

THE CURRENT SITUATION AND POLICIES OF THE
NEW ZEALAND CEREALS SECTOR

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PREFACE

Although the agricultural sector in New Zealand will remain of a primarily pastoral character for the foreseeable future, diversification into arable and horticultural products has become of growing importance. In recent years this diversification has involved, among other major aspects, a rapid expansion in cereal production which has become of much greater significance than has traditionally been the case. The developments in official policies on the production and marketing are discussed in this paper, which shows in particular just how responsive cereal producers have been to the opportunities that have arisen.

This Discussion Paper is linked to a study of the Pigmeat Industry in New Zealand being undertaken by the Agricultural Economics Research Unit, with financial assistance from the New Zealand Pork Industry Board. In recent decades cereals have become the most important single cost item in pig production and the trends in prices and availability of cereals is of major concern to the pigmeat industry. Cereal production is also now a substantial earner of foreign exchange, as well as meeting the needs of domestic consumers for cereals and cereal based products.

This paper continues the series of publications by Dr E.A. Attwood which review various aspects of the New Zealand agricultural scene, providing a fresh perspective of developments within the sector. Dr Attwood is a Visiting Research Fellow with the A.E.R.U., on leave from the Irish Department of Agriculture, where he is Chief Economist heading the Economic Unit.

R.G. Lattimore
Director

SUMMARY

Introduction

The area under cereals over the past decade has fluctuated around 200,000 hectares, with the trend slowly downwards. The area sown in 1983-84 and 1984-85 has reversed this trend; whether this reversal is a temporary one, as on previous occasions, remains to be seen. The area suitable for cereal production is at least ten times larger than the area currently being sown annually, so that there is a large potential for expansion if relative prices are favourable. The data currently available on the economics of production and utilisation of cereals is uneven, particularly with regard to feed grains.

Production of Cereals

- * Cereal production in the decade prior to 1983-84 fluctuated between 600,000 and 900,000 tonnes.
- * The sudden increase in 1983-84 to 1.125m tonnes represents a major expansion in production.
- * The major factor in the growth in production over the past decade has been higher yields; there has been no upward trend in area though 1983-84 saw a sharp increase.
- * The area under wheat has declined in every year for the past eight years. Production of about 400,000 tonnes in 1976 has declined to below 300,000 tonnes and, but for the increase in yields per ha to 4.6 tonnes, would have fallen considerably further.
- * Annual domestic wheat consumption of 300,000 tonnes would be virtually fully met from domestic production if all wheat currently produced was of milling quality, but the incidence of non-milling wheat has been relatively high in some recent years.
- * Total variable costs plus machinery overheads in wheat production in 1982-83 amounted to \$607 per hectare, and the return over these costs was \$244 - equivalent to \$44 per tonne.
- * The increase in gross returns per hectare over the six years from 1976-77 was 110 per cent (85 per cent price and 21 per cent in yields per ha) while total variable and machinery costs have increased by 226 per cent.
- * The profit margin over these costs has fallen in relation to revenue and the net return in real terms has declined sharply; there is however a wide range of profitability between growers.

- * The poor average returns from wheat in recent years have been the cause of the decline in the area under wheat and the decline in the wheat element in total cereal production.
- * In the case of barley, the sharp increase in yields in 1980-81 was the source of the increase in production in recent years.
- * By 1983-84 barley production was virtually as large as total cereal production ten years earlier.
- * As in the case of wheat, the profitability of barley production varies widely according to yields per ha and price per tonne.
- * There is at present little detailed information on the costs of, or returns from, the production of oats, but total production has been increasing recently to around 60,000 tonnes annually.
- * The problem of lack of current economic production data also applies to maize, but a study currently being undertaken will fill this gap.
- * Maize output has been declining slowly from around 180,000 tonnes annually in the late seventies to around 160,000 tonnes currently.
- * The increasing volume of cereal production has been due to the steady growth in yields per ha; in the case of barley this growth has been about 50 per cent in the past decade and over one third in the case of wheat and oats.
- * The consequences of these trends in yields, if continued unabated over the coming decade, will have a revolutionary effect on the production and utilisation of grain.

Domestic Utilisation

- * Current total grain consumption in New Zealand is just under 800,000 tonnes annually, of which wheat accounts for 40 per cent.
- * Compared with most other advanced agricultural economies consumption of feed grains is relatively small, amounting to little more than that of wheat.
- * The volume of cereals used for human consumption has been increasing slowly in recent years, which is in contrast to the trends in other advanced countries.
- * Cereals account for nearly a quarter of total intake of calories in the average New Zealand diet, and a similar proportion of total protein consumption.
- * The volume of cereals used in animal feed is much more variable from year to year than that used for human consumption; in the case of individual cereals the variation is even higher.

- * It is estimated that about 280,000 tonnes of animal feed is fed annually to poultry, 180,000 tonnes to pigs; of this a total of 380,000 tonnes is estimated to be in the form of cereal grain, but this figure may involve some degree of overestimation.
- * The steady growth of barley for manufacture has resulted from the increase in the production of beer and spirits.
- * Future increases in domestic consumption of cereals are likely to be small, of the order of 0.5% per annum though with considerable year to year variation.

External Trade in Cereals

- * Although the international grain situation over the past decade has been dominated by surpluses (which have been exacerbated by the domestic policies of major suppliers) the decline in world production of over 100m tonnes in 1983-84 gave a short-term boost to prices, particularly of feed grain.
- * The recovery in 1984-85 from the decline in world supplies of feed grain in the previous year to 800m tonnes has led to a fall in international prices.
- * World output of wheat has grown to about 500m tonnes due to growth in yields per hectare; as consumption has not kept pace, the carryover stocks have grown and are expected to reach 130m tonnes at the end of the 1984-85 season.
- * The New Zealand external trade in cereals has been characterised by its highly volatile nature, owing to its largely self-sufficient position but with seasonal surpluses and deficits resulting from climatic factors.
- * In very recent years barley has been produced specifically to meet export market demand; a total of 260,000 tonnes was exported in 1983-84 but this represented only 22 per cent of total production of barley.
- * The prices on international markets are becoming of growing importance in domestic prices for cereals.
- * Shipping costs give a considerable measure of protection against imports and act as a hurdle against the development of exports.
- * The effect of devaluation has compensated for the decline in world prices of feed grain, at least in current price terms.
- * In the case of wheat, the present price fixing formula will mean that prices for the coming season will only partially reflect the consequences of devaluation; this is likely to result in some further decline in the areas under wheat production.

Cereal Prices and Pricing Policy

- * The demand for cereals is derived from the diverse markets involved - human consumption, livestock feed, manufacturing and the export market.
- * As different cereals are substitutes in some uses, there is an interdependence in the markets and prices of the main feed grains.
- * The effective operation of the pricing mechanism requires detailed information to be available to both buyers and sellers but the present situation in New Zealand is not satisfactory as no up-to-date series on the average prices of the major cereals is available at the present time.
- * The basic price of wheat was fixed by the Government prior to 1981 and since then has been fixed by reference to the three year moving average fob price of Australian white wheat.
- * This basic price is then adjusted to give a series of premiums and discounts per tonne according to variety, and in some cases by location of production, but these are decided administratively rather than by direct reference to the market.
- * This current system of fixing New Zealand prices by reference to the Australian fob price would seem to have led to lower prices for growers than would have been set by market forces.
- * Of the total supply of domestic milling wheat of 193,000 tonnes in 1983-84, 91,000 was consumed in the Island in which it was produced and just over 100,000 tonnes was shipped from the South to the North Island; shipping costs were incurred in only half the domestic supplies of milling wheat but in all imported wheat.
- * A market pricing system, based on Australian (Standard White) wheat as the source of imports, could lead to an increase in grower prices; the uniformity of prices would however be replaced by a system of regional prices.
- * The threat that a market pricing system could lead to growers being at a disadvantage in the face of strong organised buyers can be overcome through a negotiated agreement or Government action if that is not forthcoming.
- * The present interventionist arrangements in the wheat market are not of a protectionist character and to some extent operate against the interests of growers as a whole.
- * The ending of intervention in the flour industry, with decontrol of flour prices and the ending of control over trade in flour by the Wheat Board in 1987 will have significant effects on wheat pricing, but these have not so far been announced.

- * The pricing of cereals other than wheat through market forces has created a system that has been reasonably efficient in ensuring that markets are cleared and the needs of grain using enterprises are met.
- * The present commercial arrangements give the grower a choice of fixed price contract, participation in a pooled price arrangement or selling in the spot market.
- * Prices for grain have declined in real terms over the past decade, but this has been part of the general movement of the terms of trade against the farming sector.
- * Predicting future grain prices, particularly in the longer period over which investments in machinery and buildings are made, involves very large uncertainties; these have not been resolved by various forms of "guaranteed prices" in overseas countries.
- * No forecasting systems are currently available that would give growers greater certainty as to the prices that will prevail either in the short or medium term.

Official Cereal Policies

- * Official policies in relation to cereals have involved two separate and dissimilar strands; in the case of wheat the policy has involved substantial intervention in pricing and marketing; in the case of feed grain there has been only limited intervention and the pricing and marketing are essentially determined by market forces.
- * It would appear that the basic reason for these alternative approaches to cereal production and marketing is of a political rather than economic character; interventionist policies for wheat have been developed in many other countries.
- * The objective of wheat policy is not at all clear; in the 1965 Wheat Board Act the aim of self sufficiency was set out, but it would appear that price stability has been of more importance.
- * The adoption of a system of pricing of wheat based on the three year rolling average of Australian White implies that international competitiveness is now the major concern in official wheat policy.
- * The Wheat Board has taken a number of steps to match the requirements of the milling industry more closely with those of wheat growers, including a new payment and marketing system.
- * The Wheat Board has argued that the 1965 Wheat Board Act gives a low cost, non-subsidised efficient means of marketing wheat and flour and that the alternative to Wheat Board contact will be a considerable reduction in the use of domestic wheat for milling,

higher prices for flour bran and pollard and substantial additional overseas exchange costs.

- * The present system of wheat pricing has prevented structural adjustments within the industry and is in contradiction to the basic agricultural trade policy stance adopted in New Zealand.
- * Policy in relation to other cereals is non-interventionist and while producers of cereals benefit from the general policy measures supporting agriculture, they enjoy no specific supports.
- * In spite of the absence of specific support measures, feed grain production has expanded considerably and important structural changes have facilitated further development.

Contribution of Cereals to the Economy

- * The value of total cereal output in 1983-84 was \$212m; the value added element is estimated at \$124m, equivalent to 5 per cent of the total contribution of agriculture to the GDP.
- * Although there is little importance attached to the food security aspect of cereal production in New Zealand, the capacity to meet all domestic needs for cereals has been fully demonstrated.
- * The contribution to foreign exchange earnings per hectare from intensive cropping farms has been shown to be 59 per cent higher than from sheep farms.
- * The projection of cereal production of 1.63m tonnes by 1990 appears to be optimistic; if it did materialise then the direct earnings of foreign exchange from cereal exports would be increased threefold.
- * The effects of general economic policy, and particularly exchange rate policy, is of major importance in the further development of cereal production, but the costs to farmers of policies of "sound economic management" should not be underestimated.
- * In general, domestic users of grain, particularly feed grain, gain from market pricing policies rather than interventionist ones.
- * There is a need for a clear policy objective for cereals, so that the measures actually adopted are fully understood and are consistent with this objective.
- * In the light of current policy developments, the future of the New Zealand cereal sector will be determined largely by developments in the international grain market.

SECTION 1

INTRODUCTION

In New Zealand's agricultural sector, the dominant position of pastoral enterprises has resulted in relatively little importance being attached to the production of arable crops. At times of strong demand and remunerative prices for milk, sheepmeat, beef and wool, the comparative advantage of New Zealand producers of these products over those in other countries has justified the general lack of any strong concern for the development of the arable sector. When, however, the market for livestock and livestock products is weak, the further expansion of other farm products, including cereals, becomes a much more attractive proposition.

