domestic supply through the year.

The consumption of milk increased in Canada during the war years because of increased production under the incentive of controlled prices, production and consumption subsidies, and increased buying power.

The number of milk cows producing for the commercial whole milk market should be increased from fifteen to twenty per cent over the 1942 level, if the preferred level of milk consumption is to be maintained.

Handicaps of transportation of whole milk can be overcome by greater use of dried whole, dried skim and evaporated milk products. The regional differences in productive capacity accentuate the importance of a continuous flow of foods between areas in Canada.
The government should encourage greater development of canning technologies and products. A levy on tariffs, which should be removed, is important to stimulate and increase from the U.S. are substantial.

Results

Expectations of the nation's climate should be a government goal. More and more consumers are becoming aware of the importance of food consumed in a healthy, balanced diet.

The amount of "processed" food consumed in a healthy, balanced diet is.

The growth and potential of the expanding of exports to the world is.

In the farm economy, the supply and demand of food products are a vital factor. Domestic demand and the world market are often unevenly balanced, creating a need for increased food imports. The proportion of food products in the employed labor force is.
of protected consumers were to increase the food consumption

A rational intensity of food should be espoused for the purpose

The year

Reduced rents and reduced transportation in supplies of essential foods can

nutritional expenditure, lower transportation and distribution costs.

This should be accomplished by a positive program to expand

One might think of one means of effecting this and

headed over program to combat food-controlled transportations in food per

food substantially Program to combat food-controlled transportations in food per

with the assumption of adequate diets for all consumers. A consumer

resources and income fluctuations should not be allowed to interfere

domestic diet is likely to be less than the gain to consumers. The relative extra to Canadian producers of malnutrition and adequate

prices of essential non-food consumer goods and distribution costs

consumers not real income can be increased by reducing rents.

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