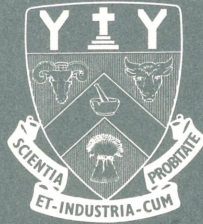


AGRICULTURAL
ECONOMICS
RESEARCH UNIT



Lincoln College

A MARKET TARGET
FOR THE NEW ZEALAND
DAIRY INDUSTRY

by

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*

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A MARKET TARGET FOR THE NEW ZEALAND

DAIRY INDUSTRY

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THE AGRICULTURAL ECONOMICS RESEARCH UNIT

THE Unit was established in 1962 at Lincoln College with an annual grant from the Department of Scientific and Industrial Research. This general grant has been supplemented by grants from the Wool Research Organisation, the Nuffield Foundation and the New Zealand Forest Service for specific research projects.

The Unit has on hand a long-term programme of research in the fields of agricultural marketing and agricultural production, resource economics, and the relationship between agriculture and the general economy. The results of these research studies will be published as Unit reports from time to time as projects are completed. In addition, it is intended to produce other bulletins which may range from discussion papers outlining proposed studies to reprints of papers published or delivered elsewhere. All publications will be available to the public on request. For list of publications see inside back cover.

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P R E F A C E

In the marketing section of its research programme the Agricultural Economics Research Unit is concerned, amongst other things, with formulating projections of the future demand for New Zealand's agricultural exports.

Such projections are an essential ingredient in the formulation of long term development plans for the New Zealand economy, especially in so far as those plans are concerned with the desirability of emphasis on increasing exports compared with the expansion of import substitution.

Market projections are also needed to assist policy makers in making the correct decisions as to the relative accent which should be placed on different products within the broad agricultural group. In this latter context, market projections or targets for specific products, are particularly important as a necessary adjunct to the overall agricultural production target of 4 per cent per annum, set by the Agricultural Development Conference.

In this paper, Mr Frampton directs his attention first to the general methodological questions underlying market projections; and then he turns his attention more specifically to the likely future supply of and demand for dairy products. The question he sets out to answer is "Can New Zealand in the next ten years sell, at profitable prices, an increased quantity of dairy products at a rate which would justify encouraging the industry to expand its output at 4 per cent per annum?".

Lincoln College
June 1965

B. P. Philpott

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A MARKET TARGET FOR THE NEW ZEALAND

DAIRY INDUSTRY

1. INTRODUCTION^(a)

It is now generally recognised by observers and students of the New Zealand economy that the rate of economic growth in the years ahead is vitally dependent on a rising level of foreign exchange earnings from exports. It has also been conceded that these increased earnings must be largely derived from agriculture. The recent Agricultural Development Conference has concentrated attention on the fact that New Zealand's future growth will depend upon her ability to sell an increasing volume of wool, meat and dairy products in overseas markets in order to sustain a rising standard of living. The Targets Committee of the Conference has estimated that in order to secure a modest 2 per cent growth in real income per head per year it will be necessary to expand total exports from the £300 million achieved in 1962-63 to £467 million by 1972-73, an increase of £16.7 million each year. The Committee also estimated that only £45 million of the £467 million required in 1972-73 can be

(a) I am indebted to Professor B.P. Philpott for his helpful comments on this publication.

earned outside the pastoral industries. In percentage terms this means that pastoral exports will have to increase at a compound rate of 4.1 per cent per annum at constant prices.

This estimate of foreign exchange earnings has been translated into a physical estimate by the Targets Committee. They suggest that livestock numbers must increase from 80 million 'ewe equivalents' in 1962 to 111 million 'ewe equivalents' in 1972-73, representing an average increase at compound rates of 3.5 per cent per year. The assumptions adopted when making these calculations are given in the Report of the Targets Committee.^(a) In estimating the level of exports needed to balance overseas payments in 1972-73 the Treasury Department assumed constant terms of trade^(b) and other prices. The assumption of constant prices is of fundamental importance when assessing the validity or reasonableness of the derived figures. Prices are, of course, dependent on many factors but in the long run the two main determinants of the price of a product are the level of production (supply) and the requirements of the consumer (demand). Therefore, this assumption of constant prices needs serious and critical examination by means of a careful review of market targets for individual products. These market targets are needed to supplement the overall production targets already produced.

(a) Report of the Targets Committee of the Agricultural Development Conference, March 1964, pp.6-10.

(b) The terms of trade is the expression of the ratio of export prices to import prices, i.e. constant relative prices.

In this paper we are concerned with the likely future world supply of, and demand for, dairy products during the next decade. The study has been considerably handicapped by the lack of current data on production trends and more especially on consumption trends for many countries. This deficiency emphasises the need for the establishment of an efficient statistical reporting service in New Zealand for the collection and distribution of overseas statistics.

Several of the many demand and supply projections that have been made in recent years are reviewed and those of particular interest to New Zealand discussed in more detail. An attempt has been made to determine whether actual production and consumption has been consistent with the projected trends. The results of the study are then discussed from New Zealand's point of view and an attempt made to answer the question:

"Can we sell an increased output of dairy products, at profitable prices during the next ten years"

and consequently

"Should the dairy industry be encouraged to expand at a rate that will ensure a 4 per cent compound rate of growth in the export quantities of milk products?"

The answer to the question is in the affirmative provided the selling authorities take a long term rather than a short term view and embark on a thorough, sustained and (possibly) expensive marketing campaign, particularly in Japan. There seems no reason to support the view that the dairy industry should be encouraged to expand at a slower rate than the meat and wool sectors of agriculture.

2. AGRICULTURE IN RELATION TO ECONOMIC GROWTH

The relative importance of the agricultural sector of an economy, the pattern of food production and consumption all change as economic development proceeds. These changes will be discussed very briefly to provide a background to a study of the future demand for food products and also to a review of methods that have been used to project future supplies and requirements.

It has been estimated⁽¹⁾ that from 300 to 500 million people suffer from physical hunger because their daily intake of calories is too low. A further 1,000 million are thought to suffer from malnutrition due to imbalanced diets, the main deficiency being animal protein. Hunger is especially widespread in the Far East where probably 20 to 25 per cent of the population (excluding Japan and Mainland China) suffer from involuntary hunger.

Countries having a food deficit are those classed by Rostow⁽²⁾ as traditional agricultural societies which are entering the initial stages of economic growth. A large proportion of the labour force is engaged in subsistence agriculture but output per head remains at low levels because the potentialities which flow from modern science and technology are either not available or not regularly and systematically applied. A chronic shortage of foreign exchange severely limits imports of food, especially the much needed, but expensive, foods of animal origin. Food-aid programmes, principally controlled by the United Nations and the United States attempt to provide additional food in

such a way that interference with domestic agricultural adjustment and commercial imports is reduced to a minimum.

As the techniques of modern science begin to be translated into new production functions in both agriculture and industry, a suitable environment is created for a rapid increase in economic growth. During this period new innovations spread in agriculture as well as in industry as agriculture is commercialised and increasing numbers of farmers are prepared to accept the new methods and the deep changes they bring to ways of life. These revolutionary changes in agricultural productivity are an essential condition for the successful initiation of economic advancement, for the modernization of a society greatly increases the demand for food from a rapidly growing urban community. Greece, Yugoslavia and Mexico are countries which are passing through this phase at the present time.

As per capita income levels rise the total demand for food increases rapidly, that is, the demand for food is income elastic. However, as consumer incomes reach higher levels the income elasticity of all food falls, because of the limited capacity of the human stomach. A simultaneous change takes place in the composition of the diet. An increasing demand develops for the more expensive foods of animal origin while the demand for cereals tends to fall. This means, in economic terms, that animal products have a higher income elasticity of demand than cereal products.

Economic growth proceeds at an increasing rate until

per capita incomes reach levels sufficiently high to support mass production and consumption. Real income per capita reaches a point where the majority of the population gain a command over consumption which transcends the demand for basic food, shelter and clothing. The structure of the working population also changes so that the proportion of urban to total population increases rapidly. Thus in developed countries consumers tend to demand more expensive foods in highly processed forms, but do not demand more food per head. This is due, not only to physiological factors, but also to the increasingly sedentary nature of human activity in wealthy societies. Simultaneously the production of food tends to exceed demand and surpluses tend to develop. The two main factors involved are the rapid advance and application of technological innovations on farms resulting in greater output per acre and an excessive supply of farmers, that is the transfer of people from rural areas to towns and cities is not taking place at a sufficiently rapid rate. Many European countries, particularly France, and the United States are in this category.⁽³⁾

It can be said, generally, that the existence of food shortages in one part of the world and food surpluses in another results from two divergent trends.

(i) The income elasticity of demand for all food valued at the farm level declines steadily when income rises (0.9^(a) in India to 0.15 in U.S.A.).

(a) An income elasticity of 0.9 indicates that a 10 per cent increase in per capita income will result in a 9 per cent increase in the demand for food. A negative value shows that demand would decrease with an increase in income.

(ii) Yields per acre or per animal increase slowly during the initial stages of economic development but improvement gains momentum during the "take-off" (Rostow) and continues at a rapid rate even at an advanced stage of economic development as a result of continued technological progress.

As long as the increase in yields tends to exceed the rate of population growth, a tendency toward surpluses will prevail. Wheat is the first commodity to reach a surplus stage. Income elasticity is negative in high income countries and yields are still rising. Pulses, milk, sugar and oils are the next commodities for which income elasticity declines rapidly when income rises while yields continue to increase.

In high income countries then, the "farm problem" is that the growth of production does not follow the same pattern as demand. A sufficiently rapid expansion of agricultural production is a critical problem in the initial stages of "take-off" especially when the rate of population growth is very high. Expansions in cultivated areas are generally insufficient to meet the rising demand for food, especially since the major part of government investment does not usually go to agriculture. Moreover the first improvements in yields are often the most difficult to achieve. At a later stage a cumulative rate of advance tends to occur which is often maintained for some time under the stimulus of research and technological innovation. In high income countries the shift from farm to non-farm occupations is a slow process, while the problem of farm incomes becomes a major political issue calling for government support policy. The result is, therefore, often a tendency

towards food surpluses in economically advanced countries.

3. PROJECTIONS OF CONSUMPTION AND PRODUCTION

A number of attempts to chart the future course of the demand and supply of food products have been made in recent years. The reasons for attempting such exercises are briefly summarised below.

There are few countries in the world where agriculture is left to the vagaries of nature or the market. The degree of government intervention varies but most governments have adopted agricultural policies with the aim of creating a productive and prosperous national agriculture in the interests of the nation as a whole. The policies adopted vary according to differing social and economic conditions and are, in particular, determined by the position of a country as an importer or exporter of agricultural products.

Yet, whatever may be the principal aims of government intervention and whatever might be the means used to implement the policy of a country at a given time, the policy makers of each country should attempt to assess future developments. A sound guideline for investment, development schemes and price determination can only be found after some ideas have been formed about current trends in production and consumption and their implications for the future situation of agriculture as a whole and the individual sectors within it.

If production and consumption developed at an equal pace it would be relatively easy to set out a policy for the future. However, the pattern of demand is being re-shaped by rising standards of living and changes in types

of work and ways of life. Demand may especially drop or stabilize for products, the production of which is expanding at a particularly rapid rate.

Governments should also take developments in other countries into account when shaping their agricultural policies especially if their country's agriculture is of importance in international trade. If production, consumption and trade cannot be balanced it will become increasingly difficult to maintain the basic aims of agricultural policy.

A study of present trends in the production and consumption of agricultural products is not only of importance because of the implications which may be derived for the future pattern of trade. The likely relationships between domestic supply and demand levels and the consequent price movements of the different farm products can also be deduced and thus the probable income situation of the farm population.

Thus various international and national organisations have considered it worthwhile to examine the numerous elements at work within the agricultural sector, to determine their implications for the likely level of future supplies and to confront the results obtained with the conclusions derived from an analysis of present consumption trends.

There are very substantial arguments that can be raised against such an undertaking^(a) but the following quotation provides a justification for projection exercises.

(a) See pp. 11-14

"All rational economic decisions are based on projections - that is, upon assumptions concerning the future movement of economic variables. Were it not for such projections, the farmer would have no basis for planting crops, the consumer no reason to save part of his income, the businessman no grounds for investment and the government no purpose in drawing up an income and expenditure budget.

Projections are not, however, the same as outright forecasts of the future; they do not amount to prophecies. Economic life is much too complicated to permit of unconditional forecasts. The best that can be achieved is to form a judgement as to the most probable course of certain variables based upon certain assumptions, both explicit and implicit, concerning their relationships to other determining or explanatory variables. The probable future course of these explanatory variables, however, can also be known only with some margin of uncertainty. All projections, therefore, inevitably include a large element of judgement and - also inevitably - all are subject to some margin of error. This is equally true of projections which represent only a "hunch", resting on nothing more than a long practical experience, of projections which represent a simple extrapolation of past trends and of projections which are derived from the most elaborate econometric models (4) based on modern statistical and economic analysis."

The figures published as projections have often been mistakenly used as predictions. To emphasise the true nature of a projection another quotation is given below which distinguishes projections from forecasts.

"It is important to stress the difference between projections, forecasts and targets. Forecasts attempt to predict the movements of economic variables while a target can be defined as a situation which it is desirable to attain. Projections have neither of these objectives. They are essentially neutral as to the desirability of the future situation and do not pretend to describe how the situation will, in fact,

develop. Indeed, the virtue of projections of this kind is that they reveal the possible imbalances or difficulties which may arise in a future situation on the basis of specific assumptions as to trends and policies, thus allowing changes in policy to be made in time to prevent such difficulties from arising." (5)

It is stressed that projections are a reflection of the assumptions made and the figures must not be used without a thorough understanding of those assumptions. Indeed, it is the assumptions that should be disputed and not the final numerical results.