It is not perhaps always appreciated that the proportion of total agricultural land in New Zealand devoted to cereal production is very small. Over the past decade, the area under cereals has fluctuated around 200,000 ha with the trend over these years being slowly downwards, from an average of 210,000 ha during the five year period 1973-77 to an average of 190,000 over the period 1979-83 (although the 1983-84 outturn has shown a sharp reversal of this trend). This area under cereals represents less than one per cent of the total agricultural land in the country, although the quality of the land involved is above that for the country as a whole. Cereals account for less than ten per cent of the proportion of the 2.5m hectares of land of high actual or potential value for the production of food.

This paper is concerned with the production and utilisation of the four cereals produced commercially in New Zealand - wheat, barley, oats and maize, and the official policies which influence them. It does not consider the role of other cereals, such as rice, in domestic consumption; nor does it cover the role of non-cereal products which are included with cereals in some major forms of utilisation, such as animal feeds. In the case of rice, the 6,000-7,000 tonnes normally imported annually all go directly for human consumption, but this accounts for only a small part of the total cereal consumption in the New Zealand diet. In the case of animal feeds, the full picture of the part played by cereals would also require a detailed consideration of the non-cereal part of the compounds. Such a consideration would take this paper considerably beyond its intended boundaries; the question of the total feeds supply/demand balance remains therefore one to be examined in a separate study.

Cereal production in New Zealand is undertaken primarily to meet domestic requirements. While there has been a considerable growth recently in the export of barley, with at the same time increased imports of wheat, the proportion of domestic production and consumption accounted for by external trade is small. Whether the recent expansion in trade in cereals will generate a volume of exports (and possibly a

further simultaneous growth in imports) such that external trade becomes the major factor in the New Zealand cereal sector, is examined in the final section of this paper. This is an issue which has attracted considerable interest in the present agricultural trade situation. The question of the part played by external trade leads to the wider one, also considered at the end of this paper, of the role of cereals in the New Zealand economy in its broader perspective. This involves an examination of its contribution to the balance of payments position, its place in the New Zealand diet, the supply of the cereal component of feeds fed to livestock, particularly pigs and poultry and the financial benefits to growers of cereals.

All of these issues are worthy of detailed consideration, although the information available on some aspects is far from complete. It is not possible, for example, to provide a comprehensive, up to date or even a uniform account of the factors determining the production and utilisation of each of the four main cereals produced in New Zealand. The volume of data that has been published on this question has followed closely the official policies that have been pursued in relation to cereals; there is in consequence a clear dichotomy between the information available on wheat and that available on other cereals. In the case of wheat, detailed annual studies have been made for eight years on the costs of production, together with a financial analysis of wheat growing. In addition, research work has been published on the economic factors affecting the areas under wheat, on the market structure and policy implications of the wheat and flour industry and on the economic aspects of the factors affecting the quality of wheat and flour produced in New Zealand. These studies are in addition to the data available in the annual reports of the New Zealand Wheat Board and the other publications from the staff of the Board. On the technical side the work of the Wheat Research Institute since 1928 and that of the Crop Research Division of the Department of Scientific & Industrial Research has provided the material for much of the work published in the New Zealand Wheat Review. No equivalent published data is available for other cereal crops, though their economic importance is much greater than that of wheat.

The volume of economic and other data on the wheat industry is therefore in contrast to the amount of economic information and analysis currently available on the production and utilisation of the other cereals grown in New Zealand. Very little data are available on the economics of production of oats, barley or maize, although the area under these crops and the value of output has consistently been larger than that under wheat for many years. There are no published studies on the factors determining the supplies of these cereals, nor detailed information on their utilisation.

The contrast between the information available on the economic factors in the wheat sector and that available on other cereals is inevitably reflected in the present study. It is not possible to remedy this imbalance without a substantial volume of further research being initiated. The current concern about the situation in the New Zealand cereals sector is however already generating research work on this issue. In the case of the production and utilisation of maize for

example, a study of the main economic factors involved is presently being undertaken by the Agricultural Economics Research Unit at Lincoln College; this should go a considerable way in filling the gap that exists in our knowledge of the economic aspects of this crop. However, there remains a need to redress the situation by similar studies of the production and utilisation of barley and oats.

The present paper is therefore not intended to examine all the economic issues which arise in the cereals sector nor to propose solutions to all the problems which exist today. Such solutions are likely to emerge only after a much more informed debate on cereal production in New Zealand than has taken place so far. The purpose of this study is to assemble the available data and to consider the issues to which it gives rise. From this it is hoped that the various issues which need to be resolved will be clearly identified, and that the necessary studies will then be undertaken to give a more balanced account of the factors affecting the production and utilisation of cereals in New Zealand.

SECTION 2

PRODUCTION OF CEREALS

2.1 Trends in Cereal Production

During the decade prior to 1983-84, the annual volume of cereal production fluctuated between 600,000 and 900,000 tonnes (Appendix Table A1). The growth from 750,000 tonnes to 870,000 tonnes during the period 1979-80 to 1982-3 was typical of the growth that had occurred in earlier years - particularly as 1982-3 production involved a small decline on that of a year earlier. The sudden surge in 1983-4 was however exceptional; it brought the total yield of cereals to well in excess of 1m tonnes in that year. The increase of 250,000 tonnes above the peak that had prevailed in the earlier years, has created a much larger role for cereal production in New Zealand agriculture than had existed hitherto.

The underlying reason for the upward trend in the total production over the past decade has been the growth in yields per hectare; the other determinant of total output, i.e. the total area under cereals, has tended to decline. As the area sown to cereals is more directly a result of the decisions of the producers than is the level of yield per hectare, the upward trend in total cereal production in recent years has not until 1983-84 been a consequence of decisions by producers to produce more; such decisions would presumably lead to an expansion in the area planted. The causes of the growth in yields per hectare are considered later; for present purposes it is useful to recognise that it is the growth in productivity, rather than an increase in area sown, that has been primarily responsible for output growth. This has been largely independent of decisions by producers, in the sense that producers would not seem to consciously aim to maximise yields at the present time in a way that is different to their objectives in cereal production five or ten years ago. However, producers could, of course, have reduced their area planted by a greater amount if the aim had been to sustain a given volume of total output.

2.2 Development of Cereal Production

2.2.1 Wheat

The area under wheat has declined in every year from 1976 to 1983 having increased sharply from 1975 to 1976 (see Appendix Table A1). In 1976, the combination of an area of over 100,000 hectares and relatively good yields brought total production up to almost 400,000 tonnes. In the subsequent years the decline to 70,000 hectares has brought annual production down to around 300,000 tonnes. This decline in production has occurred in spite of the appreciable improvement in yields which has raised the three year average by almost 1 tonne per

hectare from 3.26 tonnes in 1973-75 to 4.11 tonnes in 1981-83 (Table 1).

TABLE 1

Area and Output of Wheat - 3 Year Moving Average

Moving Average Centred on	Area ('000 hectares)	Production ('000 tonnes)	Yield (tonnes per hectare)
1974	77.6	256.9	3.26
75	77.3	261.0	3.35
76	85.9	307.4	3.51
77	97.0	357.0	3.68
78	91.5	325.9	3.56
79	88.1	309.9	3.35
80	84.8	308.8	3.65
81	79.6	307.9	3.92
82	74.5	306.2	4.11
83	68.8	295.6	4.31

Source: Derived from Table A.1

The sharp year to year changes in area, yields per hectare and total production of wheat tend to obscure the underlying trends. In terms of a three year moving average, the area under wheat during the past decade reached its peak in 1977. The decline since then has been almost exactly counterbalanced by the growth in yields, so that average production has stabilised close to 300,000 tonnes (see Table 1). This is in sharp contrast to the situation in the mid-seventies when the three year moving average of production varied by over 100,000 tonnes in just four years. It would be in the best interests of both producers and users of grain if the recent stability of supply could be sustained in the coming years, but there is no immediately evident way that this could be realised.

The average production of 300,000 tonnes a year is sufficient to meet current domestic needs, provided all the grain is of millable quality. The level of quality has however been affected to a very substantial extent by the seasonal weather patterns, so that it has been necessary to import millable quality wheat to replace the non-millable part of domestic production. In 1983-84, for example, the domestic supply of just under 300,000 tonnes would have been almost sufficient to meet the demand for human consumption of 308,000 tonnes in that year; however only 193,000 tonnes of the crop were of millable quality and it was therefore necessary to import 115,000 tonnes to replace the non-millable part of the crop.

In 1982 just under 4,700 farmers grew wheat, each producing an average 62.5 tonnes from 15.3 hectares (Department of Statistics 1983). This number was some 700 fewer than in the previous season, but the production per grower was about 3 per cent higher, due both to better yields and to a slightly larger average area per grower. The returns and costs from wheat production have been recorded in an Economic Survey carried out since 1975-76 by the Agricultural Economics Research Unit of Lincoln College. The most recent year for which results have been published is 1982-83 (Lough & McCartin 1983A); in that year gross return per ha was \$852 (equivalent to \$190 per tonne), with a very wide range about this average. On almost 15 per cent of the farms in the sample the return was less than \$600 per ha; the distribution of returns per ha was then one of similar number of farms per strata of \$100 up to \$1,100 per ha, with 15 per cent generating more than \$1,100.

On the costs side, the Survey records details of the total variable costs, together with machinery overhead costs, but does not identify other overhead costs. The total of these recorded costs (variable plus machinery overheads) amounted to \$607 per ha in 1982-83; the average margin over these costs was, therefore, \$245 per ha. At the average yield of 4.7 tonnes per ha on the Survey farms, this was equivalent to a margin over variable and machinery costs of \$44 per tonne.

Over the last 5 years, the structure of production costs has changed rapidly. While the increase in total variable plus machinery overhead costs has been 116 per cent, the growth in current labour costs has been only 28 per cent. This implies that the labour input per ha in volume terms has virtually halved in just five years. At the same time, tractor hours per ha have fallen by over 25 per cent (which of course is part of the explanation for the decline in the labour input). In the case of other inputs there were very large increases. Irrigation costs have risen from virtually nothing in the late seventies to an estimated average of \$8 per ha in 1983-84. Spraying costs increased over threefold, due particularly to problems with stripe rust; by 1983-84 it was estimated that spraying had become the most costly single input in the production of wheat.

The consequence of the escalation of costs has been that the profitability of wheat production has been steadily eroded over recent years. In the period for which data is available from the Economic Survey of Wheatgrowers (i.e. from 1976-77 to 1982-83) the basic price for wheat has increased by just over 85 per cent, while yields per ha have grown by almost 21 per cent. This growth in price per tonne and in yields per ha has meant that gross revenue per ha has increased by 110 per cent; this is slightly less than the combination of basic price and yield increases because farm gate prices per tonne received by farmers do not always increase precisely parallel to the basic price improvements.

The increase of 110 per cent in gross revenue was only just over half the increase of 201 per cent in total variable costs of production. When machinery overhead costs are allowed for, the increase in total costs was 226 per cent, i.e. twice the rate of increase in gross revenue. In 1976-77 variable plus machinery costs

accounted for 46 per cent of total revenue but the subsequent growth in production costs has led to these costs accounting for well over 70 per cent of revenue. Correspondingly the profit margin over costs (which has to meet overhead costs, reward the farmers own capital inputs and give a return to risk and management) has fallen from 55 per cent of gross revenue to less than 30 per cent. In current price terms, the margin over variable and machinery costs has risen by only 10.8 per cent over the seven year period to 1982-83. Inflation as measured by the Consumer Price Index over these years amounted to 160 per cent, so that in real terms the wheat grower has seen a very considerable erosion in his net returns from this crop. This decline in income has been from a period when wheat was a particularly profitable crop, and when production was substantially above the long term trend. These are however the only years for which the data are available.

In the circumstances, it is hardly surprising that even allowing for the particularly good returns in the mid-seventies, the area under wheat has fallen to an estimated 64,000 hectares in 1983-84. On the farms in the Economic Survey, the area under wheat contracted from 22.5 hectares per farm in 1976-77 to 18.4 hectares in 1982-83. At the same time the total cash crop area on these farms increased from 51.7 hectares to 57.8 hectares, in spite of the decline in wheat. The proportion of the cash crop area under wheat fell by almost one third to just over 30 per cent in 1982-83. The continued decline in the area under wheat at the national level, coupled with the sharp increase in the area under barley in 1983-84, has meant that the proportion of total cash crop acreage accounted for by wheat has fallen further; in 1972-73 wheat accounted for half the area under cereals but by 1983-84 it had fallen to little over a quarter.

The inadequate level of profitability from wheat production is one of the reasons for the poor incomes on wheat growing farms, as shown in the results on the financial analysis of Wheat Production (Lough and McCartin, 1983). The net profit per farm in 1982-83 was only \$10,179, and this was slightly down on the previous year. These poor incomes have come from farm businesses with output per farm of almost \$117,000, and which have substantial farm enterprises other than wheat.

It is not possible from the available data to identify precisely how much of the increase in production costs over recent years has been due to the increases in the prices of inputs, and how much has been due to increases in their volume. A measure of the price increases can be derived from the changes in the official index of farm input costs and, while this may not be entirely appropriate for wheat production, it provides a reasonable basis for estimating the price and volume elements in the increases in total production costs.

The official index of total farm input prices increased by 67.5 per cent over the four years to 1983-84, while the increases in the costs of wheat production (i.e. variable plus machinery costs) over this period, as given in the report on the Economic Survey of New Zealand Wheat Growers: Enterprise Analysis (Lough and McCartin 1983A) were 116 per cent per hectare. On the basis of these figures, the volume of total inputs in wheat production increased by an estimated 29

per cent per hectare. Most of this increase was in the volume of sprays and irrigation used, though the use of fertilisers of higher nutrient status was also recorded.

The increase in the volume of input has been paralleled by the growth in yields per hectare, which on a national basis has been 29 per cent over these years, i.e. the same amount as that of inputs. While the precise correspondence between the increases in the volume of inputs and output was to a large extent coincidental, the growth in input volume is an important element in an explanation of why the growth in yields per hectare has not led to any increase in the net returns carried from wheat production. While there are no doubt worthwhile opportunities for containing the level of inputs through greater efficiency, the economic pressures on growers to minimise production costs make it unlikely that substantial savings could be achieved without any serious repercussions on yields per hectare.

2.2.2 Barley

The rapid growth in barley production in recent years came initially from the sharp improvement in yields in the 1980-81 season. This increase in output per ha, together with higher prices for barley brought about a reversal in the decline in area under the crop which had prevailed since 1974-75. This recovery was of an uncertain nature, and it was only the large increase in 1983-84 which has given it a more secure appearance. By this latter year, barley had become by far the most important cereal produced in New Zealand, accounting for over half the area and of the total output of cereals. The upward trend in yields has continued and the estimated total barley production in 1983-84 is virtually as large as the total cereal production ten years earlier.

TABLE 2

Area and Output of Barley - 3 Year Moving Average

Moving Average Centre on	Area ('000 hectares)	Production ('000 tonnes)	Yield (tonnes per hectare)
1974	88.5	254.3	2.93
75	92.1	263.3	2.89
76	87.8	273.5	3.18
77	76.6	272.1	3.56
78	74.2	264.8	3.57
79	71.6	250.2	3.49
80	70.5	254.4	3.62
81	66.6	285.2	3.83
82	79.2	324.5	4.10
83	97.7	430.3	4.35

Source: Derived from Appendix Table A1

The three year moving average for area under and production of barley shows a downward trend in the second half of the seventies, but a substantial growth since then (Table 2). However the turning points do not quite coincide; in the case of total yield the revival began in 1980, but it was not until two years later that the area increased. In the case of yield per ha, there has been only one small break in the upward trend, and the increase of 1.7 tonnes per ha over the past decade has been a most remarkable development.

In 1981-82 (the latest year for which published data is available) there were just over 7,000 farms growing barley, producing an average of 50 tonnes from 12.5 hectares, i.e. just over 4 tonnes per ha (Department of Statistics 1983). The upward trend in yields and area during the year since then is likely to have brought about a substantially higher average production per farm, depending on the number of additional farmers who have become involved in barley production in the most recent years.

In spite of the importance of barley in the total production of cereals at the present time, no precise data exists on the average costs of production, comparable with that for wheat. The Wheat Enterprise Study of 1980-81 gave details of the area and value of total output of barley on the farms in the sample; the average area was 12.4 hectares, but this average includes a number of farms which did not grow barley at all and it would appear that the average area of those growing barley was close to 14 hectares per farm. The average gross revenue per ha from barley was \$636, which was 30 per cent below the gross revenue per ha from wheat in that year.

Some estimates of the gross margin from barley production are given in the Lincoln College Farm Budget Manual (Clark & Rennie 1983). These suggest that for 1983 the total revenue from malting barley was \$832.50 per ha; with total direct costs of \$191.28 per ha the gross margin was \$640. This was based on a crop of 4.5 tonnes per ha and sold at a price of \$185 per tonne. The consequences of changes in yields per ha, price per tonne and indirect costs are also given in the Farm Budget Manual. At a price of \$140 per tonne, the 4.5 tonnes per ha crops gave a gross margin of only \$460; at \$200 per tonne a 5.5 tonnes per ha crop a gross margin of \$915, i.e. virtually double that of the lower yield/low price crop. While the \$640 per ha gross margin may be representative of the average return, the variation around this average is substantial, as it is in the case of wheat. This points to the opportunities for improved economic performance from better yields and from efficient marketing.

2.2.3 Oats

The decline in the amount of economic data available on cereal production costs that occurs between wheat and barley becomes even more evident with oats and maize. In the case of oats production of around 50,000-60,000 tonnes per year has been maintained over the past decade, with a small trend upwards from this level. Oats are grown on some 2,800 farms with an average of just over 5 hectares per farm - a much smaller area than for other cereals. Yields per ha have now reached the 4 tonnes level; while this is still appreciably below that for other cereals, the improvement in yields so evident in the case of other cereals has also occurred with oats.

TABLE 3

Area and Output of Oats - 3 Year Moving Average

Moving Average Centre on	Area ('000 hectares)	Production ('000 tonnes)	Yield (tonnes per hectare)
1974	18.5	52.8	2.85
75	17.8	51.7	2.95
76	16.2	50.0	3.12
77	15.3	50.4	3.30
78	17.1	55.9	3.27
79	17.8	57.2	3.16
80	16.6	55.1	3.30
81	15.7	56.0	3.51
82	16.7	61.9	3.70
83	17.0	65.2	3.88

Source: Derived from Appendix Table A1

The three year moving average of the area under oats shows no evident trend over the past decade (Table 3). The increase in yields per ha of one tonne during this period has meant that total output has increased from 50,000 tonnes a year in the mid-sixties to over 60,000 tonnes in recent years.

As prices paid for oats tend on average to be somewhat below those for barley, and yields between 10 and 20 per cent lower, the gross margin per ha for oats would appear to have been consistently below those for other cereals. The slight decline over the past decade in the area grown has, however, been compensated for by the increase in yields per ha. For the past season there appears to have been a greater substitution of barley for oats in the cereal production programme, no doubt occasioned by the prices realised for barley on export markets.

Oats are clearly regarded as a traditional crop of relatively little interest in the agricultural sector generally. This is in line with the attitude in other temperate countries and there is no reason to expect it to change in the foreseeable future. However the production of oats continues to play a part in the farming programme, particularly in Southland and on recent trends is likely to remain at around 60,000 tonnes per annum.

2.2.4 Maize

The difficulties arising from the paucity of economic data which has already been discussed in the case of oats, also arise with regard to maize. The study currently being undertaken at the Agricultural Economics Research Unit at Lincoln College will go a long way to remedying this problem. In the meantime, the available information on the current situation is limited to the physical production figures, with no data on the costs of production or the gross margins to be earned from a maize enterprise at the present time.

The production of maize for threshing has shown considerable year-to-year variation. The total area grew from less than 4,000 hectares in the mid-sixties to almost 35,000 hectares in 1977, followed by a slow decline. The output of over 200,000 tonnes in 1977 was the result of a record area of 28,600 hectares rather than to particularly good yields. Since then the area has declined to just over 17,000 hectares in 1982-83, with some small recovery in the subsequent season. The decline in area has brought a drop in production, as the improvement in yields per ha up to 1981-82 was insufficient to offset this fall.

TABLE 4

Area and Output of Maize - 3 Year Moving Average

Moving Average Centred on	Area ('000 hectares)	Production ('000 tonnes)	Yield (tonnes per hectare)
1974	15.3	121.1	7.95
75	19.7	143.5	7.27
76	25.1	184.2	7.38
77	26.5	189.8	7.17
78	25.2	188.0	7.48
79	22.2	170.0	7.72
80	19.6	162.5	8.31
81	18.5	159.6	8.65
82	17.7	155.0	8.73
83	18.9	166.5	8.79

Source: Derived from Appendix Table A1

The three year moving average of the area under maize shows the increase to 26,500 hectares in 1977 and the decline since then to 17,700 hectares in the early eighties (Table 4). While there has been some increase in yields per ha it has been relatively small and in consequence the level of production has declined consistently since the late seventies to a level of around 160,000 tonnes. The trends in maize are quite different to those of other feed grains, in spite of the reputation for good yields of high quality grain from maize production in New Zealand.

By 1981-82 maize was grown by just over 1,000 farmers, with an average area of 18 hectares per farm (Department of Statistics 1983A). As maize yields per ha are almost double those of other cereals, the average production per farm of over 150 tonnes is considerably larger than for any other type of cereal in New Zealand. This relatively high level of output per farm has not, however, been sufficient to maintain interest in maize production. As in the case of other cereals, the factors influencing farmers to produce maize are not those solely concerned with the crop itself - price, yield per ha, climate etc., but are clearly influenced by the prices and profits in alternative enterprises on the farms concerned. In the case of maize the alternative farm enterprises include, not only other cereals and sheep, but also other livestock enterprises, particularly dairying.

The consequences of higher returns from alternative enterprises on the farm was highlighted by a study of the maize grain industry undertaken some years ago (N.Z.I.A.S. 1979) which pointed out that in 1978 "the mood of Waikato maize growers in the last season can only be

described as unrelieved gloom, in contrast to the rather optimistic spirit of meat, wool and dairy farmers". This mood was ascribed to the low profitability of maize in the Waikato area due to poor yields, and the difficulties and costs to maize producers of moving back into livestock farming. Costs of maize production were regarded as high due to the small overall size of the industry. The income from maize in 1977-78 was estimated at \$156 per ha for Waikato growers, a return insufficient to maintain farmers' interest in the crop.

In spite of the general view that both yields per ha and the quality of the grain are higher in New Zealand than in other maize producing countries, the economic problems of production costs and the prevailing prices paid to growers has meant that there has been no expansion in production over the past decade.

2.3 Changes in Total Production

The total area under cereals since the early seventies has fluctuated around 200,000 hectares, with a slight downward trend, though this is not shown in the 1983-84 season. Even with the sharp increase in the area sown to barley in that year, the total area under cereals still did not reach that of 1975-76. Total production however, was 20 per cent larger due to the improvements in yields and was well in excess of 1m tonnes. This expansion has been due entirely to the increase in barley production, the changes in other cereals being relatively small.

Over the past ten years there has been an apparently cyclical change in the output of cereals. The peak year output of 900,000 tonnes in 1975-76 was followed by a decline to just over 750,000 tonnes in 1979-80 and the upward part of the cycle followed in the succeeding years to reach 1.125m tonnes in 1983-84. There is no obvious reason for the cyclical character of cereal production in recent years and it does not follow that this pattern of production will be sustained in the coming years.

2.4 Causes of Increased Yields

One of the most significant factors in cereal production over the past decade has been the substantial increase in productivity per ha. This has applied to barley, wheat and oats; in the case of maize the trend is far less evident. The biggest increases in yields per ha have occurred in the case of barley, for which the three year average was less than 3 tonnes per ha only ten years ago, and for the most recent three year period the average is estimated at 4.3 tonnes. The growth of almost 50 per cent in output per ha in one decade is a most remarkable achievement. It was not achieved through any greater concentration of production on the most suitable land for barley. While the area under this crop did decline in the second half of the seventies, it then expanded again after 1980 to a record level in 1983-84. The improvement in yields per ha has continued both in the period of declining area and during the subsequent expansion.