Now projections (and forecasts) must be based on historical trends and current levels of production and consumption. If the statistical data from which these basic figures are estimated is unreliable because of sizable margins of error in the individual figures or inherent incomparabilities, the value of the projections is considerably reduced. The methods of collection and presentation of this data by The Food and Agriculture Organization of the United Nations (FAO) and the United States Department of Agriculture, have been trenchantly criticised by Helen Fansworth in her article, "Defects, Uses and Abuses of National Food Supply and Consumption Data". (6) These criticisms are summarised below.

Throughout the post-war period the United States Department of Agriculture has shared with FAO the world's leadership in presenting and interpreting national food consumption data. The Department did not publish its first group of food balance sheets until 1951 and it warned that the results were far from perfect even though the work was confined to West European nations that had been closely

studied for many years. Many difficult, partially unsolvable problems had been encountered and despite efforts to compensate for unreported production and for changes in official methods of crop estimation, there remained disturbing inadequacies and incomparabilities in some of the figures. Farnsworth then says,

"Over the past decade, however, the Department has moved farther and farther away from this cautious publication policy. At first it reluctantly followed, but later became as bad as FAO in publishing for many countries consumption estimates to which little research time had been devoted and for which both the basic data and necessary supplementary information were meagre."

A food balance sheet purports to show the total supply of foodstuffs available to a country in a given year (or period of years) offset by the itemized utilization of those foodstuffs. Three elements are listed on the supply side: domestic production, net imports or exports and net changes in end of year stocks. Similarly six elements are listed on the utilization side: seed use, industrial non-food use, animal feed, waste on farms and in distribution, processing or extraction losses and the net supply available for human consumption at the retail level.

Ideally, for each commodity, each of the nine supply and utilization estimates should be both independent and trustworthy. Ideally also, the sum of the three supply elements should in every case equal the sum of the six utilization elements. Alternatively eight of the nine balance sheet items might be independently and reliably estimated, while the ninth determined as a residual that could be adequately tested and found reasonable.

However, it must be said that not even the few

countries which have highly developed statistical services fully meet these standards. These countries do not collect statistics on minor crops or minor producing areas and usually limit stocks records to major commercial and government holdings of a few primary food commodities. They rarely have more than crude and incomplete records of animal feed, non-food industrial use and waste on farms, in storage and in transport. Even the current population estimates for such countries may be wrong by one or two per cent.

"Disturbing as such statistical shortcomings may be in the construction of food balances for highly developed countries they shrink almost to insignificance compared with the distorting defects and inadequacies of the food statistics and population estimates of under-developed countries."

Throughout much of Africa and Asia agricultural production statistics are collected only for a small number of crops. Cattle and sheep numbers may be estimated in some crude fashion but not the associated production of meat, milk or eggs. Even the scanty available "estimates" may be no more than the unsupported guesses of local administrators.

The problems of balance sheet estimation are particularly difficult for meat, milk, eggs, vegetables and fruits. The two major problems are to obtain satisfactory independent reports and checks on production and to determine a fair estimate of loss and waste. In estimating American production and consumption of these foods the analyst has available many different sources of information. Despite this great advantage and the time and attention given to the work, the resulting figures are said to be exceedingly rough, having

been influenced by subjective decisions made in the face of insurmountable problems.

Farnsworth concludes as follows:

"It is time to make clear to all users of national food supply and consumption estimates that current international tables present a mass of incomparable "estimates" ranging all the way from valueless personal guesses to cross-checked estimates of high quality. It is time for the originating agencies to stop showing side by side, undescribed, such extremely different and incomparable figures - time to substitute for the invisible motto caveat usitator (let the user beware), the more appropriate juvetur usitator (let the user be helped)"

The author is largely in agreement with these criticisms. Discrepancies do exist in data from different sources even for countries with highly developed statistical reporting services. This and other evidence gives support to the contention that national food statistics are of extremely variable quality and accuracy cannot be assumed even in developed countries. Therefore, in considering the results of the studies described below the paucity and unreliability of much of the basic data must be constantly remembered.

We now discuss several recent studies in turn.

4. AGRICULTURAL COMMODITIES - PROJECTIONS FOR 1970

This work was first published in May 1962 and was prepared for the use of a Joint Session of the United Nations Commission on International Commodity Trade and of the FAO Committee on Commodity Problems.

4.1 Scope of the Study

The growth in the demand for agricultural products is related to the growth in population and income. In developing countries particularly, the growth in agricultural production is related to the growth of Gross National Product. Therefore the prospective production and demand for agricultural commodities was analysed within the general framework of economic development and therefore on the basis of stated assumptions as to future rates of population and per capita income growth.

The market prospects for Commodity Groups were analysed only for those food commodities which play an important role in world trade (cereals, dairy and meat products, fats and oils, sugar and citrus), for tropical beverages (coffee, cocoa and tea), for the major agricultural raw materials (cotton, wool, jute, rubber) and for forest products.

Countries were divided into three major groups.

- (a) High income countries - North America, Western Europe, Japan, Australia, New Zealand, Argentina, Uruguay and South Africa.
- (b) The Sino-Soviet area - Eastern Europe, U.S.S.R. and China.
- (c) The low-income countries - the rest of the world.

Projections covered both production and demand for the high- and low-income countries. For the Sino-Soviet area such projections were not made and it was not possible to attempt more than an indication, for some products, of an

approximate range of possible changes in the net trade between this area and the rest of the world.

The projections covered a period of 12 years from 1957-59 to 1969-71. The beginning and end of the period was expressed in terms of three year averages to reduce the effect of short term fluctuations. The projections were intended to show the general trend during the sixties under stated assumptions. The length of the projection period was selected for the following reasons:

- (a) A 10 year period enabled temporary and cyclical disturbances to be evened out so that the underlying trends in world consumption and production could be shown.
- (b) The period was short enough to minimise the risk of completely new factors arising which could fundamentally alter the commodity outlook (except, of course, wars and rumours of wars).
- (c) The results of the projections could be compared with those of several other studies using 1970 as the end of the projection period.

It was stated that the study should be regarded as a preliminary analysis to be revised in the light of comments received and experience gained.

4.2 Methods and Assumptions

The methods of analysis used and the assumptions made are now briefly reviewed.

4.2.1 Population and Income

During the fifties population increased rapidly in North America, Oceania and the U.S.S.R., even more rapidly in low-income countries, but rather slowly in Japan and Western Europe. During the sixties, it was expected that the rate of increase would decline slightly in North America and Oceania (partly as a result of the lower birthrate of the war years), and in Western Europe and Japan. In low-income countries the rate of population growth was expected to accelerate as a result of a reduction in mortality rates and maintenance of fertility rates in most countries.

Rates of growth of Gross National Product per head during the fifties were generally modest in North America, Oceania and the low income countries. The increases were more marked in Western Europe (EEC and certain Mediterranean countries) and in Japan. For the sixties the fastest rates of growth were expected in the "middle" income group of countries.

In view of the uncertainty inherent in Gross National Product (GNP) projections two alternative rates of growth were assumed. The lower assumption implied a rate of increase for the world as a whole (excluding the Sino-Soviet area) of 4 per cent per annum which was in line with that of the fifties. The higher assumption implied a 5 per cent rate of increase which was in line with many national plans - it was an optimistic figure. Variations were made in these assumptions for some countries but the difference between high and low rates was generally kept within a range of $1\frac{1}{2}$ per cent per year.

4.2.2 Projection of Demand

Demand for food and beverages was projected on the basis of the assumptions made for population and income growth, given, in general, no change in relative prices. Wherever necessary, demand was projected separately for each of the major end uses. It was assumed as a rule that ceteris paribus a 10 per cent rise in population would result in a 10 per cent rise in the total demand for food while the impact of a 10 per cent rise in per capita income on per capita demand would depend on the commodity and income level of the country concerned. The income elasticity of the demand for food was extensively studied.^(a) This elasticity generally declines when income and per capita consumption rise, particularly for cereals, milk, fats and oils and sugar. The projected increase in per capita demand was therefore obtained by using appropriate demand functions which allowed for a progressive reduction in the value of the income elasticity as incomes rose.⁽⁷⁾

(a) Income elasticities of demand for food were obtained from household survey data, time series and international comparisons. Farnsworth notes that there are four common measures of food consumption. (1) Net supplies of food at the retail level. (2) The food purchases of representative families - a budget study approach. (3) "Food prepared for eating" - a dietary survey approach. (4) "Food intake", i.e. with plate waste deducted. From one to another of these stages of consumption, significant loss and waste occurs, so that the raw data from different types of consumption studies are inherently incomparable.

4.2.3 Projection of Production

The projection of production (supply) raised difficult problems, because of the impact of technological progress and agricultural policies, including price policies, on rates of change of production. Projections were even more difficult for specific commodities than for agricultural production as a whole in view of the possibilities of substitution.

It was generally assumed that the area of agricultural land would remain constant in high income countries and would increase in low-income countries in line with recent trends. For high-income countries past trends in yields were projected although it was recognised that there was greater scope for increase in some countries than in others. Two assumptions were used for developing countries - a lower one corresponding to an extrapolation of recent trends, and a higher one, based on an acceleration of those trends in line with national plans. These were associated with the low and high assumptions for GNP respectively. For livestock products however, projections of production were limited to the high income countries owing to inadequate data for the low-income countries.

4.2.4 Balance between Projected Demand and Production

It was considered that the difference between projected demand and production did not always provide a reliable indication of trade possibilities, especially in cases where trade was marginal in relation to domestic production. For a given country, total commercial imports and exports had to be in balance after allowing for invisibles and

capital movements. It was assumed that a scarcity of foreign exchange would continue to be a major obstacle to the expansion of agricultural imports in low-income countries. Moreover, there were established connections between countries, differences in types of product (e.g. cheese) and bilateral trade agreements which could greatly affect trade patterns. Therefore particular attention was given to the possible development of regional agreements, especially in Europe, to the possible expansion of non-commercial trade under food-aid programmes and to possible changes in the net trade balance of the Sino-Soviet area with the rest of the world.

Two types of balance were established between the projected world demand and production, depending on the commodity concerned: ⁽⁷⁾

- (1) For some commodities, in particular wheat and dairy products, domestic demand and production were projected independently, no attempt being made to consider the implications for trade balances of individual countries. This led, in some cases, to a large world imbalance which was taken to indicate that the assumptions, either on the demand or the supply side, were unrealistic. The purpose of the exercise was then to analyse how the assumptions, especially as regards prices and policies, could be modified so as to reach an equilibrium.
- (2) Demand and production were projected, taking into account the likely flows of imports and

exports of individual countries and a balance was then reached by successive approximations. This method was used for some commodities (including meat) whose production was fairly responsive to demand.

With this brief review of the assumptions made we pass on to a discussion of the projection results for dairy products.

4.3 Projection Results for Dairy Products

The figures derived have been given in more detail (adjusted where necessary) in an FAO paper entitled, "Means of Adjustment of Dairy Supply and Demand"⁽⁸⁾ published in 1963.

The projections for dairy products were based, generally, on an average of the years 1956-60 for economically advanced countries and 1955-59 for developing regions but due attention was given to developments during previous years. So that the results would be comparable all milk products were converted to metric tons of milk equivalent and also to tons of butterfat.^(a) Trade in skim milk powder was considered but casein and skim milk powder were excluded from the food balance sheets to avoid "double counting".

(a) Where possible, national conversion factors were applied. In all other cases standard conversion rates were used. See, "Technical Conversion Factors for Agricultural Commodities", FAO, Rome, 1960.

The countries with advanced dairy industries included North America (U.S.A. and Canada), Oceania (Australia and New Zealand), Western Europe (except the Iberian Peninsula, Yugoslavia and Greece), Poland, Argentina, South Africa and Japan. In these countries "sufficient"⁽⁶⁾ data was available to construct balances for each country (see Tables 3 and 4). For the developing countries, however, the analysis was limited to broad indications of the possible regional development.

The projections of production for 1965 and 1970 were in most cases supplied by the governments concerned, on the basis of balance sheets prepared by FAO. Where official projections were not available, FAO estimates based on recent trends were used. Projections of exportable supplies and import requirements were derived from projections of production and consumption. Actual production and consumption in 1965 and 1970 were not expected to coincide with these projections, since measures would have to be taken in advanced countries to mitigate the surplus problem.

The projections indicated that production of milk in the developed countries of Europe would rise more rapidly than consumption. The same tendency would occur in North America, but to a lesser extent. In Oceania, Argentina and Japan, however, increases in consumption were likely to be greater than those in production. The overall effect would be a further widening of the gap between supply and demand in the developed countries as shown in Tables 1 and 2.

According to the projections, the total production of advanced dairy countries would be 15 per cent higher in 1965 than in the base period while consumption would have increased by 11 per cent. For 1970 the figures were 22 per cent and 18 per cent respectively. The net exportable supply from the advanced countries was estimated to be 10.1 million tons of milk equivalent in 1965 and 11.6 million tons in 1970 compared with 3.3 million tons in the base period (see Table 2). This would correspond to about 455,000 tons of butterfat in 1965 and 525,000 tons in 1970.

From Table 2 it appeared that commercial import requirements of the less developed countries as a whole would be well below the aggregate exportable supplies of the advanced countries.