In the case of wheat, the increase in the three year average of yields per ha has been just under one third over the past decade. This would have been regarded as a major achievement were it not for the substantially larger increase in the case of barley. Even so the 1983-84 national yield of almost 4.6 tonnes per ha meant that for the area actually planted in 1983-84, 90,000 tonnes more were produced than would have been the case at the 1973-74 national average yield.

The rate of improvement in yields of oats more than kept pace with that for wheat. The increase in the three year average of 37 per cent over the ten year period has brought the figure for 1982-84 to just under 4 tonnes per ha. This has been sufficient to bring about a small upward trend in total production; in spite of this oats have remained the least important commercial cereal crop in New Zealand.

The exception to the general upward trend in cereal yields is maize. While there has been some improvement in the three year average, this has been much smaller than in the case of other cereals. This poorer performance in the growth of maize yields has been attributed in part to the effects of continuous cropping (N.Z.I.A.S. 1979), though the small area devoted to the crop would appear to make continuous cropping unnecessary.

A detailed explanation of the causes of the sharp upward trend in cereal yields, other than maize, over the past ten years, why it has been so much stronger in this decade than in earlier ones and why maize seems to be an exception to these trends is outside the scope of this present paper. Clearly the explanations lie primarily in the introduction of new cereal varieties and in the improvements in agricultural technology. The additional volume of inputs which have been required to achieve the growth in yields has not been generally recognised, but this has been a major factor in the rapid growth in output per ha, that has been achieved over recent years.

In a paper published eight years ago, Hall and Unwin (1978) examined an old theory that sunspot activity generated longer term (11 year) cycles through the effects on weather, but concluded that the random nature of the actual yield changes is unlikely to sustain any correlation with weather data. In the course of this examination they extrapolated wheat yields from 1870, and predicted that they would rise to 3.8 tonnes per ha by 1980 and thereafter that the trend would flatten out. In practice, the yield increase did not quite reach 3.8 tonnes by 1980, but the 1981 figure of 4 tonnes was slightly above their predicted level and the upward trend since then has not, so far, shown any signs of flattening out. However the forecast of some decline in the growth in yields does seem reasonable; the short term random weather effects have made it difficult to interpret the current improvements, but the pattern should become clearer over the longer term. It would seem hardly likely that the rate of improvement of the past decade could be sustained for any long period; the forecast by Hall and Unwin of a decline in the growth rate would seem to be the most reasonable assumption, not only for wheat yields but for cereal yields generally. The conclusion on future wheat yields put forward in 1979 that "the prospects for advance in the future are even greater

than in the past and I know of no reason why the average wheat yield in New Zealand should not again double within the next 50 years, as it has done in the previous 50" (Smith 1979) seems to be somewhat different to the views of Hall and Unwin. The progress in the past decade has however gone one third of the way to this 50 year target, making it appear that yields might double in well under 50 yers.

In the case of barley, the rate of growth has meant that in one decade over half of the target of doubling yields has been attained. Whether these exceptionally high rates of growth can be sustained over the coming decades is a most interesting but unanswerable question. Although there is no evidence of any downturn in the yields in the most recent years, the consequences of annual growth rates of 3 to 4 per cent per year over a long term period of several decades would have a revolutionary effect on the production and utilisation of grain. At the same time, if these yield increases were to require the growth in the volume of inputs that has occurred over recent years, the effect of managerial competence may be reflected even more strongly than at present in the net returns that are earned from cereal production.

SECTION 3

DOMESTIC UTILISATION OF CEREALS

3.1 General Pattern of Utilisation

The total quantity of cereals consumed in New Zealand over recent years has averaged just under 770,000 tonnes a year (Table 5). Consumption fell from 1977 to 1980, but 1981 saw a sharp recovery to almost 800,000 tonnes. While these figures allow for changes in stocks of grain, changes in stocks of the main cereal products are not separately identified in the official statistics, so that some of the sharp year to year changes which have occurred in utilisation may be explained by the variations in stocks of cereal products.

The major cereal used in domestic consumption is wheat, which accounts for 45 per cent of the total. Compared with most other advanced agricultural countries, the total volume of coarse grain used for animal feed is relatively small - reflecting the dominance of pasture as the primary source of feed for animal production. Indeed the volume of cereals used in animal feeds declined in the later years of the seventies, though the upturn in 1981 appears to have brought the total used for this purpose (including the by-products of wheat) back to the 400,000 tonnes annual rate, and possibly above it.

The official data from the food balance sheets identify five categories of use of cereals (Dept. of Statistics, 1983B). Three of these are major uses - human consumption, animal feed and manufacture, while the remaining two, seed and waste, are of much less significance. The use for human consumption has been growing slowly over recent years, while the use for manufacturing has been growing more rapidly. Animal feed use has been clearly influenced by changes on both the supply and the demand sides. Seed and waste are virtually static in the amount of cereals they absorb; as they account for only just over five per cent of total supplies available on the domestic market; it is unlikely that any changes in this category of utilisation would make an appreciable difference to total cereal consumption.

TABLE 5

Cereal Balance Sheet: Supply and Utilistaion
(All Domestic Cereals ('000 tonnes))

	Year (Calendar Years)						
	1977	1978	1979	1980	1981	1982	1983
SUPPLY							
Total Production	894.5	813.5	795.8	752.6	797.2	878.9	869.7
Changes in Stocks	+11.7	-8.8	+6.7	-7.7	+5.0		
Gross Exports	56.1	66.8	103.7	88.4	45.7		
Gross Imports	-	5.8	47.8	59.3	46.3		
Available Supply	826.7	761.3	733.2	731.2	792.8		
UTILISATION							
Animal Feed	399.7	320.2	294.0	280.1	337.3		
Seed	20.8	21.9	22.1	20.4	20.6		
Manufacture	76.0	92.0	96.1	100.4	101.1		
Waste	32.2	29.2	29.0	27.2	28.6		
Gross Food	298.0	298.0	292.0	303.1	305.2		
Total Disposal	826.7	761.3	733.2	761.2	792.8		
Extraction Rate %	77.5	77.3	76.0	79.0	78.0		
Net Food	230.9	230.4	222.0	239.4	238.1		

Source: Department of Statistics 'Food Available for Household Consumption in New Zealand'. Monthly Abstract of Statistics February 1983.

3.2 Human Consumption

The volume of cereals for human consumption is identified in terms of both the gross amounts of unprocessed grain and the net amounts after processing. All but 4 per cent of the cereals for human consumption is produced from wheat, with oats accounting for nearly all the remainder. On average just under 300,000 tonnes of wheat per year have been required to meet the food needs of the New Zealand population, though this has been growing slowly (Appendix Table A4). The extraction rate from wheat has been constant at 78 per cent, so that net food from wheat has been around 230,000 tonnes annually, the remaining 70,000 tonnes being used for animal feed. In the case of oats, around 10,000 tonnes have been used for human consumption, but with an extraction rate of 54 per cent, the net food from oats has been only just over 5,000 tonnes (Appendix Table A5).

TABLE 6

Cereals Available for Human Consumption (per head)

Year Ended December	Kilograms Per Year	Grams	Calories	Per Day Protein (gms)	Fat (gms)
1977	75	207	755	23	2
78	76	207	754	22	2
79	73	200	732	22	2
80	78	214	780	23	2
81	78	213	773	23	2

Source: Dept. of Statistics Food Balance Sheets. Monthly Abstract of Statistics February 1983

The volume of consumption, in terms of kilograms per person per year, has moved upwards slightly over recent years (Table 6). Cereals account for nearly a quarter of the total intake of calories in the average New Zealand diet, considerably ahead of any other category of carbohydrate foods. Cereals also provide almost a quarter of the total protein intake, although in this case they are not the major source. In the face of the high level of total food consumption in New Zealand, it would be unrealistic to expect cereal intake to increase further, so that consumption can be expected to remain at around its present level.

3.3 Animal Feeds

While the volume of cereals used in animal feed accounts for half of the total consumption of cereals, there have been very large year to year variations in the quantities involved. The official figures show a

drop of over 35 per cent between 1977 and 1979, (i.e. from 470,000 tonnes to 365,000 tonnes) followed by an increase in the subsequent two years of almost the same proportion. This variation is even more pronounced in the case of the individual cereals; barley used in animal rations fell by half between 1979 and 1980, while maize dropped by over 40 per cent between 1977 and 1979. These very large variations however may in fact reflect some of the difficulties encountered in the official estimates, as the data on feed use is a residual in the food balance sheet calculations and as such is likely to contain any errors in the calculations themselves.

Of the total quantity of cereals used for animal feed, barley and maize contributed just under 40 per cent each in normal years, with wheat contributing around 20 per cent and oats between 5 and 10 per cent. As maize has a higher energy content than barley or wheat, it has been used more extensively in broiler rations. The availability of maize in the North Island and of barley in the South Island, and the level of transport costs in relation to the farm gate prices of these cereals has, however, meant that economic forces have been a significant factor in determining the utilisation of particular cereals in pig and poultry rations, rather than the purely nutritional ones.

The consumption of cereals in animal feed is determined by the level of production of livestock and livestock products, the volume of feed fed per unit of livestock and the level of cereals in the total feed ration. It is convenient to consider these three factors in relation to three groups of livestock - pigs, poultry and all other farm livestock together (sheep, dairy cattle, beef cattle, deer and horses).

It has been estimated that the current total feed requirement for pigs is 179,000 tonnes a year (Boshier 1983); of this some 50,000 tonnes are fed in the form of manufactured feed, with an estimated 129,000 tonnes being feed mixed on the farm. In addition, substantial quantities of garbage and dairy by-products are fed to pigs. No estimates of the volume involved are available; in any event as these do not involve cereals they are not of immediate concern. On the basis that cereals account for 88 per cent of current pig rations, the total cereal utilisation in pig feed is estimated to amount to 160,000 tonnes.

In the same study, the total animal feed requirement of the poultry sector was estimated at 279,400 tonnes, of which 203,000 tonnes was consumed by laying birds and their replacements and about 76,400 consumed by broilers. These figures include feed consumption in "backyard" production, estimated at 56,000 tonnes. Of the total feed consumed by poultry, manufactured feed accounts for 78-82 per cent of total feed requirements for laying birds, and 95 per cent for broilers and replacement birds. On the basis of these estimates, the market for manufactured feed for egg production can therefore be assessed at 166,000 tonnes a year, with a further 72,600 tonnes a year used for broiler and replacement birds. It has been estimated that cereals account for 78.5 per cent of the total feed ration; on this basis the total amount of cereals fed to poultry would amount to almost 220,000

tonnes.

The level of consumption of feed by the third category of livestock (sheep, dairy cattle, beef cattle, deer and horses) has been estimated at around 65,000-70,000 tonnes of manufactured feed annually; in addition cereals are fed to these types of livestock either in the form of home mixed feed or as straight cereals, which implies that this category of livestock accounts for at least 50,000 tonnes of cereals and possibly considerably more.

On the basis of these estimates of feed utilisation by the various categories of livestock, the total amount of cereals used in animal feed, either manufactured or as home mixed amounts to some 430,000-450,000 tonnes. This is in excess of the amount accounted for by animal feed in recent years in the official food balance sheets (Table 5); it is possible that some of the "waste" cereals in the food balance sheet is used for livestock feed in one form or another, but it only accounts for part of the difference between estimated availability and consumption. Allowing for this factor would still not bring the estimated consumption of cereals by livestock to the amount attributed to animal feed in the official food balance sheets. This would imply either that there may have been some over-estimation of the consumption of cereals by the different categories of livestock or of the overall cereal content in livestock rations, or that cereals used for animal feed purposes may have been understated.

3.4 Manufacturing

In recent years about 100,000 tonnes of cereal have been used for manufacturing. All but 7,000 tonnes of this is barley used for malting and distilling, the remainder being predominantly oats, with a small quantity of maize. The demand for barley for malting has been increasing slowly with the changes in production of beer and spirits (Table 7).

TABLE 7

Consumption of Beer and Spirits (per head)

Year Ended December	Beer Litres	Spirits Litres
1977	.360	3.10
78	.348	4.11
79	.326	4.11
80	.331	3.08
81	.334	4.10

Source: Dept. of Statistics, Food Balance Sheets. Monthly Abstract of Statistics February 1983.

3.5 Seed and Waste

Seed and waste account for just under 50,000 tonnes of cereals per year; of this seed requirements account for 20,000 tonnes and waste under 30,000 tonnes. The total utilisation in this category represents only 6 per cent of total cereal used in New Zealand and this is not an end use which is likely to alter to any significant extent.

3.6 Changes in Cereal Utilisation to 1990

3.6.1 Human consumption

The slight upward trend in per capita consumption of cereals in the last years of the seventies was followed by a stable level of 78 kilograms per head per year until the present time. It is unlikely that this level of consumption will grow further; the greater likelihood is that in the face of pressures for reduced carbohydrate intake in everyday diets, the level of consumption per head may revert to the 75 kilograms per year which prevailed in 1977. On the basis of the official projections, the total population is expected to grow to 3.23m in 1983, to 3.485m by 1991 and 3.6m by 1996, on the assumptions of long term net annual migration of zero and medium fertility levels and zero short term migration (Dept. of Statistics 1984). This is equivalent to a population growth of one per cent per year. Total cereal consumption for human purposes is therefore likely to increase at a very low rate, as the small growth in total population is likely to be partially offset by some decline in per capita consumption. Given the uncertainties in both population projections and dietary composition in the coming year, it would be realistic to accept the hypothesis that there will be no significant trend in total cereals used for human consumption in New Zealand in the foreseeable future.

3.6.2 Livestock consumption

In the case of trends in future livestock consumption, the issues are more complex. In the study edited by Boshier (1983), three possible market scenarios for the pig and the poultry sectors were specified with a single assumption of the growth in the market for feed for other categories of livestock. These scenarios, which represent points in a wide spectrum of possible developments, give a projected growth in the consumption of animal feed to 1990 ranging from +2 per cent to +27.75 per cent, with the middle consumption in each group of three scenarios giving +12 per cent. Over a period of a decade this represents a growth of only just over one per cent per year.

3.6.3 Cereals for manufacture

The third major type of utilisation of cereals - for manufacture - is also subject to considerable uncertainty. This arises because of the difficulties in interpreting the trends in consumption of beer over the past decade and the diversity of factors affecting average per capita levels of alcohol consumption. In the face of these uncertainties, it is appropriate to assume that manufacturing will account for around 100,000 tonnes of cereals per annum, with the possibility of a small increase of one to two per cent per year.

3.6.4 Future trends in total cereal consumption

In aggregate, these individual forecasts of changes in the total domestic utilisation of cereals give an upward trend of around 0.5 per cent per annum. The substantial year to year changes in the volume of cereals consumed in New Zealand in the different outlets are likely to continue, so that consumption is likely to show considerable short term movements, but these seem unlikely to represent significant trends in the medium to longer term.

SECTION 4

EXTERNAL TRADE IN CEREALS

4.1 World Grain Production and Consumption

4.1.1 Coarse grains.

The international grain situation over the past decade has been dominated by a surplus of supply over effective demand, with consequential large stocks making it difficult for exporters to generate reasonable returns. These surpluses have been exacerbated by the policies of some major grain producers, notably the European Community and the U.S.A., of encouraging production through measures which involved various forms of subvention even in years of over-supply on world markets. These years of surplus have, however, been interrupted by shortfalls of production in some individual years, which have brought a better balance into the market and helped to reduce stocks, at least in the short run.

A year of such shortfall in world production of coarse grains occurred in 1983-84, when the sharp decline of 115m tonnes in the U.S.A. harvest was offset by an increase of only 6m tonnes in the rest of the world. This decline in production in the U.S.A. was caused by dry conditions in the main corn production regions, coupled with substantial acreage reductions under government programmes designed to reduce the total volume of output. The drop in total world supplies, i.e. production plus opening stocks, at the beginning of 1983-84, to 849m tonnes compared with 934m tonnes at the opening of 1982-83, meant that world carryover stocks at the end of the 1983-84 season were projected to be only half those at the opening of the season (Ministry of Agriculture & Fisheries, 1984).

The effect of the lower supplies in the world market has been to raise prices and particularly producer prices in the U.S.A. and in other grain producing countries receptive to world market conditions. US prices in 1983-84 increased to between NZ\$179.4 and 197.8 a tonne, compared to NZ\$123.3 a tonne in the 1982-83 season. These market conditions were reinforced by the poor spring barley crop in the European Community in 1983, down to 35m tonnes from 41m tonnes in the previous harvest. This contributed towards the much stronger world market for malting barley in 1983/84.

The shortfall in coarse grain production and the considerable price increases that have followed have led to some decline in world consumption after three years of steady expansion. This decline has occurred particularly in the U.S.A., and has been sufficient to offset increased demand in some other countries. In addition, the abundant stocks of wheat have led to an increased usage of wheat for animal feed purposes. The prices of maize and wheat were at comparable levels in

trade at the end of 1983, even though the feed value of wheat exceeded that of maize. The upper price of maize is set, to a considerable extent, by the wheat price and thus any strengthening of the price of maize on international markets is not likely to occur in the short term in the face of large surpluses of wheat.

The outlook for the world coarse grain market in 1984-85 is for output to recover in the U.S. but lower exports in other major producing countries; this is expected to lead to higher utilisation and expanded trade, with the level of stocks moving back to well over 100m tonnes. World production is currently expected to grow by 120m tonnes to reach close to 800m tonnes, as countries in the northern hemisphere increase their area under coarse grains (possibly at the expense of some of the land planted to wheat). An increase of output to this level is expected to result in a decline in prices, with the prospects of a fall in prices for maize to around NZ\$200/tonne in 1985. This fall of 20 per cent in current prices, and close to 25 per cent in real terms, is expected to result in an increase in consumption, possibly up to 780m tonnes. At the same time, it is anticipated that feed wheat will still be available in substantial quantities and will continue to provide competition for feed grains in the Asian markets, as well as in the Soviet Union and Eastern Europe.

4.1.2 Wheat.

In the years since 1980 the volume of world wheat production has grown by over 40m tonnes from 440m tonnes in 1980-81 to an estimated 487m tonnes in 1983-84 (Ministry of Agriculture & Fisheries 1984). This growth has been due entirely to higher yields per hectare, as the total area under wheat in the world has declined by 3 per cent over these years. During this period total wheat consumption has grown at a slightly smaller rate than production in spite of the greater use of wheat as a feed grain. There has, therefore, been a growth in carryover stocks which, by 1983-84 are estimated to have reached 118m tonnes.

In 1984-85, it is expected that output will continue to grow and to reach a record of 500m tonnes, provided that weather conditions are normal. An increase in production in the European Community by more than 20 per cent above its previous record is a major cause of the large world supplies. Consumption is projected to remain at the 1983-84 level of 485m tonnes, so that carryover stock will grow further, and could well reach 130m tonnes. With this level of production and stocks, it is likely that competition for the world's markets will remain very strong and prices in international markets should remain relatively stable.

4.2 New Zealand Trade in Cereals

4.2.1 Volatility of trade.

The volume of New Zealand trade in cereals, both imports and exports, has been characterised by its highly volatile nature. Until recently this has been due to the basically self sufficient situation of cereal production, with surpluses and deficits being due primarily to seasonal factors. This has resulted in unduly fluctuating levels of overseas trade in cereals. The most recent surge in exports has, however, been a consequence of increased production specifically designed to meet export opportunities. This is only a very recent phenomenon; it is not yet possible to see whether this will become a more stable element in the utilisation of cereals produced in New Zealand.

The volatility in terms of quantities entering into trade is also evident in the particular countries involved in this trade, the only exception being that of wheat imported from Australia. Markets for exports of grain have been found in many parts of the world, but there are only one or two cases of reasonable consistency in these destinations primarily Saudi Arabia. Many of the markets for barley, the principal cereal export, have been on a once or twice only basis e.g. Singapore, Belgium and West Germany, while even the markets that have been supplied on a more regular basis, such as the U.S.S.R. and Taiwan have not been supplied at all in some years. In the case of maize there has been a greater degree of regularity of destination, particularly the quantities exported to the Pacific Islands, but in this trade the quantities involved annually have been relatively small. The irregularity of wheat exports, with quantities since 1971 only significant in 1972-73, 1976-77 and 1983-84, has inevitably been associated with an absence of any consistent market destination. The exports in 1983-84 of non-millable wheat were sent to Bangladesh and Korea.

4.2.2 Exports.

The total volume of exports of cereals was virtually nil in 1971 and again in 1974 and 1975 (see Table 8). It grew very rapidly after 1975 to reach 136,400 tonnes in 1976 and then declined to 70,000 tonnes in 1979. After some resurgence in 1980 it declined to only 32,000 tonnes in 1982. Over the following two years, however, the volume has grown to almost 260,000 tonnes in 1983 - a level almost double that of the previous peak export year of 1976. While the 1983 growth has evoked considerable interest, it still represents only 22 per cent of total cereal production at that time.

Earnings from these exports were less than \$4m a year in the early seventies, but in 1976 they exceeded \$16m - a total that was not surpassed until 1984 when they were worth almost \$55m. While this represents only a small proportion of the value of total cereal output, the effects of a dynamic export trade on the total net earnings in cereal production is of considerable importance.

TABLE 8
Exports of Grain 1971-84
(quantity - tonnes: Value NZ\$ 000 f.o.b.)

Year end 30 June	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Wheat														
quantity	8	10	30,232	13	-	-	14,662	78	62	78	15	4	15	40,851
value	1	1	1,431	1	-	-	1,375	13	14	31	7	2	9	8,784
Maize														
quantity	3	5	9,517	27	148	77,114	46,303	20,832	58,037	29,199	22,472	9,780	54,132	10,720
value	1	3	426	4	20	8,709	5,471	2,242	6,115	3,875	3,330	2,363	9,903	2,794
Barley														
quantity	-	10,991	29,805	-	-	59,264	52,610	49,971	12,245	84,679	51,559	22,523	17,217	207,432
value	-	267	1,968	-	-	7,317	6,946	5,914	1,415	11,505	8,774	4,063	3,199	43,045
Oats														
quantity	12	9	34	8	102	14	43	20	49	92	139	110	36	249
value	2	1	3	1	9	2	13	5	15	18	35	38	15	94
Total														
quantity	23	11,015	69,588	48	250	136,392	113,618	70,901	70,393	114,048	74,185	32,417	71,400	259,252
value	4	272	3,828	6	29	16,026	13,805	8,174	7,559	15,429	12,146	6,466	13,126	54,717

Note: Data for barley for 1983 and 1984 includes "barley groats" (N.Z. SITC 0470201)

Source: Ministry of Agriculture and Fisheries and Department of Statistics

TABLE 9

Imports of Grain 1971-84

(quantity - tonnes: Value NZ\$ 000 c.i.f.)

Year end 30 June	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	
Wheat	quantity	80,122	45,320	-	49,882	127,422	122,126	-	-	31,758	53,877	53,060	51,326	70,756	124,713
	value	4,989	2,962	-	8,095	19,629	17,741	-	-	5,681	11,638	13,525	13,771	21,101	40,998
Maize	quantity	1,277	64	26	28	9	9	6	12	68	1	1	-	-	551
	value	223	45	36	35	14	34	10	35	73	5	1	-	-	387
Barley	quantity	24,278	13,119	-	4,949	-	13	2	3	2	-	21	12	5	7
	value	1,213	717	-	494	-	13	2	11	2	-	17	16	7	5
Oats	quantity	635	-	597	6,093	-	-	1	-	-	-	-	89	-	-
	value	46	-	78	697	-	-	4	-	-	-	-	37	-	-
Total	quantity	106,312	58,503	623	60,952	127,431	122,148	9	15	31,828	53,878	53,082	51,427	70,761	125,271
	value	6,471	3,684	114	9,321	19,643	17,788	16	46	5,756	11,643	13,545	13,814	21,108	41,390

Source: Ministry of Agriculture and Fisheries and Department of Statistics

4.2.3 Imports.

Imports of cereals over the past decade have consisted almost entirely of wheat from Australia (see Table 9). In some years there have been no wheat imports at all (e.g. in 1973, 1977 and 1978) and total cereal imports in those years have therefore been virtually non-existent. On the other hand, in years such as 1975, 1976 and 1984, imports of wheat exceeded 100,000 tonnes. In the other years since 1970, the volume of imports has fluctuated between 31,000 and 80,000 tonnes.