The commercial net imports of developing countries were projected on the assumption that per capita consumption of milk and milk products in Africa, the Far East and Western Asia would remain at the level of the base period but increase in Latin America and the Mediterranean area. Since production was unlikely to expand as quickly as population growth in the first three areas, total commercial imports were likely to increase. The extent of concessional exports and donations to developing countries could not, of course, be projected.

The excess of production over commercial demand in advanced countries would be 6.8 million tons of milk equivalent (255,000 tons of butterfat) in 1965. By 1970 this surplus would have risen to 8 million tons (302,000 tons of butterfat). These exportable surpluses of

developed countries amounted to about 3.2 per cent and 3.5 per cent of milk production in 1965 and 1970 respectively. On the basis of butterfat, this would correspond to the equivalent of about 60 per cent in 1965 and 72 per cent in 1970 of their total commercial butter exports during the base period. It had to be expected that most of the surplus milk would continue to find its main outlet in butter production. This suggested that difficulties on the butter market would continue and could become more acute.

Production and Consumption in Advanced Countries

Production projections by individual countries are given in absolute figures in Tables 3 and 4. The most important increases were expected to occur in:

- (a) France, where production was expected to rise by 8.9 million tons (42 per cent) and where, consequently, exportable surpluses will be nearly 10 times as high in 1970 as they were in the base period.
- (b) South Africa, where production was projected to increase by 1.2 million tons (50 per cent).
- (c) Poland, where production was expected to increase by 50 per cent which will increase exportable surpluses threefold.
- (d) Italy, where production was projected to rise by 3.6 million tons (40 per cent) reducing import requirements by 35 per cent.
- (e) Japan, where the increase in production was expected to be largest (136 per cent) but where consumption was expected to rise even faster so that import

demand was expected to rise nearly sevenfold.

- (f) The United States, where production was projected to increase slightly until 1965 but to decline thereafter resulting in a drop of 50 per cent in exportable surpluses between 1965 and 1970.

The traditional dairy exporters - The Netherlands, Denmark, New Zealand^(a) and Australia - were expecting to increase milk production only to a limited extent. The indicated result was that total exportable surpluses of these four countries would increase by only about 12 per cent. Consequently, their share in the gross exportable surpluses of the 22 countries was projected to decline from 72 per cent in the base period to 52 per cent in 1970.

Per capita consumption of milk products was projected to rise between the base period and 1970 in all but five of the 22 countries. The exceptions were Ireland, Sweden, Canada, the United States and Australia.

Total human consumption was expected to be lower in only two countries in 1970. In Ireland a decline of 2.8 per cent was projected, due to a decline in population and per capita consumption. In Sweden the declining per capita consumption and a relatively small population increase would cause total human consumption to decline by 1.5 per cent. Projected increases in other countries were as follows:

(a) The information was obtained, presumably, from the New Zealand Government.

- Less than 9.9 per cent : Norway, U.S.A.
- 10 to 14.9 per cent : Belgium, Luxembourg, Austria,
United Kingdom.
- 15 to 19.9 per cent : Denmark, Switzerland.
- 20 to 29.9 per cent : France, Finland, Canada,
Australia, New Zealand.
- 30 to 39.9 per cent : Western Germany, Italy,
Netherlands, Poland,
Argentina, South Africa.

An increase of 168 per cent was projected for Japan.

The projected changes in per capita levels of individual dairy products can be summarised as follows:

Liquid Milk and Cream

Japan and Italy are countries which have very low consumption levels for liquid milk and cream, but a relatively high income elasticity of demand. Consumption was projected to increase by 158 and 24 per cent respectively. Many countries, however, with a high per capita consumption showed very low or negative income elasticities of demand and it was expected that their consumption in per capita terms would decline or remain constant. In Finland, Norway, Sweden and Switzerland declines in per capita liquid milk consumption of 5 per cent, 4.2 per cent, 8.7 per cent and 7.8 per cent respectively were projected. A sharp decline of 20.3 per cent in the United States consumption was projected on the assumption that the shift in consumer taste from whole milk to low fat milk would continue.

Butter

The projections of per capita consumption of butter indicated considerable declines in Australia (18.6 per cent), U.S.A. (18.2 per cent), Canada (18.3 per cent)^(a) and Sweden (10.9 per cent). Substantial increases in consumption were expected in Western Germany (38.5 per cent), Italy (37.1 per cent), the Netherlands (30.9 per cent) and Finland (20.1 per cent). It was thought likely that the declines in the first four countries would be accompanied by declines in the total fat intake while the increases in Germany, the Netherlands and Finland would probably be partly at the expense of margarine so that total fat intake would rise less rapidly than butter consumption.

Cheese

The projections pointed to increased consumption of cheese per capita in all countries except Ireland, where consumption was projected to remain constant. The increases were expected to exceed 25 per cent in Germany, Belgium-Luxembourg, Denmark, Finland, Norway and Poland. In Japan cheese consumption per capita could rise to nearly 170 per cent by 1970.

Canned Milks and Milk Powders

Consumption of condensed and evaporated whole milk powder and 'other' dairy products was expected to increase in all countries. The quantities of milk utilised for

(a) The introduction of a consumer price subsidy in 1962 had the effect of increasing butter consumption in Canada. The projected decline in per capita consumption is likely to change if the subsidy is continued in future years.

such products were, however, relatively small and hence limited increases in per capita consumption would not influence substantially the total dairy balance.

Trade in Dairy Products

In the base period only five out of 22 advanced countries were notable net importers of milk products. The United Kingdom had the largest deficit of 9.7 million tons of milk, followed by Western Germany (1.56 million tons), Italy (382,000 tons), Belgium-Luxembourg (325,000 tons) and Japan (105,000 tons).

For 1965 and 1970, the projections showed much larger net exportable supplies than those of the base period. A particularly large increase was projected for the EEC countries. Exportable surpluses in North America were expected to continue to increase until 1965 but decline thereafter.

Tables 3 and 4 show the projected development of production, domestic disappearance and potential net trade for individual countries. Import demand on a whole milk equivalent basis was expected to increase in the United Kingdom by 9 per cent and in Japan by 580 per cent. Imports into Western Germany would be reduced by 70 per cent while those of Italy would decline by 35 per cent. Belgium-Luxembourg and South Africa were expected to become net exporters while Sweden could become an importer of 100,000 tons. The largest increases in exportable surpluses were projected for France (tenfold) and Poland (threefold). The present large dairy exporting countries could increase their exportable surpluses, but not

substantially. Austria, Finland, Ireland and Norway could also increase their export surpluses.

4.4 Comparison of Actual and Projected Production

The projected and actual levels of total milk production for 22 countries have been compared. (See Figures 1, 2 and 3.) The comparisons show that actual production, as recorded by FAO up to 1963, has approximated the projected trend in most countries. Production has fluctuated markedly around the trend in the United States and the United Kingdom and appears to be well below the projected level in Italy. Until the end of 1963, at least, the huge projected increases for France and Germany were being realised.

The decline in milk production during 1964 has not yet been recorded in published statistics. There are two main reasons for this fall in production.

(i) The drought and severe winter of 1963-64 reduced feed supplies in Europe causing farmers to cull their herds severely. In the United States, unfavourable weather brought dairy production below the 1962 and 1963 levels, while in Canada the butter subsidy programme increased consumption and reduced the exportable surplus.

(ii) As a result of the imposition of quotas on butter entering the United Kingdom, producer prices had to be reduced in a number of European countries. This, combined with a higher level of beef production caused by favourable relative price changes, has had the effect of reducing milk production.

Figure 1
Projected and Actual Milk Production

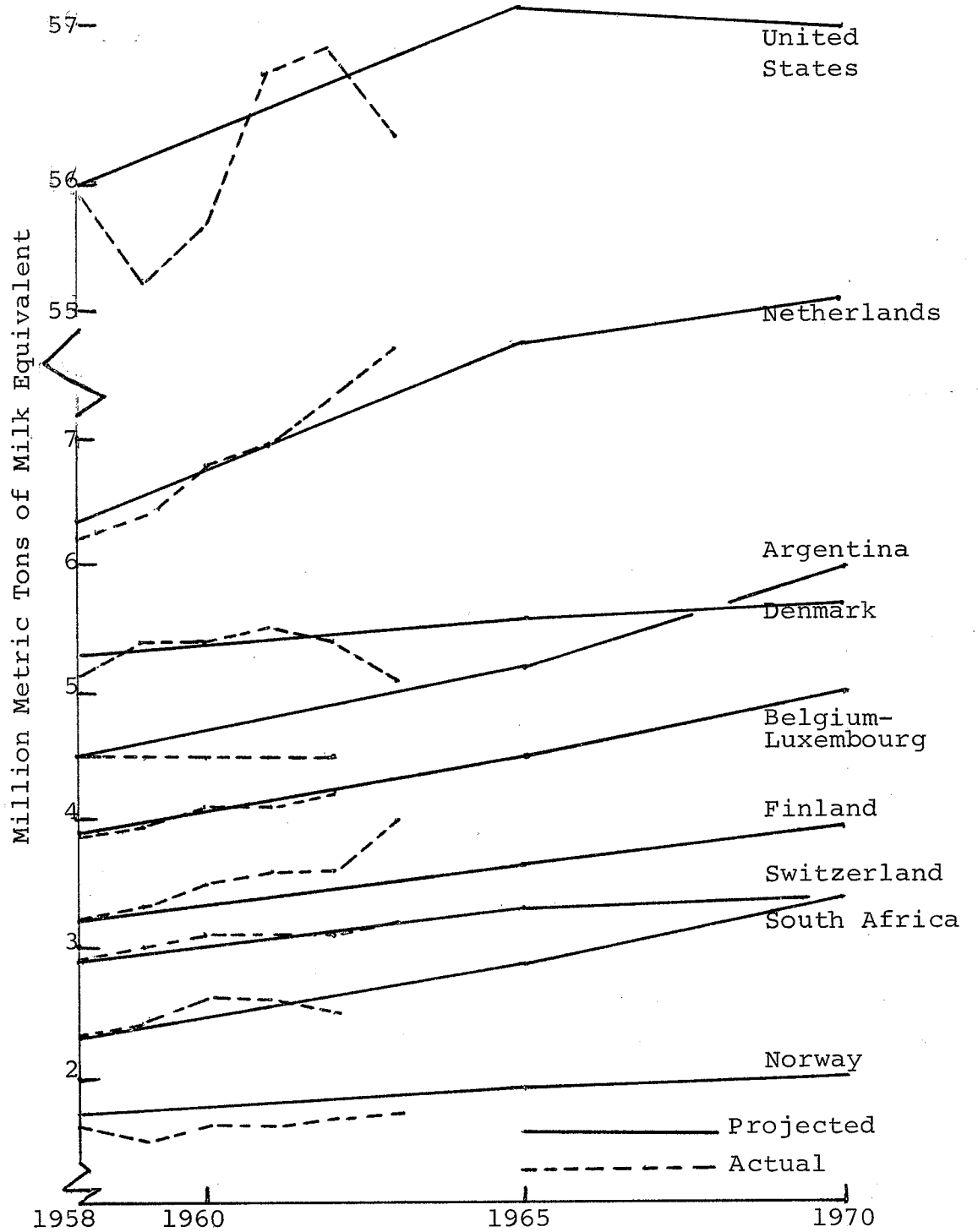


Figure 1 (Continued)