There has been no clear pattern of years of low and high wheat imports; they have been large in years of low production due to only small areas being planted (e.g. in 1975 and 1976) and in years of a high proportion of poor quality production (particularly 1984). Whilst the volume of cereal exports during the past decade has been over one third higher than of imports in value terms the imports have been 10 per cent greater. This was particularly noticeable in 1984, when the volume of exports was over twice that of imports, the value being less than one third greater.

4.3 Effects of Transport Costs

One of the major factors affecting external trade in cereals is the high cost of transport and port charges in relation to the f.o.b. value of the product. These changes can be illustrated by the costs of shipping wheat from Australia and even more clearly by the average costs of wheat shipped from the South Island to North Island mills. In the case of the shipments from Australia the average cost for wheat in the period February 1983 to January 1984 was \$89.74 per tonne; in the case of shipments of wheat from the South Island to the North Island, the average cost in that year was \$84.45 per tonne (Wheat Board, 1984). There is, therefore, a substantial degree of protection against external supplies of grain on the New Zealand market offset in part by the costs of shipping from the main cereal production regions within New Zealand to the main consumption areas.

In the case of the export markets for grain, a correspondingly large economic hurdle exists, reducing the net earnings from sales of New Zealand grain on external markets. The capacity of exporters to pay remunerative net returns to growers in the face of these relatively high transport costs is far easier in periods of strong world demand; in periods of slack demand the effect of transport charges becomes much more serious. As the level of international grain prices is determined for the most part by factors which are unrelated to shipping charges (i.e. by the level of supplies on the world market) it is unlikely that any decline in world grain prices would be accompanied by a decline in shipping costs of sufficient magnitude to cushion the effects of lower prices on the returns to the New Zealand grower.

4.4 Future Levels of Trade in Cereals

Even though the export market accounts for less than a quarter of total production, the trend in the demand for cereals on international markets is one of the most important issues in the current situation of the cereals sector in New Zealand at the present time. Over the 1983-84 season the shortfall of U.S.A. maize production resulted in buoyant world prices for feed grains, as the normal demand could not be met in full from the current level of production. This strong external market for cereals coincided with a very large increase in the supplies of grain from New Zealand. While the additional volume of New Zealand supplies for the export market was of considerable significance in the context of New Zealand production (being almost double the previous highest level of exports), it was miniscule in the case of exports to smaller Pacific Island markets, the consequences of higher New Zealand exports of grain had no effect on the prices actually realised.

As New Zealand is basically a 'price taker' in external markets for grain, the profitability of grain exports in the coming years will depend on:

- (a) the prices prevailing on world markets;
- (b) the exchange rate policy pursued by the New Zealand Government and the exchange rates that actually prevail;
- (c) the increases in costs of production of cereals in New Zealand;
- (d) transport costs;
- (e) the ability to produce consistent grades of export grain e.g. malting barley.

The strong world market situation for feed grains of 1983-84 has inevitably receded in the face of the large recovery in production in the U.S.A. This growth has led to a decline in the spot and forward prices of maize, with the end 1984 forward price down to NZ\$211.2 a tonne which, while still well above the 1982-83 prices, is considerably down on those of 1983-84. Forward prices for 1985 have declined further and the effect of the much larger supplies of coarse grains on world markets has tended to reduce the volumes of grain traded over the longer futures markets.

The current decline in U.S.A. maize prices has an impact on prices of other feed grains in U.S. dollar terms; however this has been offset as far as New Zealand producers are concerned by the effects of the July 1984 devaluation. In the case of exports of feed grains, all the benefits of devaluation will be incorporated in the returns from exports subsequent to June 1984 (except in so far as traders bought New Zealand dollars forward at the predevaluation rate for sales agreed before the devaluation, but shipped subsequent to it).

While the benefits of devaluation in terms of the return to the grower may more than offset the decline in feed grain prices in U.S.

dollars terms, the net benefits to growers will depend upon the extent to which devaluation causes production costs to rise. While it is not expected that, for the 1984-85 season the growth in production costs will increase as rapidly as the rate of devaluation, it is distinctly possible that the combined effects of lower world prices, domestic inflation and devaluation will leave growers with a margin from the 1984-85 crop comparable to that of the previous season in current terms and therefore below the 1983-84 returns in real terms. In these circumstances it is likely that, while the area under cereals will be maintained at the 1984-85 level, the growth experienced in 1983-84 will not be repeated. This would mean that, given the stability of the domestic grain market, the volume of exports would remain at around the 1983-84 level of 250,000 tonnes.

In the case of wheat, the factors determining future external trade levels are significantly different from those affecting other cereals. The system of fixing domestic grower prices by reference to the three year rolling average of prices of Australian Standard White gives a greater stability in prices from one season to the next, but this limits the impact of devaluation. In practice, on average about half the effects of devaluation will be incorporated in the prices for wheat in the following season, and the remaining increases spread over the following two years. Meanwhile the higher production costs occasioned by devaluation would be effective in full in the season following devaluation, so that the margins earned by growers are likely to be squeezed in current terms as well as in real terms.

The consequences of weather will also affect the decisions by wheat growers on the area to be planted, so that the narrower effects of changes in prices of outputs and of inputs will be modified. The climatic factors have a major bearing on the volume of wheat of milling quality that is produced, which makes it difficult to predict changes in supplies of such wheat from domestic sources. Given that the 1983-84 volume of wheat imports was exceptionally high, due to the volume of non milling wheat in the domestic crop, the effects of a more normal climate in 1984-85 is likely to lead to greater supplies of suitable wheat from domestic sources and therefore to a decline in the volume of imports. This could be the case even with a further decline in the total supplies of domestic wheat, which could follow a drop in the area of wheat harvested.

SECTION 5

CEREAL PRICES AND PRICING POLICY

5.1 The Diversity of Demand for Cereals

Little if any of the cereals produced in New Zealand is used directly for human consumption. All the grain is subject to some form of processing - either industrial processing, farm processing, or is exported increasingly in a partially processed form. The demand for grain is therefore derived from the demand in the diverse markets involved. In the case of the animal feed market, demand is dependent on the level of livestock production particularly of pigs and poultry. In the industrial market it depends primarily upon the factors affecting alcohol consumption. In the domestic food market demand is mainly a function of per capita consumption of bread as the changes in population and in non-bread cereal consumption tend to be relatively slow. Finally, on the export markets demand for New Zealand cereals is dependent upon the world demand and supply situation and the level of stocks.

The prices received by cereal growers in New Zealand are thus determined by a wide variety of factors in the different outlets. In addition there would appear to be some degree of interaction between the various cereals, both in production and consumption, such that changes in the price of one cereal have an effect on the price of others. Thus, with the exception of wheat, which is subject to special pricing arrangements, the price of any one cereal is determined by the quantity of that cereal on the market (or coming onto the market in the foreseeable future), the demands for the various forms in which that cereal is utilised and the prices ruling on the markets for other cereals. There would appear to be no major difficulties in principle in developing an explanatory equation of New Zealand cereal prices, though considerable problems would arise from the lack of reliable data on actual prices, particularly in the different regions of the country.

5.2 Role of the Primary System

As in the case of all other products, the pricing mechanism for cereals has to play two major roles:

- (a) the short-term function of bringing equilibrium between the volume of supplies on the market at any particular time and the level of demand;
- (b) the longer term function of guiding the producers in their future production programmes and the consumers on their utilisation programmes. As far as producers are concerned the market signals are of major importance in determining the mix of products and the

level of output in terms of the intensity of their production systems.

The more important of these two roles is generally held to be the longer term one of guiding production and consumption decisions, but for this to operate efficiently it is necessary to have a realistic and accurate interpretation of the day to day prices arising from the short term market clearance role. This shorter term function includes not only the formation of spot market prices but also of the contract prices negotiated between growers and buyers, who are also concerned with the need to ensure that the market clearing role of these contracts operates efficiently during the period of this agreement.

The differences between the actual market clearing prices and those which would be required to ensure equilibrium in the longer term has been held to justify intervention by governments in the pricing mechanism. This has been the case with wheat in New Zealand but it has not been extended to other cereals where prices are now left entirely to market forces. However, the effective operation of a market pricing system requires a knowledge of the prices that actually prevail and an accurate interpretation of the factors which will determine prices in the future. Both of these requirements involve considerable problems in New Zealand. The statistics on current cereal prices are less well documented than is generally the case in other developed agricultural economies. At the same time, however, the difficulties of interpreting the current developments in order to predict future prices for some years ahead are universal and have not been resolved in any free market economy.

5.3 Data on Cereal Prices

Time series data on cereal prices exist from three different sources, but there are considerable differences between them in any one year. The three sources are:

- (a) in the case of wheat, details of the "basic price paid to growers (g.o.p. growers station)" is published by the New Zealand Wheat Board (1984) and in their most recent Annual Report time series data are available back to 1956. However, the actual prices received by wheat growers are not the same as these basic prices; the average actual price reflects not only the basic price set for each year but also a variety of other factors. These include the volume and price of undergrade wheat, the premiums and discounts for different varieties of wheat and the volume to which they apply; the discounts on contract and non-contract wheat grown for biscuit flour production and, if non-contract production, whether grown in the South or North Island. The average prices received by growers will also be affected by the schedule of deliveries, as a storage increment scale applies to deliveries of wheat to the Wheat Board. The effect of these factors in most years has been to result in an average actual price somewhat below the basic price, though the difference between the two prices is not uniform from year to year. This can be seen in the data given in the

Economic Survey of New Zealand Wheatgrowers: Enterprise Analysis 1982-83 (Lough and McCartin, 1983A) where the gap between the basic price and the actual price over the years 1979-80 to 1983-84 varied between \$1.66 per tonne in 1981-82 to \$14.08 per tonne in the following year.

- (b) the average prices paid to producers of each of the four major cereals derived directly from the supporting data to the New Zealand System of National Accounts, that have been made available by the Department of Statistics (Table 10). In this case the consequences of different rates of payment according to variety, grade, location etc. have all been taken into account. The data does not permit the division of crops within the categories into the main sub-groups e.g. barley into that for feeding or malting, but would otherwise appear to give by far the most representative set of cereals prices received by growers. It is available for the years from 1977-78 to 1982-83, and can be extended to 1983-84 by incorporation of the estimated production and farm gate value of cereals as given in the Study on the Arable Industry: Strategy for Growth (Federated Farmers 1984) (but this is of a provisional character and therefore has a lesser degree of accuracy than the Department of Statistics' figures.)
- (c) a set of "Domestic Grower Prices" for each of the main cereals, with those for barley segregated into malting and feed barley prices (Table 11), has been published by the Ministry of Agriculture and Fisheries (Bauckham and Walker 1983). These prices, however, are taken from the published lists of major stock and station agents (with the exception of wheat, where the "Basic Price Paid South Island" is taken). In these circumstances it is not clear how representative the prices are of those actually received by farmers for the total volume of cereal production which is sold each year. There are very substantial differences between these prices and those of the Department of Statistics referred to above; in some cases the year to year changes are markedly different between the two sets of price data. However, these are the only sources of published information on feed and malting barley prices over a period of a decade or more.

The available price data on cereals is therefore not as complete as would be required for a detailed examination of the factors determining average prices actually received by farmers. The figures from the Department of Statistics are undoubtedly the most representative, but do not cover a long time span (earlier figures might be available from that Department, though there may be some problems with consistency of data over long term periods.)