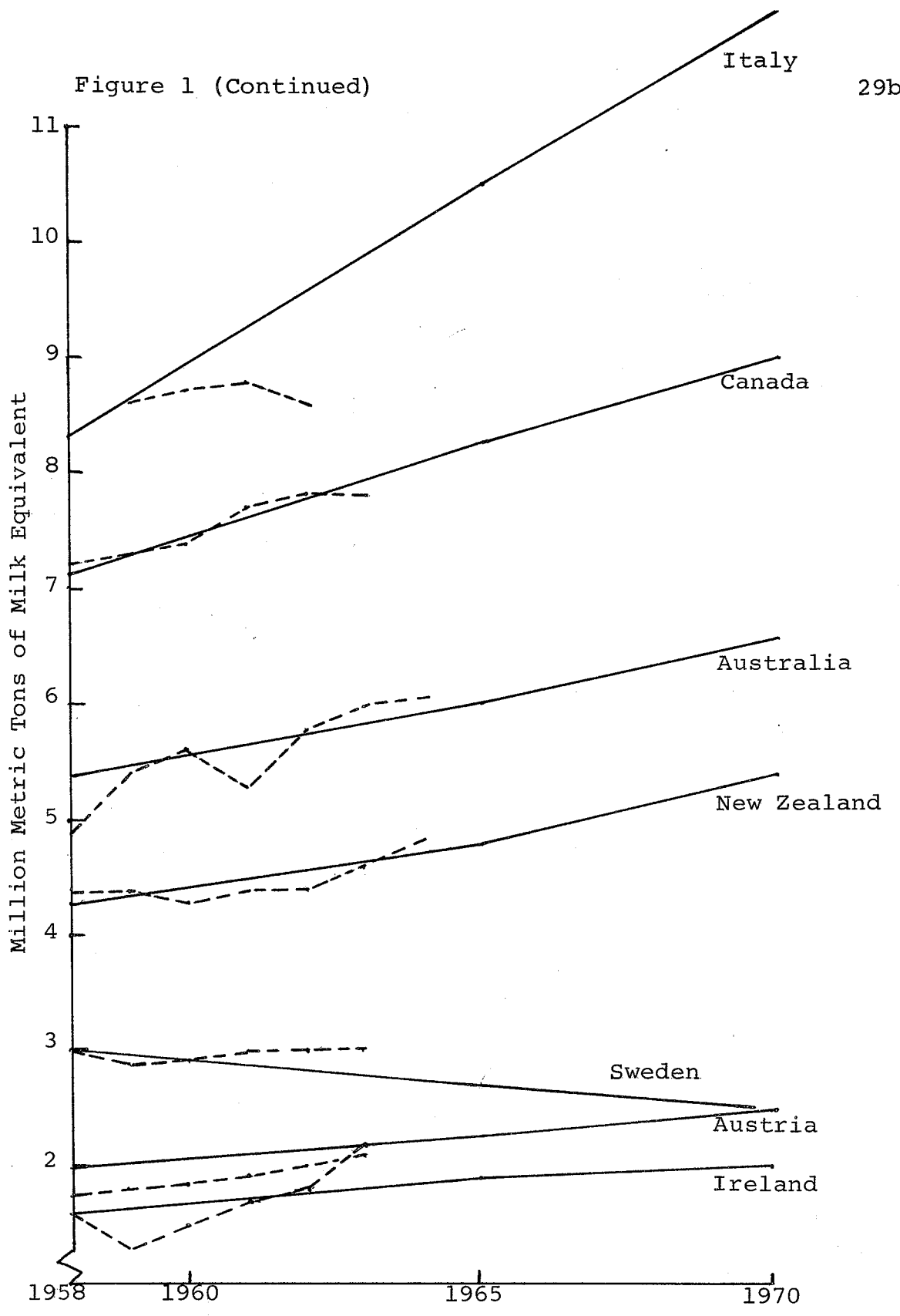
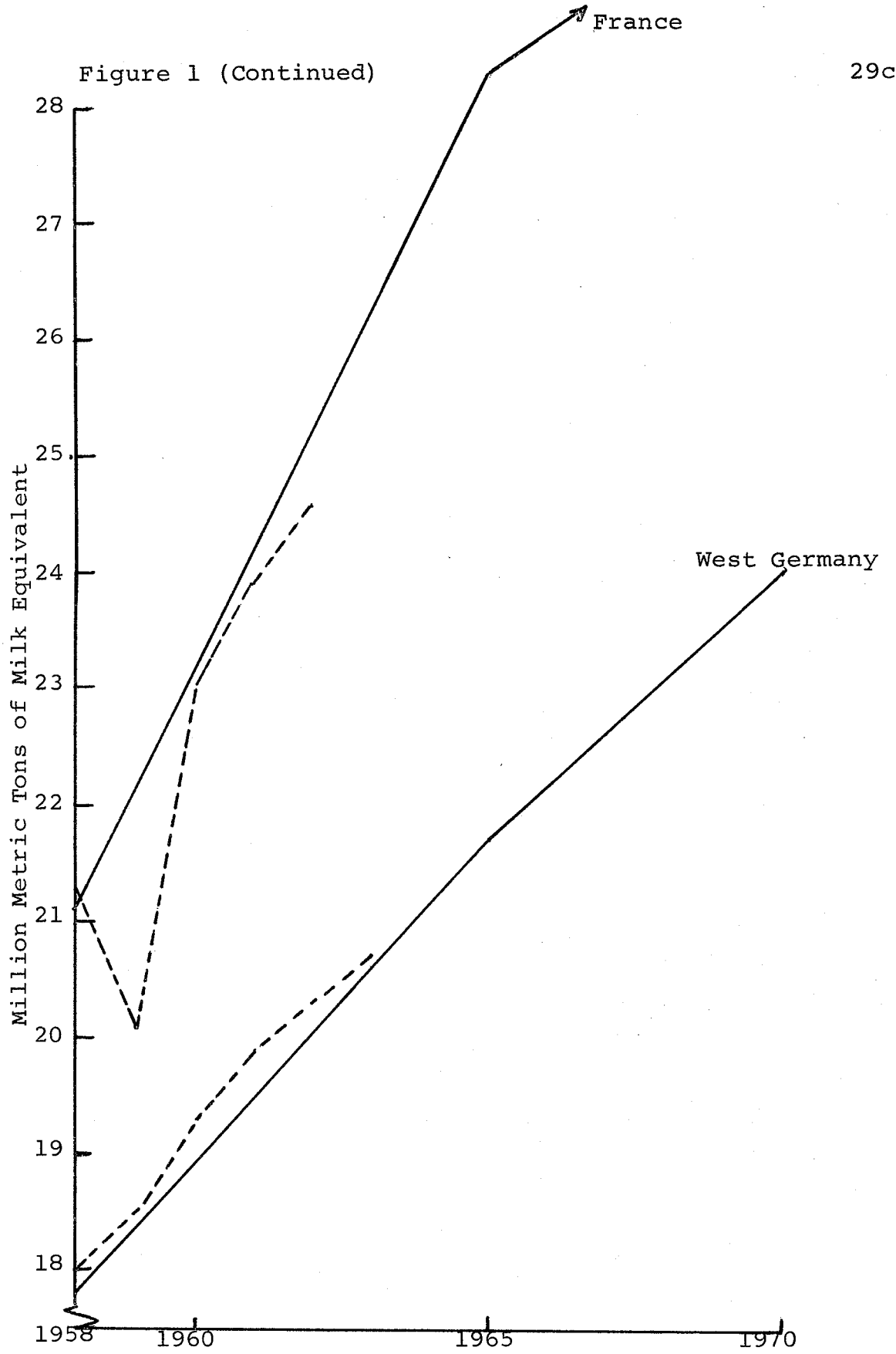


Figure 1 (Continued)



Whether milk production will again exceed demand is a matter of conjecture. However all the available evidence at May 1965 tends to support the view that milk production in Europe has again resumed its upward trend.

Thus the fact that surpluses did not develop in 1964-65 as projected, does not mean that they will not arise in 1970. The results of the FAO study must be considered in the light of the previous discussion but they indicate quite clearly that a tendency exists (given present policies) for surpluses of dairy products to arise from time to time. Consequently, there appears to be little opportunity for New Zealand to increase her exports of dairy products to traditional importers. Exporting efforts will have to be directed, in the future, to new and developing markets. It behoves those interested in the welfare of the New Zealand dairy industry to take notice of this situation.

5. "EUROPEAN AGRICULTURE IN 1965"⁽⁴⁾

In 1961 the Joint Secretariat of the Economic Commission for Europe (E.C.E.) and FAO published a paper which attempted to assess how production and consumption of the major agricultural commodities in European countries could develop during the years 1960-65. The results of this work were incorporated, after revision, in the FAO study discussed above.

The United States Department of Agriculture is conducting a world-wide country-by-country analysis of

the prospective supply, demand and trade in agricultural products in 1965, 1970 and 1975. Individual country studies are contracted out to a competent research organization within the country whose report is published without amendment. When complete, the series will include studies of 32 countries which represent about 80 per cent of the market for U.S. agricultural exports.

The methods used to evaluate future prospects have been devised independently for each country and no attempt is made here to exhaustively discuss these methods or the assumptions made. However, the general remarks made earlier apply with equal force to all of these studies.

6. PROJECTIONS FOR THE UNITED KINGDOM

A study of particular interest to the New Zealand dairy industry is that for the United Kingdom which was published in 1962.⁽⁹⁾ This report was prepared in the Institute for Research in Agricultural Economics at Oxford University under the direction of Mr Colin Clark. Projections of demand and supply, at constant prices, were made for a wide range of agricultural products. In most instances discrepancies between projected demands and supplies were revealed. These differences were then reconciled to produce a single figure showing demand and supply in balance, thus transforming the projections into forecasts. These final forecasts should be understood as estimates for the period 1963-7 rather than 1965 and the 1973-7 period rather than 1975 and are based on the

period 1955-9.

The stated aim in presenting the forecasts was to show a "reasonable" expectation of a "normal" state of supply, demand and imports. The forecasts corresponded to an equilibrium between supply and demand which was consistent with the assumptions made and similar to the long run equilibrium assumed to exist by the classical economists. The forecasts were made in this form, not because a state of balance was expected in 1965 or 1975 but because the deviations from this balance seemed to be quite unpredictable.

A brief outline of the main assumptions is now given.

All food commodities were placed in two main groups.

- (a) Commodities where price was expected to play an important role in reconciling demand and supply.
- (b) Commodities where the adjustment would be on the supply side, either for special reasons concerned with the organization of the market or because supplies are highly elastic.

Milk products were placed in the first group and estimates of the final consumption and the prices necessary to ensure that consumption, were made. In general, the secondary effects due to changes in price in the first group on consumption in the second were ignored. It was also assumed that the present basic system of agricultural support was continued, that the real value of farm incomes was maintained, that the restrictions of the 1957

Agricultural Act were adhered to, and that there was no increase in the import costs of food and feeding-stuffs.

6.1 Projection of Demand

Two population estimates (A and B) were used. The assumption A corresponded to the structure of population forecasts prepared by the Government Actuary in consultation with the Registrar-General while assumption B corresponded to estimates made by Mr Colin Clark. The latter estimate was the lower, the difference being 658,000 in 1965 and 1,771,000 in 1975.

Three different assumptions concerning the growth of productivity per head of the labour force were also made, i.e.,

- (a) 1.3 per cent
- (b) 2.0 per cent
- (c) 2.8 per cent

The first estimate approximated the compound rate of growth of productivity in the recent past, the second represented "cautious optimism" while the third was in line with declared Government aims. Thus six separate forecasts of demand, at constant prices, were made corresponding to the three productivity assumptions and the two population assumptions (Table 5).

6.2 Projection of Production

The projection of production raised difficult problems. Important assumptions were made about the interaction between milk and beef production as relative costs and prices varied and also about the rate at which

milk yields were expected to rise.

It was considered that deficiency payments for milk would be eliminated by 1975. The rate of subsidy on liquid milk fell sharply during 1955-59, because the decline in deficiency payments was paid for by an increase in the consumer price. It seemed clear that it was the Government's intention to avoid substantial deficiency payments on milk and not to encourage further milk production for manufacturing purposes.

Since changes in the prices of feeding-stuffs have immediate effect on the output of livestock products in the absence of other changes in price, it was decided to make projections based on high and low import prices of feeds, i.e.,

(a) Low price

Wheat and grain at 15 per cent less and oil-cake and fishmeal at 10 per cent less than the 1955-59 average price.

(b) High price

Wheat and grain at the 1955-59 price and oil-cake and fishmeal 5 per cent above the 1955-59 price.

The forecasts for milk production are shown in Table 6. The columns marked P do not include any explicit consideration of demand. However, the large expansion of milk supplies revealed, had to be met by a decline in the pool price of milk and the point where the supply and pool price were in balance had to be found. This required explicit consideration of demand because demand would clearly differ

for different assumptions concerning population and income. Forecasts marked Q take into account the reaction of the Milk Marketing Board to the supply and demand situation under the fairly optimistic assumption of a high population and a 2 per cent growth in general productivity. Even with these adjustments it still appeared that output was likely to rise faster than demand at constant prices.

6.3 Projections of Imported Supplies

The following passage is taken directly from the Report.

"Forecasts of supplies of dairy products were made for the four main sources - New Zealand, Australia, Denmark and the Netherlands. It seems likely that supplies of butter from New Zealand would increase slightly at the expense of cheese; that supplies from Australia will fall somewhat and supplies from the Netherlands are likely to be diverted towards Germany..... In general we do not expect a large expansion of supplies of butter and cheese at the prices prevailing over 1955-59..... Numbers of dairy cows in many supplying countries are expected to stagnate around their present levels. Increased production seems likely to come chiefly from increases in yield. Increased domestic consumption and diversion of milk products under international aid agreements seem likely to prevent a further increase in supplies of butter and cheese to the U.K. As far as other milk products are concerned the situation is complicated. The U.K. has been a net exporter of condensed milk and some other products and a net importer of cream and chocolate crumb. If the U.K. becomes a net exporter of all these milk products it would probably lead to protests from several sources - especially New Zealand, Holland and Switzerland. The most likely outcome seems to be that the imports and exports will about balance; and the Milk Marketing Board will be restrained from launching too vigorously into the

export field. Expressing all imported milk products in gallons of milk at U.K. conversion rates some decline in supplies is expected." (See Tables 7 and 8.)

6.4 Reconciliation of Supply and Demand Projections

After a comprehensive study of price elasticities of supply and demand final projections were made. At this stage six alternative estimates of demand at constant prices based on two alternative assumptions about population and three assumptions concerning trends in productivity were prepared. Also there were alternative projections of home production, one based on an expectation of a low level of feed prices and the other on a higher level of prices. Thus there were 12 different sets of discrepancies between supply and demand for both 1965 and 1975 for different combinations of assumptions.

The final forecasts of supplies of milk and milk products and the consumption of fats are presented in Table 9.

From this wide range of possibilities the authors believed that the lower estimate of feed prices would prevail and that the forecasts should lie between the boundaries given by the assumptions Aa, Ab, Ba and Bb. If more "precision" was required they suggested that assumption a of a 1.3 per cent growth in general productivity was to be preferred to assumption b. The higher population forecast of A was more probable than B and for 1965 the forecast Aa could be taken as the most probable choice. For 1975 a mean between Aa and Ba might be taken as the most likely forecast. The

forecast United Kingdom production, consumption and import requirements consistent with these decisions are shown below in thousand metric tons of milk equivalent.

Production:

1965 11,822

1975 13,198

Consumption:

1965 22,221

1975 23,400

Import Requirements:

1965 10,399

1975 10,202

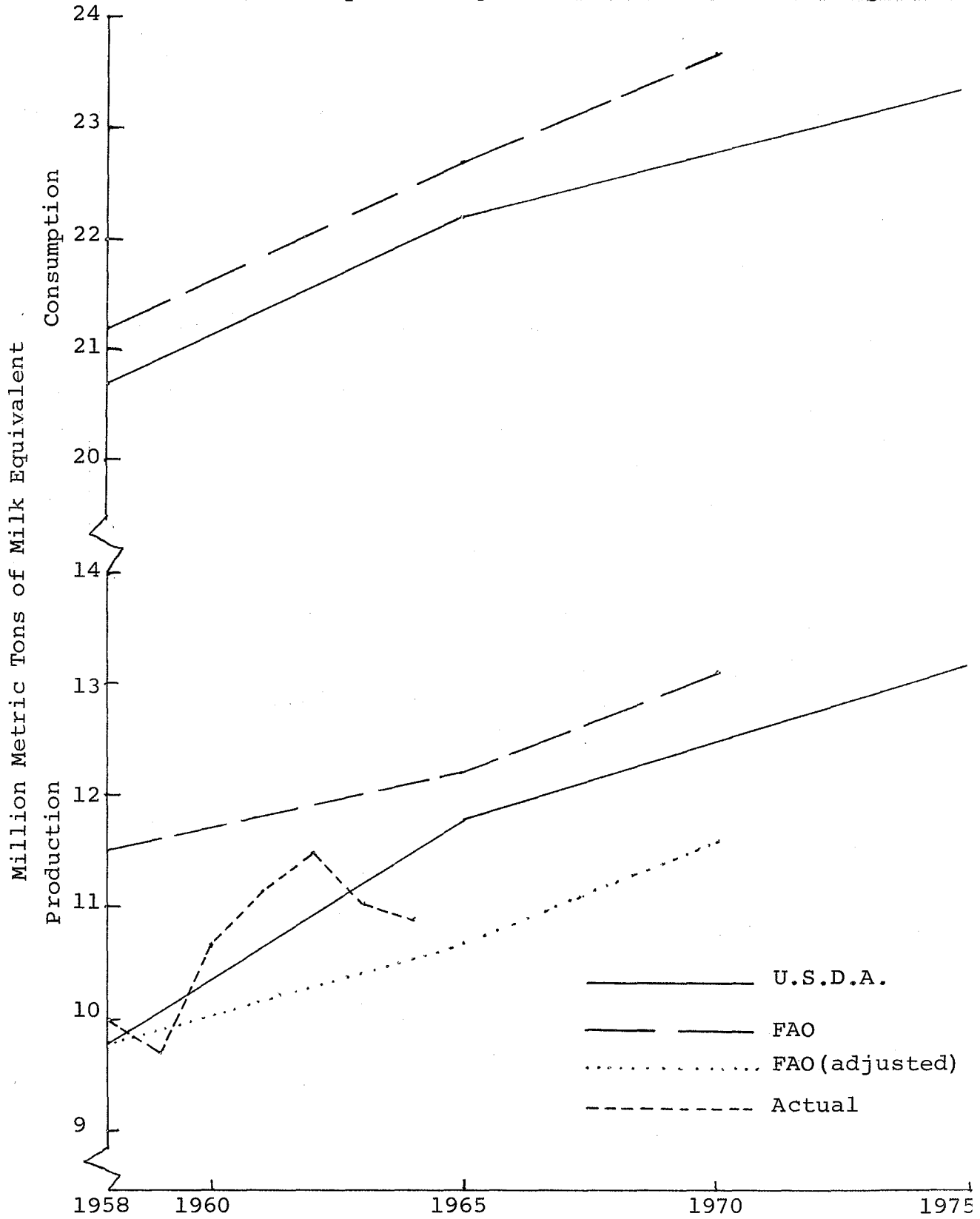
Thus a slight decline in import demand is forecast up to 1975.

7. COMPARISON OF FAO PROJECTIONS AND UNITED KINGDOM FORECASTS

The most likely situation in the United Kingdom as described above has been compared with the FAO projections for that country in Figure 2. Actual milk production from 1958 to 1964 has also been shown.

A direct comparison cannot be made between the two estimates because the FAO projections of both production and consumption include milk fed to livestock while the United Kingdom estimates exclude these quantities. However the net import balances are directly comparable as shown in Table 10. The dotted line in Figure 1 shows the FAO milk production projection when an approximate correction

Figure 2
Production and Consumption Projections for the United Kingdom



is made for milk fed to livestock.

The comparison shows that the trends are similar in both analyses but that there seems to be slightly greater scope for dairy product imports under the FAO projections than under the United Kingdom forecasts. Actual production has fluctuated around the United Kingdom forecast trend up to 1965. Current monthly data suggests that production in 1965 is likely to again approach the trend line. (a)

Although the U.S.D.A. study may, superficially, be considered the more reliable the fact is, that many subjective estimates and opinions have been incorporated in the derivation of the numerical forecasts. With the present state of the arts and the nature of the problem, this is inevitable.

It seems clear from both studies that the United Kingdom will be unable to absorb an increasing volume of dairy products at profitable prices to exporting countries. New Zealand is particularly dependent on the British market at present and the development of new markets will be necessary if an increased output of dairy produce is to be sold.

The Japanese demand for milk products is growing rapidly and this potential market offers the most promising

(a) Monthly Intelligence Bulletins published by the Commonwealth Economic Committee, London. The statistics exclude estimates of the quantity of milk fed to animals.

prospects for exporting countries. The United States Department of Agriculture has recently issued a set of projections for Japan produced by the Institute of Agricultural Economic Research at the University of Tokyo.⁽¹⁰⁾ This work is discussed below.

8. PROJECTIONS FOR JAPAN

It was found particularly difficult to project the domestic demand and supply of agricultural products in Japan due to the rapid change in structure of the Japanese economy. For example, the rate of population increase reflected great changes in the birth rate during and immediately after the war. There was no positive evidence that this trend would continue in the future. It was particularly difficult to estimate the future national income and its distribution with any degree of certainty. Also it was difficult to establish, on the basis of past experience, the relationship between the demand for agricultural products and the various determining factors, (prices, per capita income, etc.). This was due to the short period of "normality" since the economic collapse during and after the war. Further, significant changes in consumer tastes and habits have occurred due to the continuing westernization of the general mode of living along with urbanization.

Supply estimates were even more difficult because of the dynamic transition occurring in Japanese agriculture. The farm labour force was declining as labour moved into

commerce and industry. Although Japanese agriculture had not fully adopted modern techniques and achieved high labour productivity it was considered that large scale farming would appear in place of, or side by side with, the small scale farming currently practised.

8.1 Projections of Demand

The level of demand was estimated by taking into consideration the influences of future population, income, past trends and other relevant factors. Demand functions based on 1951-60 market statistics were used. Dairy products were classified into beverage milk, butter, cheese, powdered whole milk and condensed whole milk. Estimates were made for 1965, 1970 and 1975. (See Table 11.)

Income and price elasticities of demand were invariably near or larger than unity. For income elasticity the order from lowest to highest was found to be, condensed milk, powdered milk, butter, beverage milk and cheese.

8.2 Projections of Production

The level of domestic production was calculated from projections of the livestock population which were based on past trends. In most cases the influence of price was given little consideration. In other words, the production estimate was made independently of the levels of demand and imports.

The national average of dairy cattle per farm at February 1, 1960, was 2.1 head and the ration fed included 50 per cent of concentrate feeds. The dairy cattle

population was projected to increase by 10 per cent per year to 1970 and 8 per cent after 1970. (See Table 13.) Progress towards large scale operation, the adoption of modern techniques and increased production of feed crops and fodder were considered necessary to achieve this rate of increase. As carrying capacity per farm rose, and labour requirements fell due to mechanization, the proportion of concentrates fed was expected to decline. It was assumed that this would not lead to a reduction in yield per cow.

8.3 Projections of Imported Supplies

Import demand was shown as the balance after subtracting domestic supply from the estimated level of demand. (a)

The results (see Tables 11 and 12) indicated that an over-supply of milk could develop in 1965 when some powdered and condensed milk might be exported. Substantial imports of all categories of dairy products were projected for 1970 with more than a 100 per cent increase (in milk equivalent) by 1975. It was stressed in the Report that many of the estimates made were subject to error. For example:

-
- (a) The large expected increase in the demand for livestock products could be met in two ways. One was to import finished goods and the other to import feed grains for domestic production. The future domestic supply of livestock products and the demand for feed grains were estimated on the basis of projected numbers of various types of livestock.

"..... the number of animals in this instance has been estimated solely on the physical condition of the animals, with an almost total disregard of economic factors. Since dairy farming in this country (Japan) has not reached a stable condition either technically or managerially, our supply estimates (domestic production) are based on an even more unstable foundation than our estimates of demands."

8.4 Summary of Results

As a general rule the projections were made on the assumption that current policies would be continued and the price level kept constant. The fact that the Japanese people were rapidly acquiring a taste for milk products was reflected in the analysis, since it revealed a high and rising income elasticity of demand. Of all the agricultural products considered, dairy products were expected to have the largest expansion in consumer demand.

The projections also reflected the domestic inability to meet the marked increase in the demand for livestock products. Japanese agriculture up until World War II had developed a structure to satisfy a food consumption pattern depending mainly on plant products. As such, it had a high degree of self-sufficiency. However, the trend towards livestock products in the food consumption pattern was expected to make Japan more dependent on imported food supplies.

The plausibility of the estimates was tested in various ways. For consumption the future level of

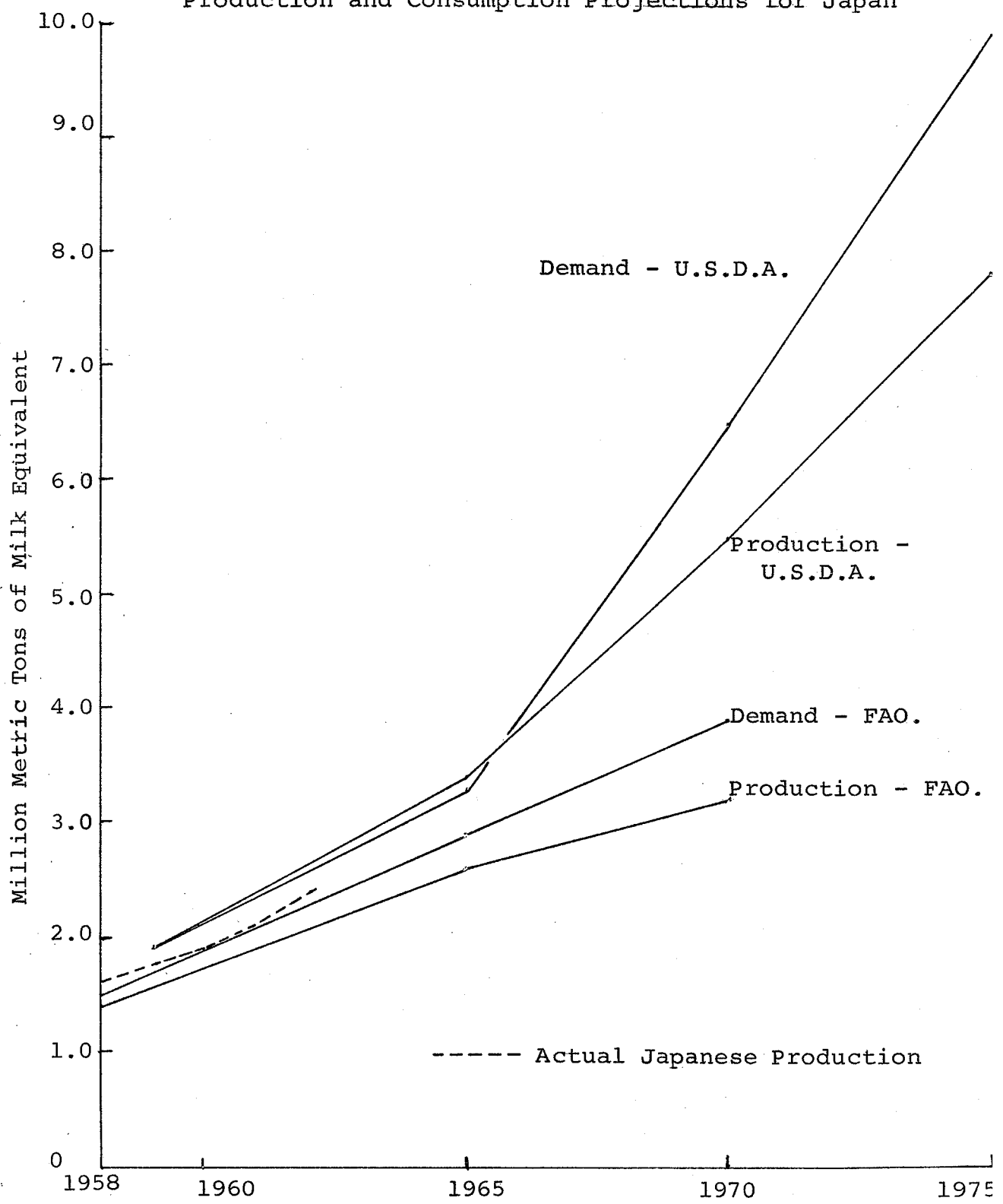
Engel's Coefficient^(a) was calculated and also the per capita calorie and protein intake levels. For production the future degree of land utilization was estimated. Comparisons were also made of the projected level of agricultural product imports with the projected level of total imports. The report states that there did not appear to be any particularly irrational points when these characteristics were compared with the past performance of the Japanese economy or with international data.