5.4 Pricing of Wheat

The fixing of wheat prices in New Zealand by the Government has been a major feature of agricultural policy for many years prior to 1981. During this time the basic price was determined by the Government following consultations between the Department of Trade and

TABLE 10

Average Prices of Cereals 1977-78 to 1983-84
(Average price per tonne (\$))

Year	Wheat		Barley		Oats		Maize	
		1977-78		1977-78=100		1977-78=100		1977-78=100
77/78	118.56	100	114.62	100	94.05	100	112.07	100
78/79	125.28	105.7	125.80	109.8	136.36	145.0	110.13	98.3
79/80	138.26	116.6	111.00	96.8	136.01	144.6	117.00	104.4
80/81	183.62	154.9	162.00	141.3	155.02	164.8	136.00	121.4
81/82	202.48	170.8	175.00	152.7	227.99	242.4	173.00	154.4
82/83	204.00	172.1	161.00	140.5	185.00	196.7	182.00	162.4
83/84	211.96	178.8	180.00	157.0	165.0	175.4	189.7	169.3

Source: 1977-78 to 1982-83 Department of Statistics supporting data for the NZ System of National Accounts, 1983-84 Federated Farmers Arable Farming Strategy for Growth

TABLE 11

Domestic Grower Prices
(\$ per tonne)

Harvest	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Wheat (Basic Wheat Price)	55.12	56.95	59.71	91.86	102.88	110.0	120.0	127.5	140.0	183.0	203.0	204.0
Malting Barley	44.10	45.86	57.33	93.05	93.0	105.0	105.0	110.0	145.0	158.0	180.0	165.0
Feed Barley		35.28	88.2	80.0	81.5	81.5	90.0	80.0	86.5	125.0	150.0	150.0
Maize				80.0	80.0	92.0	103.0	109.0	125.0	168.0	192.0	175.0
Oats	70.0	44.08	99.2	75.0	90.0	90.0	107.0	107.0	125.0	140.0	220.0	210.0

Source: Bankham & Walker, New Zealand Grain Production, Ministry of Agriculture and Fisheries 1983.

Industry, the wheat growers' and the Wheat Board.

From 1981 onwards the basic price was set by reference to the three year moving average of the f.o.b. price of Australian standard white wheat. This has taken the annual decision on wheat prices away from direct Government intervention and instead related it closely to international market prices. The Wheat Board then sets the prices to be paid to growers in terms of premiums and discounts according to variety, and for some varieties it has established prices for contract and non-contract biscuit wheats according to the location of production. The Wheat Board also gives approval for the production of wheat for special end use purposes (e.g. the production of Konini purple wheat).

The change to the three year rolling average from 1981 was followed by a series of exceptional factors which have made it difficult to evaluate its full implications. At the time of its introduction international wheat prices were strong, and the immediate effect was an increase in the basic price of over 30 per cent. This was followed by a much smaller rise in the following year, as the international market was less buoyant. The subsequent imposition of the price freeze, as it affected wheat prices, in effect suspended the pricing arrangements introduced only a short time earlier.

In spite of these unexpected events, the question of whether the current system is the most efficient one for fixing wheat prices has not been subject to any detailed published consideration. The system of linking producer prices of wheat directly to the f.o.b. price of Australian standard wheat would appear to have resulted in New Zealand producers receiving a lower price for their wheat of milling grade in 1983-84 than would have been the case if the domestic price had been set by market forces (assuming Australia remains the source of external supplies). This has arisen from the effects of shipping costs. Australian wheat imported in 1983-84 incurred a shipping cost averaging almost \$90 a tonne (i.e. the gap between the f.o.b. price ex Australia and the landed cost in New Zealand). This charge was only slightly larger than the cost of shipping wheat from the South Island to the North Island; in the case of domestic wheat this charge is incurred on only a proportion of the domestic crop in New Zealand but, by definition, on all imports of wheat from Australia.

The proportion to which the inter-island shipping charge applies depends on the supplies available in each season. For the 1983-84 year it would appear that, of the total domestic milling supplies of 192,852 tonnes of wheat,

- (a) 73,785 tonnes were consumed in the South Island from South Island production;
- (b) 17,252 tonnes were consumed in the North Island from North Island supplies;
- (c) 44,156 tonnes were shipped as wheat to North Island mills from the South Island crop and;

- (d) the equivalent of 57,659 tonnes of wheat were shipped to the North Island in the form of flour from South Island supplies milled in the South Island.

On the basis that the wheat in categories (c) and (d) above cost \$84.45 per tonne to ship (and in so far as over half of this was in the form of flour derived from this crop, the cost is likely to have been less than that), the average shipping costs of all wheat of milling quality produced in New Zealand in 1983-84 was \$44.58 per tonne. This would mean that the average delivered cost of domestically produced wheat (excluding any transport costs internally in either the South or the North Island) was \$254.25 per tonne, including storage increments, premiums and discounts in the price paid to growers. Although this cost is not entirely comparable with the landed price of Australian Standard White wheat, because of differences in the levels of internal transport involved, the gap between the two figures for 1983-84 of \$85 a tonne is a substantial one that is likely to be considerably in excess of the gap that would be justified by market forces. If the market had been left to determine the appropriate price for domestically produced milling wheat, with the supplies from external sources still being in the form of Australian Standard White, it would seem likely that the price paid to domestic producers would have been above those which actually prevailed.

Such a higher domestic price would have some effect on the price of flour and consequently of bread. It would also be likely to have stimulated the level of domestic production; in so far as this occurred the imports of wheat would have been reduced. However, a policy of allowing market forces to determine the actual price paid to producers in relation to the landed price of Australian Standard White will mean that the present basically uniform pricing system within New Zealand would change to a more strongly regionalised one, related to the transport charges actually involved in the dispersal of the crop by individual producers. Such a system will have a greater benefit for some producers than others and while this would not be popular with those who would gain little, if anything from this arrangement, it would give a greater overall return to producers and lead to a more efficient use of resources.

One fear that has been expressed about a market pricing system is that producers would be at a disadvantage in negotiating prices in the face of strong and organised buyers of wheat. An effective market system requires either a multiplicity of both sellers and buyers, or that the relative negotiating strengths of the two groups should be equally balanced. There are no intrinsic reasons for reasonable equality of bargaining strength to be beyond agreement, as it would be in the interests of both producers and users of wheat to develop a more efficient production and marketing system, in which the benefits would flow to both parties. In any event, the powers of the Government under the Commerce Act to have regard to the national interest in the operation of the flour milling and bread making industries would enable the Commerce Commission to deal with any problems that might arise.

A more market orientated pricing policy is clearly necessary in the light of the forthcoming gradual introduction of free imports of flour from Australia under C.E.R. Such a policy will need an appropriate mechanism of transition, but this could be incorporated in steps to improve the general level of market efficiency in the production and marketing of wheat. The longer term benefits both to producers and to the balance of payments of New Zealand make such a development strongly attractive. The current system of linking the domestic price to the three year rolling average of the f.o.b. Australian wheat price has the inevitable result that at times of devaluation such as that in July 1984, the basic price paid to growers reflects the post devaluation situation only when the three year rolling average includes prices which are all post devaluation. Thus for the 1984-85 season, the basic price paid to growers will represent both pre and post devaluation prices, unless the pricing system is altered. This is in contrast to the prices paid for other farm products which will include the full consequences of devaluation in so far as external prices are the determinant of domestic producer prices.

It would seem clear that the present pricing system for wheat, while reflecting the external situation does not work to the growers-advantage, but rather leaves them with less than they would receive if the full consequences of relating prices to those of the Australian standard white were allowed to work through to the price actually paid to growers. Under the present arrangements the intervention system in the wheat market has brought a considerable measure of stability to the pricing system, but it has not given the grower the full benefits of an efficient market pricing arrangement. Far from the present system operating to give a measure of protection to the New Zealand producer, it would seem to give some degree of advantage to Australian exporters, who enjoy a somewhat larger share of the New Zealand market than would be the case under a more market orientated pricing system.

The announcement by the Government that the intervention in the flour industry will be ended, with decontrol of flour prices by early 1987 and the growing level of import licences, will bring major changes in the wheat and flour milling industries. The removal, by 1987, of the control by the Wheat Board over trade in flour, the restriction to trading in milling wheat and flour on a commercial basis and the ending of the sole importer arrangement in 1989 will change the role of the Wheat Board. It is not clear what effects these changes will have on the pricing system for wheat or on the returns earned by producers. It would seem unlikely that the present controls over the marketing of wheat and the existing pricing arrangements could be sustained in the face of the decontrol of flour marketing and imports, but what changes will come in wheat pricing has not yet been announced. The effects of decontrol on the price of bread are likely to be small, given the low proportion of the retail price accounted for by grain prices, and the levels of imported flour currently used in the grist.

5.5 Pricing of Other Cereals

In the case of cereals other than wheat, prices are determined through the operation of market forces. The absence of any formal system of establishing prices means that there is no single uniform price for each category of cereal, or of any pre-determined structure of prices in relation to quality differences, varieties, terms of delivery etc. At the same time, the operation of market forces is such as to create a pricing system that has been reasonably efficient in ensuring that supplies on the market are absorbed by the different grain using enterprises.

The key role in the operation of the coarse grain market in New Zealand is that of the merchant who must balance the need to offer farmers a sufficiently attractive price to encourage them to grow the volume of output for which the merchant can find secure outlets - against the willingness of grain users to pay the prices that evolve in this process. The role of the merchant, both in setting the price and in organising the subsequent destination of the grain is of critical importance in the smooth functioning of the market for coarse grain. The price decisions are made after the prospects in the domestic and export markets have been assessed: the profitability of alternative enterprises that the farmer could expand if the grain enterprise was not continued or developed has also to be taken into consideration. The entry into the market of new merchants, particularly the (Co-operative) South Island Barley Society has enhanced the effectiveness of the merchant system, although the Co-operative has a somewhat more specific export market orientation than the more traditional merchants.

The decisions on prices offered by merchants to the farmer reflect the expectation of the prices for which he will be able to sell the grain; these in turn are based on the prices current at that time in the New Zealand grain market and the likely changes in demand and supply in the coming season. The offer prices have usually been set in the mid year months, before the spring sowing, but with both the advent of autumn cereals and the greater competition in the grain market, there is pressure on merchants to agree contracts earlier in the year. These prices are derived from the expected realisation in the end use - in animal feed, exports, manufacturing or other miscellaneous uses. They have to allow for storage charges (both in terms of the physical storage facilities and interest on the capital involved), the merchant's margin to meet their costs and profit and, in some cases, a transport charge depending on the arrangements that are made for the sale of the grain. Generally prices paid to farmers in different regions reflect the differential transport charges to the major outlets, while prices within a region are generally fairly uniform but may reflect the volume produced by the grain grower, the ability of the farmer to negotiate the best possible terms and the level of competition between the buyers.

The price as agreed between farmer and merchant is normally the subject of a Sale and Purchase Contract, specifying the area grown, variety, price and quality standards. Some producers prefer to market

part or all of their cereal crop to take advantage of the spot grain market, selling it at their time of choosing to whichever outlet gives them the best return. This gives the possibility of a better realisation than would have been achieved from a contract arrangement, but, at the same time, it also gives the possibility of a poorer one and leaves the farmer with the risks in selling on the spot market.

Merchants in New Zealand often provide part of the input requirements of farmers, both in cereal production and in other enterprises. This generally involves the provision of credit for these inputs, which is repaid out of the return from a cereal crop. While it may tend to tie producers to the merchant concerned, the growth of new outlets for grain, particularly barley, has worked in the opposite direction.

One factor which has had an important influence on non-wheat cereal prices is that of wheat itself, both directly in that wheat is often a crop in direct competition with other cereals in a farmer's production programme, and somewhat indirectly in that the prices of bran and pollard from wheat sold for stock feed affect the price of feed grain. In the more important case of prices for wheat, the effect is essentially one way; wheat prices can have an effect on prices of other cereals. While the prices may affect the area under wheat, they do not affect the price paid for wheat. In the less direct case of the prices at which bran and pollard have been sold by the Wheat Board, the decisions on these prices have been made after an assessment of the prices prevailing for other stockfeed ingredients, particularly barley and maize. The figures that have been set have been at levels which have meant that the available supply was not sufficient to fulfill all the demands at these prices and the quantities have therefore been allocated by the Wheat Board to the purchasers. This pricing below the equilibrium market price may have had some downward effects on coarse grain prices, though it would be difficult to assess the extent to which this has occurred.