9. COMPARISON OF FAO AND JAPANESE PROJECTIONS

A comparison of FAO and Japanese projections together with actual production has been made in Figure 3. It can be seen that the FAO projections are considerably divergent from those of the Japanese. Actual production is following closely but slightly below the trend indicated by the latter projection. It seems clear that the rising demand for dairy products cannot be met by domestic production and that there will be an increasing import demand from Japan for dairy products. This clearly defined trend can be expected to appear in other developing countries (especially semi-tropical and tropical countries) if, and when, real income per capita approaches the level presently observed in Japan.

(a) Engel's Coefficient is expenditure on a food or group of foods as a percentage of total consumption expenditure.

Figure 3
Production and Consumption Projections for Japan



The U.S.D.A. has published studies of the import demand for agricultural products for a number of other countries but these will not be discussed here.⁽¹¹⁾ It is sufficient to say that they reveal high income elasticities of demand for milk products where per capita consumption is at present very low, declining income elasticities as consumption levels rise and very low, even negative, income elasticities where consumption is relatively high. In this last case increased consumption is largely a function of population increases and favourable relative price changes with respect to substitute and alternative products.

10. SUMMARY OF THE WORLD DAIRY SITUATION

The trend towards self sufficiency in dairy products which commenced after the Second World War, is continuing in Europe. Present dairy policies in those countries, particularly in the European Economic Community, indicate that a surplus of butter and other dairy products may arise. The situation in the United Kingdom is complex and is largely dependent on Government price policy towards the domestic milk producer. Apart from seasonal fluctuations in supply, it appears that the United Kingdom Government wishes to maintain total imports at around their recent average level so that an expansion of the total United Kingdom import demand is unlikely.

In the United States dairy production is falling each year and stocks of surplus dairy products have almost

disappeared. There is no apparent reason to expect this to change in the immediate future. One observer has suggested that it should be possible to increase butter consumption in North America considerably if only sufficiently good and uniform butter qualities are offered by the dairy industry together with an intelligent and sustained promotional campaign. (12)

The quantity of most dairy products moving in international trade is a small proportion of total world production. This characteristic, together with low price elasticities in developed markets and inelastic, lagged, supply responses, makes the trade in milk products peculiarly subject to wide price fluctuations. (In this respect it is somewhat similar to the price behaviour of the world sugar market.⁽¹³⁾) The United Kingdom provides the only market which can absorb large quantities of butter and cheese but the recent imposition of butter import quotas has transformed that free market into a "managed" market where the forces of supply and demand cannot operate freely. The United Kingdom market for cheese is also "managed" to some extent because the Dairy Boards of England and Wales, Australia and New Zealand agreed from mid-1962 to an unofficial market sharing arrangement. (14)

For products other than butter and cheese, relatively free markets exist, although surplus disposal operations and export subsidies paid by some countries affect the prices obtainable. Prices fluctuate quite violently for many products as levels of milk production change in marginal exporting and importing countries.

All recent research and current data suggest that the possibilities are not good for the creation of profitable new outlets, on a large scale, for dairy products in world markets. The potential Japanese market provides the only significant exception to this conclusion. However, it must be strongly emphasised that this does not mean that more New Zealand dairy products cannot be sold in the world's markets at profitable prices. But it does mean that the New Zealand dairy industry faces very strong marketing competition and that the industry must strive to obtain a greater share of existing markets. It must also continue its policy of improving processing and marketing flexibility so that maximum advantage can be taken of short term relative price changes for various products.

11. MARKET PROSPECTS FOR THE NEW ZEALAND DAIRY INDUSTRY

It seems clear that the potential Japanese market is the only one capable of providing large new outlets for milk products during the next decade. It is, therefore, important that New Zealand should secure the largest possible share of this new demand. In this section we examine the rates of growth of production that will be required of the Industry, firstly, to supply various shares of the expected Japanese import demand and secondly, to provide a 4 per cent overall increase in dairy product exports.

11.1 The Increased New Zealand Production Required to Supply the Projected Japanese Market

We will make the following assumptions:

- (i) That New Zealand secures various shares of the projected Japanese import demand - 25, 50, 75 and 100 per cent.
- (ii) That increasing New Zealand domestic demand due to a rising population is met.
- (iii) That established markets continue to take the same quantities in total as in the base year 1963-64, i.e. the total quantity exported in terms of milk equivalent remains constant.

The local disappearance of milk products has been increasing annually but the rate of increase has declined since 1958-59 (See Table 14). The consumption per capita in terms of butterfat equivalent reached a peak of 60.8 lbs. in 1958-59 but had fallen to 58.8 lbs. in 1963-64. The annual increase in total consumption over the last five years was 2.1 million pounds of butterfat. An annual increase of 2.0 million pounds has been assumed here over the next decade. Using the population projections of the Government Statistician this implies per capita consumption of 57.0 lbs. in 1969-70 and 54.9 lbs in 1974-75. It is possible that the present subsidy arrangements for milk products will be changed over the next 10 years and any price increases will probably be reflected in lower domestic consumption. Considering the uncertainties associated with population projections and future government policies this figure of 2.0 million pounds seems reasonable. The projected levels of domestic consumption are given in Table 15.

Now if we take the projected Japanese import demands of 1,000,000 metric tons (984,200 long tons) of milk

equivalent in 1970 and 2,105,000 metric tons (2,071,700 long tons) in 1975 we can derive Table 16 which shows the rates of growth of production required from the Industry under the various assumptions. The results are summarised below.

Rates of Growth of Production Required
from the New Zealand Dairy Industry

% Share of Projected Japanese Import Demand in 1970 and 1975	% Compound Rates of Growth from 1963-64 to:	
	1969-70	1974-75
25	1.1	1.1
50	1.7	1.8
75	2.4	2.5
100	3.0	3.1

Note: The split years (June to May) 1969-70 and 1974-75 have been used for New Zealand production, because produce from these split years is likely to be sold on overseas markets in the 1970 and 1975 calendar years, respectively.

New Zealand, by virtue of her low production costs and geographical position, is extremely well placed relative to her competitors and should be capable of obtaining the largest share of the Japanese market. If we assume a 75 per cent share, the table shows that New Zealand milk production must rise at a compound rate of 2.4 per cent annually from the base year of 1963-64 to 1969-70 and at 2.5 per cent for the 11 years to 1974-75. These rates of growth will ensure that present export markets are

maintained at 1963-64 volume levels and that increasing domestic demand due to population growth is satisfied. If New Zealand secures the whole of the Japanese market, then the rates of growth are 3.0 and 3.1 per cent respectively. (a)

The reader should note that the expected import levels for Japan are given for the two calendar years, 1970 and 1975, but projections of this nature really refer to the average, around particular calendar years. Also the calculations have been based on the 1963-64 production year which was a record year for New Zealand milk output. (Production in the current year is estimated to be 5% higher than in 1963-64.) Further the calculations assume that New Zealand production and Japanese import demand (see Figure 3) will increase steadily each year. This is, of course, most unlikely and we must expect an uneven growth of production and consumption from year to year. The table indicates what the average rate of increase in New Zealand milk production must be if the Japanese market has developed as expected in 1970 and in 1975 and if New Zealand secures various shares of it.

11.2 The Implications of a 4 per cent Growth Rate of New Zealand Dairy Exports.

In the base year, 1963-64, total milk production in New Zealand was 5,644,700 long tons, domestic consumption

(a) If domestic consumption is above the projected level, these necessary rates of growth will be slightly higher.

was 1,440,400 long tons of milk equivalent, leaving an export balance of 4,204,300 long tons of milk equivalent. An annual growth rate of 4 per cent in exports to 1970 and 1975 means that the export balances from the 1969-70 and 1974-75 production years must be 5,319,800 and 6,472,300 long tons respectively. To achieve this export balances as well as supply the increased domestic consumption the production growth rate must be 3.3% from 1963-64 to 1969-70 and 3.4% from 1963-64 to 1974-75 as shown in Table 17 and summarised below.

	(long tons milk equivalent)
Total milk production 1963-64	5,644,700
Dairy exports 1963-64	4,204,300
Required dairy exports 1969-70	5,319,800
Required milk production 1969-70	6,874,700
Required Rate of Growth of milk production from 1963-64 to 1969-70	3.3%
Required dairy exports 1974-75	6,472,300
Required milk production 1974-75	8,122,500
Required Rate of Growth of milk production from 1963-64 to 1974-75	3.4%

We can now calculate the proportions of the 4 per cent growth in the volume of exports, that can be absorbed by Japan appropriate to New Zealand's share of that market. This is shown below.

Projected Percentage of Increased N.Z. Dairy Exports
Imported by Japan

% Share of Projected Japanese Import Demand in 1970 and 1975	% of Increased N.Z. Dairy Exports Imported by Japan in:	
	1970	1975
25	22.1	22.8
50	44.1	45.7
75	66.2	68.5
100	88.2	91.3

We see that if New Zealand could obtain the whole of the expected Japanese market in 1970 this would absorb 88.2 per cent of the required increase in exports while 91.3 per cent would be absorbed in 1975. If the more realistic figure of a 75 per cent share is taken then 66.2 per cent and 68.5 per cent of the increased exports could be sold to Japan in 1970 and 1975, respectively.

Therefore, the developing Japanese market is of vital importance to the New Zealand dairy industry and a strong effort must be made to secure the largest possible share of this market. This will require action on the part, both of the Industry and the Government. The Industry should keep itself informed on changes in consumer tastes and stand ready to supply the quantities and qualities demanded, while the Government should concern itself with trade matters, particularly reciprocal trade between Japan and New Zealand. ^(a)

(a) The recent closure of the Dairy Board's offices in Tokyo can only be regarded as a retrograde action.

We may say, therefore, that if New Zealand can secure a 75 per cent share of the projected Japanese import demand for dairy products the compound rate of growth of milk production will need to be 2.5 per cent annually over the next decade. If a 4 per cent growth in total exports of milk products is to be achieved over this period then production will need to rise by 3.4 per cent each year. Around 1970 and 1975 Japan is expected to have an import demand of 984,200 and 2,071,700 long tons of milk equivalent respectively. These quantities represent 88.2 per cent in 1970 and 91.3 per cent in 1975 of the required 4 per cent growth in the volume of New Zealand dairy exports. If New Zealand secures 75 per cent of this import demand then Japan would take 66.2 per cent in 1970 and 68.5 per cent in 1975 of the increased volume of exports over the 1963-64 level. (a)

It is clear from these computations that if New Zealand fails to become the major supplier of dairy products to Japan, other markets will have to be expanded considerably to absorb the increased volume of exports. Taking the 1975 year and assuming a 100 per cent share of Japanese import

(a) The reader is again referred to earlier sections of this publication where the limitations of the numerical results of projection exercises are outlined. It should also be recalled that skim milk powder and casein exports are excluded because they do not contain butterfat. All products have been aggregated into whole-milk equivalents.

demand, exports to other markets will have to rise at an annual compound rate of 0.4 per cent if the export target is to be attained. Assuming a 75 per cent share the rate of increase from 1964 to 1975 will need to be 1.4 per cent. An increase of 1.4 per cent may well be possible if an aggressive marketing campaign is carried out⁽¹⁵⁾ but any larger increase will be a very difficult, probably impossible, task at remunerative prices to dairy farmers. Thus if it can be shown that the New Zealand share of the Japanese market will not reach the proportions suggested here, then the market target should be reduced accordingly. If New Zealand could not increase her sales to Japan at all, over the next decade, then the market target should be set at a more modest level, say 1 to 1.5 per cent increase in volume of dairy exports from 1964 to 1975.

12. CONCLUSIONS

An attempt has been made in this paper to supplement the production targets prepared by the Agricultural Development Conference with market targets for milk products. In doing so the implications of a 4 per cent rate of growth of dairy exports has been clarified.

The reasons for the appearance of surpluses of agricultural products in a hungry world were discussed in Section 2. It was seen that milk production had a tendency to exceed demand (at current prices) in the developed countries of Europe and in North America. The disposal of these surpluses either by dumping or assistance programmes creates trading problems for dairy exporters.

In Section 3 the purposes and limitations of demand and supply projections were reviewed. In spite of the restricted value of the numerical results of these exercises, they must be attempted before a rational view of the future can be formed. The methods and results of several studies were then discussed in succeeding sections.

Studies of developed countries show that a strong tendency exists for the development of surplus dairy products particularly butter and skim milk powder. This tendency is likely to persist for some years in Europe and the observer should not be misled by favourable short term changes in the market situation. However, the semi-permanent production of surplus milk products is unlikely because of the very high cost to the

producing country of disposing of the excess production. Years of reasonably good prices are likely to be followed by years of lower prices especially for milk powders and casein.

The only developing country which has an immediate potential import demand for dairy products is Japan. This new import trade is likely to be permanent and will probably increase for several decades. Although some dumped supplies from surplus producers will inevitably find their way on to the Japanese market and depress prices from time to time, Japanese importers and distributors will be seeking permanent suppliers of high quality dairy products.

Now what can be said of the future prospects for the New Zealand dairy industry in the light of these medium and long term projection studies? It seems abundantly clear that they are of no use for planning the year by year operations of the industry. The projections treat the world or national demand for milk products, some products being aggregated into milk equivalents, whereas the New Zealand industry is interested in the demands for each specific product relative to that of its competitors. In addition the fallibility of the basic data discussed earlier indicates that very little reliance can be placed on the actual numerical results for any particular year.

However, the results are important in that they reveal certain trends both world-wide and in individual countries which are of great importance. These trends are the result, primarily of national policies which

either encourage or discourage expanded production and indicate the consequences of a continuation of these policies. The likely impact of policy changes can also be evaluated from the basic data. It must be noted, of course, that such trends may be changed or be reversed in the short run by relative price changes, the weather and a multitude of other factors.

It is clear from the projections that the long term trend in Europe is for a static import demand for milk products with the possibility of a decrease if the United Kingdom enters the European Economic Community. Even if Britain remains outside the Community there does not seem to be any indication of a permanently increasing import demand at current price levels. We are considering here, medium and long term market prospects and not the month by month situation. The recent increased demand for butter in the United Kingdom, for example, was not caused by a change in the basic market structure. It was principally due to reduced milk production in Britain and Europe caused by severe winter weather and a relative price change in favour of beef production. It must be remembered that the fundamental pressure on price due to increasing domestic milk production is still present in all European countries. The extent to which this pressure develops is partially dependent on the producer pricing policy adopted by the various governments. Thus, New Zealand cannot assume that increasing quantities of dairy exports can be sold in Europe at profitable prices.

If milk production in the United States continues to decline a market for some manufactured dairy products may develop but this seems unlikely during the next few years as surplus grains would probably be used to encourage domestic milk production. However, the price depressing effects of United States surplus disposal operations are expected to be slight unless milk production increases again.

Although a substantial trade in milk products takes place in developing countries, particularly in Asia,⁽¹⁵⁾ there are no indications that this trade is likely to expand rapidly in any country with the single exception of Japan. Japan is the only country in the region which offers prospects of a rapidly increasing demand for milk products. Ridler⁽¹⁵⁾ suggests that New Zealand could increase her share of the present Asian market by adopting more vigorous and consistent marketing policies. This aspect is not pursued here but if the Japanese demand develops as projected it will provide an outlet for world dairy products, additional to those already available. This fact is of vital interest to New Zealand. The Japanese people should be persuaded to demand New Zealand dairy products rather than those of competing countries. If New Zealand can become the major supplier of dairy products to Japan then a 4 per cent growth in dairy exports can be sustained with only a relatively small increase in marketings elsewhere.

The New Zealand marketing authorities should not delude themselves into thinking that this market will be theirs for the taking, as it develops. There are no

Commonwealth or race ties between the two countries. Sentimental attachments which may exist between Britain and New Zealand (although it is doubtful that they really affect United Kingdom policy towards New Zealand) simply do not exist between Japan and this country.

Other dairy exporting countries will also be seeking a share in this new market so the New Zealand industry should be prepared to invest considerable resources in market research in Japan. The fact that Japanese import restrictions prohibit imports of some products at present should not prevent this research going ahead now. The projection results should be being checked, market surveys conducted to determine trends and changes in consumer tastes, investigations of wholesaling problems such as cool storage and a vigorous promotional campaign planned for the time when imports are liberalised.

The Government should strengthen its trade commissioner service in Japan and publicise the merits and relative cheapness of New Zealand dairy products. The relaxation of import controls in favour of New Zealand will inevitably be conditional on the granting of reciprocal trade advantages to Japanese exporters. Trade negotiations should be conducted at the highest level so that the Japanese Government is made fully aware of New Zealand's ability to supply high quality, reasonably priced dairy products.

New Zealand should seize every opportunity of placing her products before the Japanese people, even if

this means that supplies on the United Kingdom market fluctuate from time to time. Continuous supply is of the greatest importance in market development especially in the early stages when the quantities moving are relatively small. Although the United Kingdom will remain New Zealand's main market for many years the development of the Japanese market should not be prejudiced by the diversion of supplies to Britain to relieve any temporary shortages which may arise there. We cannot rely on Britain to "watch our vital interests" on our behalf - indeed we should not expect it of her.

It seems, therefore, that the market prospects for increased exports of milk products are reasonably good, particularly from the late sixties onwards, provided that the Japanese market develops as projected and New Zealand secures a major share of it and that she can gradually increase sales to established markets. Dairy farmers can increase milk production with confidence as long as the marketing organization tackles the task of selling the increased volume of produce with determination, the Government conducts vigorous and sustained trade negotiations, particularly with Japan, and both take a long term rather than a short term view of the situation. It must not be forgotten that a formidable and expensive marketing campaign must be mounted and carried through if the objective of a 4 per cent rate of growth in dairy exports is to be achieved. The attainment of this market target is certainly not beyond the feasible range of possibilities.

The future market situation for individual major and minor products has not been specifically covered in this paper. This should be the next stage in a continuing research project. It is to be hoped that the New Zealand Dairy Production and Marketing Board is carrying out this research now and plans to intensify the work immediately.

Although market targets are necessarily subject to a greater degree of uncertainty than production targets it seems reasonable to conclude that a 4 per cent growth in the volume of dairy product exports can be sold at profitable prices, on average, over the next 10 years. The target set by the Agricultural Development Conference is then, consistent with market prospects provided that the conditions set out in this paper are met. Thus the Dairy Industry should be encouraged to increase its production of milk products to ensure a target rate of growth in the volume of exports of 4 per cent per year.

TABLE 1

PROJECTIONS OF MILK PRODUCTION AND CONSUMPTION IN ADVANCED
REGIONS, 1965 AND 1970, AS PERCENTAGES OF THE BASE PERIOD
(Milk Equivalent)

Region	1965		1970	
	Production	Consumption	Production	Consumption
	per cent			
EEC Countries	126	117	137	126
Other European Countries (1)	113	112	122	118
North America (2)	104	102	105	104
Oceania (3)	110	115	120	123
Argentina, Japan, South Africa	132	135	155	163
Total	115	111	122	118

(1) Austria, Denmark, Finland, Ireland, Norway, Poland,
Sweden, Switzerland, United Kingdom

(2) U.S.A. and Canada

(3) Australia and New Zealand.

Source: F.A.O., "Means of Adjustment of Dairy Supply
and Demand", Commodity Bulletin Series No.37,
Table 1, p.4.

TABLE 2

THE EXTENT OF DISEQUILIBRIUM IN THE
WORLD DAIRY INDUSTRY

	Base Period	1965	1970
	million tons of milk equivalent		
<u>Advanced countries</u> (1)			
Total cow milk production	188.2	215.6	229.5
Total domestic disappearance	184.9	205.5	217.9
Net exportable supplies	3.3	10.1	11.6
<u>Developing Regions</u> (2)			
Total milk production (3) (cow and buffalo)	57.9	64.6	72.7
Commercial net imports	2.4	3.3	3.6
Available supply	60.3	67.9 (4)	76.3 (4)
<u>Disequilibrium</u>			
In milk equivalent	0.9 (5)	6.8 (6)	8.0 (6)
In butterfat (1000 tons)	33.6	255.0	302.0

(1) See Table 1

(2) See Reference (8) Table 3 in Statistical Appendix

(3) Projections based on recent trends

(4) Supply required in order to keep per capita consumption of milk (excluding skim milk powder) in 1965 and 1970 equal to that of the base period, except in Latin America and Mediterranean countries where per capita consumption is expected to increase.

(5) Includes net exports to Eastern Europe excluding Poland (about 220,000 tons).

(6) Calculated by taking into account changes in the fat content of milk produced.

Source: F.A.O. op.cit. Table 2, p.5.

TABLE 3

BALANCE OF PRODUCTION AND DOMESTIC DISAPPEARANCE OF MILK AND
MILK PRODUCTS 1/, IN MILK EQUIVALENT, IN 22 ADVANCED COUNTRIES

Country	Total production of milk Averages centering around:			Total domestic dis- appearance <u>2/</u> Averages centering around:			Balance (-Exportable surplus) Averages centering around:		
	1958	1965	1970	1958	1965	1970	1958	1965	1970
	-----1000 metric tons-----								
1. France	21,115	28,320	30,000	20,580	23,029	24,780	-535	-5,291	-5,220
2. W.Germany	17,807	21,713	23,995	19,368	23,115	24,444	1,561	1,402	449
3. Italy	9,345	11,500	13,000	9,727	11,972	13,243	382	472	243
4. Netherlands	6,350	7,750	8,100	3,850	4,765	5,235	-2,500	-2,985	-2,865
5/6. Belgium- Luxembourg	3,943	4,477	4,981	4,268	4,607	4,831	325	130	-150
EEC Countries	58,560	73,760	80,076	57,793	67,488	72,533	-767	-6,272	-7,543
7. Austria	3,000	3,280	3,560	2,770	2,910	3,060	-230	-370	-500
8. Denmark	5,276	5,550	5,700	2,390	2,610	2,750	-2,886	-2,940	-2,950
9. Finland	3,169	3,650	3,950	2,701	3,151	3,324	-468	-499	-626
10. Ireland	2,604	2,895	3,000	2,267	2,222	2,222	-337	-673	-778
11. Norway	1,693	1,872	1,971	1,525	1,579	1,626	-168	-293	-345
12. Poland	11,514	15,250	17,500	11,093	14,450	16,179	-421	-800	-1,321
13. Sweden	4,015	3,736	3,465	3,689	3,733	3,566	-326	-3	101
14. Switzerland	2,889	3,250	3,400	2,696	2,999	3,210	-193	-251	-190
15. U.K.	11,518	12,200	13,100	21,225	22,727	23,700	9,707	10,527	10,600
7-15 Sub-Total	45,678	51,683	55,646	50,356	56,381	59,637	4,678	4,698	3,991
16. Canada	8,074	9,200	10,000	7,794	8,833	9,538	-280	-367	-462
17. U.S.A.	56,018	57,379	57,152	55,219	55,628	56,261	-799 ^{4/}	-1,751	-891
North America	64,092	66,579	67,152	63,013	64,461	65,799	-1,079	-2,118	-1,353

TABLE 3 (Cont'd)

18.Australia	6,359	7,032	7,629	4,465	5,006	5,449	-1,894	-2,026	-2,180
19.New Zealand	5,304	5,822	6,354	1,531	1,759	1,942	-3,773	-4,063	-4,412
Oceania	11,663	12,854	13,983	5,996	6,765	7,391	-5,667	-6,089	-6,592
20.Argentina	4,488	5,228	6,010	3,978	4,793	5,560	-510	-435	-450
21.South Africa ^{3/}	2,276	2,900	3,400	2,278	2,718	3,066	2	-182	-334
22.Japan	1,356	2,600	3,200	1,461	2,927	3,917	105	327	717
GRAND TOTAL	188,113	215,604	229,467	184,875	205,533	217,903	-3,238	-10,071	-11,564

1/ Cow milk only

2/ Total human consumption, plus milk for feed.

3/ Excluding milk fed to animals.

4/ Including milk products used for concessional exports.

Source: F.A.O. op.cit. Table 1, p.98.

TABLE 4

BALANCE OF PRODUCTION AND DOMESTIC DISAPPEARANCE OF MILK AND MILK PRODUCTS 1/ IN TERMS OF BUTTERFAT, IN 22 ADVANCED COUNTRIES

Country	Total production of milk			Total domestic disappearance <u>2/</u>			Balance (-Exportable surplus)		
	Averages centering around:			Averages centering around:			Averages centering around:		
	1958	1965	1970	1958	1965	1970	1958	1965	1970
----- in 1000 metric tons of butterfat -----									
1. France	792	1,062	1,125	772	864	929	-20	-198	-196
2. W.Germany	654	814	888	611	867	905	57	53	17
3. Italy	336	446	520	350	464	530	14	18	10
4. Netherlands	239	301	324	145	185	209	-94	-116	-115
5/6. Belgium-Luxembourg	132	157	185	143	161	179	11	4	-6
EEC Countries	2,153	2,780	3,042	2,121	2,541	2,752	-32	-239	-290
7. Austria	114	125	135	105	111	116	-9	-14	-19
8. Denmark	221	239	251	100	112	121	-121	-127	-130
9. Finland	136	157	174	116	136	146	-20	-21	-28
10. Ireland	93	103	108	81	79	80	-12	-24	-28
11. Norway	69	76	81	62	64	67	-7	-12	-14
12. Poland	375	503	586	361	477	542	-14	-26	-44
13. Sweden	154	148	139	142	148	143	-12	.	4
14. Switzerland	112	127	132	105	117	125	-7	-10	-7
15. U.K.	415	439	472	764	818	854	349	379	382
7/15 Sub-Total	1,689	1,917	2,078	1,836	2,062	2,194	147	145	116
16. Canada	283	322	350	273	309	334	-10	-13	-16
17. U.S.A.	2,123	2,152	2,137	2,093	2,086	2,104	-30	-66	-33
North America	2,406	2,474	2,487	2,366	2,395	2,438	-40	-79	-49

TABLE 4 (Cont'd)

18.Australia	254	288	321	178	205	229	-76	-83	-92
19.New Zealand	247	272	299	71	82	91	-176	-190	-208
Oceania	501	560	620	249	287	320	-252	-273	-300
20.Argentina	141	166	192	125	152	178	-16	-14	-14
21.South Africa	83	107	129	83	100	116	.	-7	-13
22.Japan	46	88	112	49	100	137	3	12	25
GRAND TOTAL	7,019	8,092	8,660	6,829	7,637	8,135	-190	-455	-525

1/ Cow milk only

2/ Total human consumption, plus milk for feed, and changes in stocks.

Source: F.A.O. op.cit. Table 2, p.99.

TABLE 5

PROJECTIONS OF DEMAND AT CONSTANT PRICES

	Consumption 1955- 1959	Projections for 1965						Projections for 1975					
		A			B			A			B		
		(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
Liquid milk ^(a)	1519	1621	1628	1636	1602	1609	1617	1721	1749	1776	1673	1698	1726
Milk as butter ^(b)	2151	2308	2333	2351	2297	2318	2338	2448	2524	2604	2396	2467	2546
Milk as cheese ^(b)	498	536	540	543	533	536	539	575	587	600	562	573	586
Milk in other products ^(b)	263	293	297	300	291	294	297	323	335	348	315	326	339
All milk	4431	4758	4798	4830	4723	4757	4791	5067	5195	5328	4946	5064	5197
Butter ^(c)	391	420	424	427	418	421	425	445	459	473	436	449	463
Margarine ^(c)	367	364	360	357	359	356	352	364	347	330	350	334	317
Lard and other compound fat ^(c)	247	248	247	246	245	244	243	249	243	237	241	235	229
Other fats ^(c)	238	253	254	256	251	253	254	268	272	276	261	265	269
All Fats	1243	1285	1285	1286	1273	1274	1274	1326	1321	1316	1288	1283	1278

(a) Million gallons, sales through M.M.B. only

(b) Million gallons at U.K. conversion rates

(c) Thousand tons

Source: U.S.D.A. "United Kingdom: Projected Level of Demand, Supply and Imports of Farm Products in 1965 and 1975", ERS-Foreign-19, Table 5, p.92.

TABLE 6

PROVISIONAL PROJECTION OF MILK PRODUCTION
(million gallons)

	Low Feed Prices		High Feed Prices	
	P	Q	P	Q
1965	2608	2511	2425	2381
1975	2922	2793	2725	2647

1955-59 Production was 2203 million gallons

P Allowance has been made for the reduction and elimination of deficiency payments.

Q also includes the effect of reductions in the pooled milk price due to adjustments of supply to the demand situation indicated by the high population and medium income assumption.

Source: U.S.D.A. op.cit. Table 10, p.96.

TABLE 7

PROVISIONAL PROJECTIONS OF NET TRADE IN MILK PRODUCTS

	1955-59	Expected Supplies at Constant Prices	
		1965	1975
Butter ^(a)	367	348	350
Cheese ^(a)	124	123	116
Other Milk Products ^(b)	31	0	0
All Milk Products ^(b)	2335	2197	2192

(a) 000 tons

(b) million gallons milk equivalent

Source: U.S.D.A. op.cit. Table 12, p.95.

TABLE 8

OBSERVED AND EXPECTED DISTRIBUTION OF IMPORTS
OF MILK PRODUCTS
(000 tons)

	1954-58	1959	1960	1965	1975
<u>Butter:</u>					
New Zealand	143	162	147	151	167
Australia	58	64	58	52	48
Denmark	91	95	98	87	80
Netherlands	16	13	17	8	5
Others	38	66	88	50	50
Total	346	400	408	348	350
<u>Cheese:</u>					
New Zealand	86	73	77	67	55
Australia	14	14	15	14	14
Denmark	11	10	10	10	12
Netherlands	8	15	9	12	15
Others	8	23	21	20	20
Total	127	135	132	123	116

Source: U.S.D.A. op.cit. Table 13, p.96.

TABLE 9

SUPPLIES OF MILK AND MILK PRODUCTS AND CONSUMPTION OF FATS

		m.gals. 1955-59	1965A ₁			1965B ₁			1965A ₂			1965B ₂		
			a	b	c	a	b	c	a	b	c	a	b	c
Liquid milk sales		1519	1621	1628	1636	1602	1909	1617	1621	1628	1636	1602	1609	1617
Milk as cheese	H	213	288	283	280	290	284	282	237	230	225	240	238	233
	I	285	246	253	259	240	248	253	294	304	312	288	293	301
Total cheese		498	534	536	539	530	532	535	531	534	537	528	531	534
Milk as butter	H	132	324	316	310	336	329	317	201	190	177	216	203	191
	I	2019	1976	2002	2021	1959	1981	2007	2071	2099	2123	2052	2078	2103
Total butter		2151	2300	2318	2331	2295	2310	2324	2272	2289	2300	2268	2281	2294
Other milk products	H	232	293	297	300	291	294	297	293	297	300	291	294	297
	I	31	-	-	-	-	-	-	-	-	-	-	-	-
Total Other milk products		263	293	297	300	291	294	297	293	297	300	291	294	297
Home produced milk		2096	2526	2524	2526	2519	2516	2513	2352	2345	2338	2349	2344	2338
Imported butter & cheese as milk		2335	2222	2255	2280	2199	2229	2260	2365	2403	2435	2340	2371	2404
Total		4431	4748	4779	4806	4718	4745	4773	4717	4748	4773	4689	4715	4742
		000 tons												
Cheese	H	92	125	123	122	126	123	123	103	100	98	104	103	101
	I	124	107	110	112	104	108	110	128	132	135	126	128	131
Total		216	232	233	234	230	231	233	231	232	233	230	231	232
Butter	H	24	59	57	56	61	60	58	37	35	32	39	37	35
	I	367	359	364	368	356	360	365	376	381	386	373	378	382
Total		391	418	421	424	417	420	423	413	416	418	412	415	417
Margarine		367	366	363	360	360	357	354	371	368	366	365	362	360
Lard & compound fat		247	248	247	246	245	244	243	248	247	246	245	244	243
Other fats		238	253	254	256	251	253	254	253	254	256	251	253	254
All fats		1243	1285	1285	1286	1273	1274	1274	1285	1285	1286	1273	1274	1274

TABLE 9

		1975A ₁			1975B ₁			1975A ₂			1975B ₂		
		a	b	c	a	b	c	a	b	c	a	b	c
Liquid milk sales		1721	1749	1776	1673	1698	1726	1721	1749	1776	1673	1698	1726
Milk as cheese	H	350	339	329	361	343	342	303	292	283	328	305	295
	I	222	224	267	199	227	241	268	290	312	231	265	287
Total cheese		572	583	596	560	570	583	571	582	595	559	570	582
Milk as butter	H	433	407	381	465	445	416	323	297	270	354	331	304
	I	2001	2084	2170	1934	2008	2098	2089	2172	2259	2024	2101	2188
Total butter		2434	2491	2551	2399	2453	2514	2412	2469	2529	2378	2432	2492
Other milk products	H	323	335	348	315	326	339	323	335	348	315	326	339
	I	-	-	-	-	-	-	-	-	-	-	-	-
Total Other milk products		323	335	348	315	326	339	323	335	348	315	326	339
Home produced milk		2827	2830	2834	2814	2812	2823	2670	2673	2677	2670	2660	2664
Imported butter & cheese as milk		2223	2328	2437	2133	2235	2339	2357	2462	2571	2255	2366	2475
Total		5050	5158	5271	4947	5047	5162	5027	5135	5248	4925	5026	5139
		000 tons											
Cheese	H	152	147	143	157	149	149	132	127	123	143	133	128
	I	97	106	116	86	99	104	116	126	136	100	115	125
Total		249	253	259	243	248	253	248	253	259	243	248	253
Butter	H	79	74	69	85	81	76	59	54	49	64	60	55
	I	364	379	395	351	365	381	380	395	411	368	382	398
Total		443	453	464	436	446	457	439	449	460	432	442	453
Margarine		366	353	339	350	337	323	370	357	343	354	341	327
Lard & compound fat		249	243	237	241	235	229	249	243	237	241	235	229
Other fats		268	272	276	261	265	269	268	272	276	261	265	269
All fats		1326	1321	1316	1288	1283	1278	1326	1321	1316	1288	1283	1278

Note: H Home produced A = High population estimate
I Imports B = Low population estimate
A₁ & B₁ Low feed prices a = 1.3% growth rate in productivity
A₂ & B₂ High feed prices b = 2.0% " " " " per head
c = 2.8% " " " " " "

Source: U.S.D.A. op.cit. Table 51, p.124.

TABLE 10

COMPARISON OF FAO AND UNITED KINGDOM FORECASTS
(000 metric tons)

	<u>F.A.O.</u>	<u>U.K.</u>
<u>Production:</u>		
1958	11,518	9,809
1965	12,200	11,822
1970	13,100	
1975		13,198
<u>Consumption:</u>		
1958	21,225	20,737
1965	22,727	22,221
1970	23,700	
1975		23,400
<u>Import Requirements:</u>		
1958	9,707	10,928
1965	10,527	10,399
1970	10,600	
1975		10,202

TABLE 11
 PROJECTION OF MILK DEMAND, SUPPLY AND IMPORTS
 (000 metric tons of milk equivalent)

	Demand for Milk			Domestic Supply of milk	Import Requirements
	Drinking	Processing	Total		
1960	-	-	1,914	1,887	27
1965	2,082	1,199	3,281	3,422	0
1970	4,307	2,230	6,537	5,537	1,000
1975	6,538	3,353	9,891	7,786	2,105

TABLE 12
 PROJECTED NET IMPORTS OF DAIRY PRODUCTS
 (metric tons)

	1965		1970		1975	
	Milk Equiv.	Commodity Weight	Milk Equiv.	Commodity Weight	Milk Equiv.	Commodity Weight
Butter	-	-	396,000	14,290	729,000	26,272
Cheese	-	-	268,000	25,211	802,000	75,446
Powdered Milk	- 80,000	-12,508	202,000	31,582	345,000	53,939
Condensed Milk	- 61,000	-21,426	134,000	47,017	229,000	73,860
Total	-141,000	-	1,000,000	-	2,105,000	-

TABLE 13
 PROJECTION OF DAIRY CATTLE POPULATION

Date	Number
1.2.65	1,290,000
1.2.70	2,238,000
1.2.75	3,277,000

TABLE 14

DOMESTIC DISAPPEARANCE OF MILK PRODUCTS

<u>Year</u>	<u>Total Disappearance (m.lbs. butterfat)</u>	<u>Disappearance per capita (lbs. butterfat)</u>
1953-54	125.4	59.0
54-55	126.8	59.9
55-56	129.4	59.9
56-57	132.2	59.9
57-58	134.4	59.5
58-59	140.5	60.8
59-60	143.0	60.5
60-61	145.1	60.3
61-62	147.5	60.0
62-63	149.2	59.3
63-64	151.0	58.8

Notes:

- (1) Annual increase 1953-54/63-64 = 2.57 m. lbs.
 (2) Annual increase 1958-59/63-64 = 2.1 m. lbs.

Source: Annual Reports of the New Zealand Dairy Board to 1961, thereafter, of the New Zealand Dairy Production and Marketing Board.

TABLE 15

PROJECTED DOMESTIC DISAPPEARANCE OF MILK PRODUCTS*

Year	Total Disappearance		Disappearance per capita (lbs. butterfat)
	(m.lbs. butterfat)	(000 long tons milk equiv.)	
1963-64 (Base year)	151	1,440.4	58.8
1969-70	163	1,554.9	57.0
1974-75	173	1,650.3	54.9

* Assuming an annual increase of 2 million pounds of butterfat equivalent and using the population projections found in the Official Year Book, 1963, p.58.

Note: 1 million pounds of butterfat is equivalent to 9.539 thousand long tons of milk.

RATES OF GROWTH REQUIRED FROM THE N.Z. DAIRY INDUSTRY TO
COVER LOCAL CONSUMPTION AND VARIOUS PERCENTAGES OF THE
PROJECTED JAPANESE IMPORT DEMAND
(long tons of milk equivalent)

----- 1970 -----				
N.Z. Shares of Japanese Import Demand	100%	75%	50%	25%
N.Z. Exports to Japan in 1970	984,200	738,150	492,100	246,050
Increase in N.Z. consumption from 1963-64 to 1969-70	114,500	114,500	114,500	114,500
N.Z. Prod'n. in 1963-64	5,644,700	5,644,700	5,644,700	5,644,700
Necessary N.Z. Prod'n. in 1970	<u>6,743,400</u>	<u>6,497,350</u>	<u>6,251,300</u>	<u>6,005,250</u>
Rates of Growth of Prod'n. from 1963-64 to 1969-70	3.0%	2.4%	1.7%	1.1%
----- 1975 -----				
N.Z. Shares of Japanese Import Demand	100%	75%	50%	25%
N.Z. Exports to Japan in 1975	2,071,700	1,553,775	1,035,850	517,925
Increase in N.Z. consumption from 1963-64 to 1974-75	209,800	209,800	209,800	209,800
N.Z. Prod'n. in 1963-64	5,644,700	5,644,700	5,644,700	5,644,700
Necessary N.Z. Prod'n. in 1975	<u>7,926,000</u>	<u>7,408,275</u>	<u>6,890,350</u>	<u>6,372,425</u>
Rates of Growth of Prod'n. in 1970	3.1%	2.5%	1.8%	1.1%

Note: 1969-70 and 1974-75 production and consumption years are taken because produce from these split years is likely to be sold in the 1970 and 1975 calendar years respectively.

TABLE 17

IMPLICATIONS OF A 4 PER CENT GROWTH IN THE
EXPORT OF MILK PRODUCTS

	1963/64	1969/70	1974/75
	long tons milk equivalent		
Total Production	5,644,700		
Domestic Consumption	<u>1,440,400</u>		
Exports	<u>4,204,300</u>		
Required Exports @ 4%		<u>5,319,800</u>	<u>6,472,300</u>
Extra Domestic Consumption		114,500	209,800
Extra Exports Required		1,115,500	2,268,000
Base Year Production 1963/64		<u>5,644,700</u>	<u>5,644,700</u>
Total milk production required		<u>6,874,700</u>	<u>8,122,500</u>
Annual Average Compound Rate of Growth of Production from 1963-64		3.3%	3.4%

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