While the trends in prices for cereals over the past decade have been strongly upwards, in real terms prices have declined appreciably since their peak in the mid seventies. When adjusted for inflation (as measured by the Farming Cost Price Index), the prices received by growers in recent years have been one quarter to one third lower than in the mid-seventies; this reflects both the general movement of the terms of trade against the farming sector and more particularly the effects of the peak year 1974-76 in the subsequent trend in prices and income from cereals. This downward trend has affected all cereals - though the actual peak year in the mid-seventies varies between 1974 and 1976 according to the cereal concerned.

5.6 Predictions of Future Price Levels

One of the major problems facing cereal growers is forecasting the prices that will prevail in the various outlets of the New Zealand grain market. The availability of contract pricing arrangements only partly resolves this problem, as the prospect of higher prices from

pool or spot markets leaves a considerable degree of uncertainty in the decisions on the optimum channel for marketing grain. Growers may well find that of all the activities involved in the production and sale of a crop of cereals, the one decision which has the most significant effect on profitability is that concerned with selling, either on contract, in a growers pool or on the open market.

By the very nature of the problem, growers are not in a position to evaluate all the factors determining grain prices up to a year ahead when they make their decision on the area and types of cereal to be planted. As long as prices are largely export determined, the farmer has the benefit of the knowledge of futures prices on the Chicago market up to 18 months ahead, which are reported in N.Z. farm journals. In so far as some decisions in a farm programme are of a considerably longer term character (e.g. decisions on investments in farm buildings and machinery required in cereal production), the grower has to make decisions on the level of profitability of cereal production for the life of these investments. These uncertainties have led governments in some countries to provide guaranteed prices for cereals (as of course for other farm products); in practice it is doubtful if producers with these guaranteed prices feel any lesser sense of uncertainty or any greater satisfaction with such a system than producers facing a market pricing system. Indeed, the difficulty of making accurate forecasts of the levels of supply and demand of cereals on the market, except in the short term, has made the system of intervention no more effective, and often less so, than non-intervention in the achievement of longer term market equilibrium.

The difficulties of forecasting trends in cereal markets, coupled with the role of international trade in the production policies of the main cereal producing countries (except, of course, in the centrally planned economies, where efforts to regulate production have generated their own serious problems) has meant that the studies available on the longer term trends of cereal do not show any major changes in the future compared with recent decade prices on international markets. Indeed, in the light of the complexities of studies which would result in realistic forecasts, it is clear that the cereal grower is unlikely to receive reliable advice in making medium and longer term decisions on investment in cereal production. Even in the shorter term it is doubtful if there would be any consistent advice on whether the contract, pool or open market option would be the best at the beginning of any season.

There may be some opportunities to improve the shorter term efficiency of the market pricing system and particularly of ensuring that growers have as much information as possible on the likely prices on the alternative markets that are currently available. It is far from clear how efficiently the current marketing system operates as far as the individual grower is concerned; there are no a priori reasons for expecting major improvements, particularly in view of the absence of any strongly expressed views from growers of adequacies in current arrangements. It is not unreasonable to conclude that, by and large, producers are reasonably satisfied with the operation of the present grain pricing system; whether this would prevail in the event of a

sharp fall in the prices paid to growers in current terms is much less certain.

In the medium to longer term, world wheat consumption has been projected to grow by 12-14 million tonnes a year, a slightly slower rate of growth than has prevailed for the past two decades (Bureau of Agricultural Economics 1983A). Over 40 per cent of this increase is expected to occur in developing countries, due largely to increasing urbanisation and industrialisation with consequential increases in demand for flour. As production in these countries is expected to grow at a slower rate than consumption, their potential deficit is likely to grow faster. However the maintenance of recent rates of growth in production in the industrialised countries will be more than adequate to meet any larger commercial demand from the developing countries. In these circumstances, the downward trend in real prices of just over one per cent per year is likely to continue. The levels of world stocks of wheat are likely to increase still further, well in excess of 100m tonnes; the need for limitation of production in the major growing areas is likely to continue for many years. Trade in wheat is expected to grow by around three percent a year, which is basically a continuation of the trends of the past two decades. These trends would mean that the opportunities for sale of New Zealand wheat abroad are not likely to be significantly different from those of the past decades. In these circumstances the expansion of wheat production for export markets will depend upon exchange rate developments and the opportunities for developing exports of specialty type wheat.

In the case of coarse grains, world demand has been projected to grow at an annual growth rate of about 2.5 per cent in the medium term, which would bring total consumption to over 850m tonnes by 1986-87 (Bureau of Agricultural Economics 1983). Only a small part of this increase is expected to arise in the industrial countries; growth in the centrally planned economies is expected to account for half the increased consumption and that in the developing countries for a further third. The lower rates of growth in the USA and EEC are a consequence of both the low projected growth rates in the consumption of livestock and livestock products and the effects of non-grain feed substitutes which, particularly in Europe, has tended to reduce the demand for coarse grains for feeding purposes.

The growth in production of coarse grains of around 2.5 per cent per annum is expected to come largely from growth in yields per ha. Over the past two decades yields have grown at 2 per cent per annum, and the growth in the area has been relatively small. There is still considerable potential in N. America to expand the area under production, should there be sufficient demand. Some major consuming countries e.g. China pursue a policy of self sufficiency, and production increases are closely linked to changes in consumption.

World production and consumption growth of 2.5 per cent per annum in the coming decade is likely to generate a growth in world trade of about double this rate - which is considerably below the rate of the past decade. The bulk of the increase in inputs is likely to occur in those developing countries which have rapid economic growth, while the

five major exporters should retain their dominance on the export side.

If this basic continuation of the current trends continues, world prices in real terms are likely to decline probably at 2 per cent per year, though price variability is expected to remain high. The effects of this on cereal producers in New Zealand will depend in particular on the trends in the external value of the New Zealand dollar, and the associated levels of domestic inflation. It would clearly mean that the economic climate for rapidly increasing sales of barley is unlikely to be as favourable as in the recent past. The commercial market contacts that have been developed will remain a source of potential sales, but the competition on these markets may be considerably greater.

SECTION 6

OFFICIAL POLICIES IN RELATION TO CEREALS

6.1 General Approach to Cereals Policy

The approach which has been adopted by successive New Zealand Governments to the production and distribution of cereals consists basically of two separate and dissimilar strands. As far as wheat is concerned, a specific Government policy has been implemented for nearly fifty years that has involved a very substantial degree of intervention in both the day-to-day and the longer term operation of the market. In the case of other cereals, there has been only very limited specific intervention, and, apart from the effects of very general economic policies, the pricing and utilisation of these cereals is left to the operation of the market place. The State has intervened in the past to ensure the availability of domestic supplies for internal consumption but this policy has been abandoned for one of non-intervention. It is not intended to quantify the costs and benefits of these two policies as this would be a complex analysis requiring a substantial volume of detailed information which is not available at the present time. Furthermore the wheat policy is now in a period of transition, and it is not yet clear what the outcome of the change will be.

In these circumstances a discussion of official policies in the cereals sector is bound to be somewhat unbalanced. In the case of wheat it is possible to set out the actions which have been taken, the reasons given for those actions, the views of the different parties involved and the issues which are currently under examination. In the case of cereals other than wheat, there have been few explanations of policies of successive governments; it is difficult to find published information on the reasons for policies of non-intervention; the views of the different parties do not find public expression and debate and there do not appear to be any significant policy issues currently under examination.

The underlying reasons for the two opposing approaches to policies in the cereals sector would appear to be more in political rather than economic factors. New Zealand is by no means unique in having experienced a positive reaction to the view that wheat is of fundamental significance to the well-being of the people. Wheat - the staff of life - has played a part in political consciousness which is quite different to that played by other cereals. Nor is it uncommon to find that when an issue such as intervention in the production and distribution of wheat has become of serious political consequence, it generates pressures for the continuation of official intervention, even when the conditions which brought about that intervention have changed. The present intervention policies go back almost 50 years to the circumstances of the mid 1930-s, and the problems of severe depression that affected the New Zealand economy, including the agricultural

sector, at that time. The economic difficulties today have little in common with the problems of the 1930-s, but the character of the intervention policies has remained basically unchanged. The changes recently announced by the Government should be seen as a part of the policy of greater dependence on market forces not just in the wheat sector but in the economy generally.

6.2 Policy in Relation to Wheat

The official policy in relation to wheat consists of two basic elements:

- (a) the fixing of wheat prices through some mechanism other than the operation of market forces; and
- (b) the control of the purchase of wheat of milling quality from producers and the sale of wheat and flour to the users of these products by the Wheat Board.

However, in their study of the New Zealand Wheat and Flour Industry: Market Structure and Policy Implications, Borrell and Zwart (1982) commented that "the precise policy objective Government has for the wheat and flour industry is not entirely clear". The authors pointed out that while "self-sufficiency is specified as the major objective for the industry in the Wheat Board Act 1965", the results of the work by Chudleigh et al (1978) would suggest otherwise. The conclusion of this latter work is that stable prices appears to have been the primary objective pursued in relation to wheat. In neither interpretation does it seem that the supply of flour at minimum cost was regarded as a primary concern and in these circumstances "it is likely that the minimum cost imperative which is necessary to maintain efficiency in the industry has not received the priority it deserves" (Borrell and Zwart 1982).

The major difficulty with official wheat policy as it has operated over recent decades continues to be the lack of a clear specification of the objective of this policy. Even if self-sufficiency or stable prices were the objective during the period of price fixing by the Government, the introduction of the system of prices fixed in relation to those of Australian Standard White wheat has made these objectives of little current relevance. The present system of price fixing has been clearly intended to make the wheat market in New Zealand more responsive to the medium term trends on the international market, but this is not of itself an objective of policy and leaves unresolved the question as to the basic purposes of the policy.

As is discussed in the preceding chapter, the current pricing policy for wheat does not work at the present time to the advantage of domestic producers, so that the policy is not in practice a protectionist one as far as producers are concerned, in the sense that agricultural trade protectionism in many other countries is designed to raise domestic producers' incomes at the expense of overseas suppliers. This, however, only makes it even more difficult to understand the

purposes of the policy. The effects of lower prices for domestic supplies of millable wheat than would prevail under free market pricing can be expected to have had some limited effect in keeping bread prices below those which otherwise would prevail. However, income redistribution policies of this nature (i.e. from wheat producers to bread consumers) are so inefficient in welfare terms that it is hardly surprising that little if any reference is made to justifying the policy in terms of economic benefits to bread consumers.

As stated above, the conditions under which the policy originally evolved no longer prevail. For a country which has pressed so strongly and for so long for a policy of free trade in farm products, it is difficult to justify the reasons for the strongly interventionist policy that has been followed in relation to wheat for such a lengthy period. The justification for such a policy in terms of the effects on incomes of producers or the living standards of consumers in New Zealand is far weaker than arises for example in the case of the protectionist agricultural policies followed in many other countries. The gradual introduction of free trade in flour from Australia and the withdrawal of control over the flour industry will reduce the effective degree of intervention over the coming years, but this policy will only have its full impact by the end of the current decade. In the meanwhile the external trade in wheat will remain subject to control through a Board acting under legislative authority.

The other basic element of policy in relation to wheat is the very detailed controls over the purchase and sale of wheat and flour which are exercised by the New Zealand Wheat Board. This Board was set up under the 1965 Wheat Board Act to control the distribution of both imported and locally produced wheat and the distribution of flour and associated offal. All New Zealand milling wheat is purchased from farmers by the Wheat Board through the agency of grain merchants acting as brokers for the Board. The Board is responsible for the distribution of all imported wheat and its functions also include arrangements for the processing of wheat by flourmillers and the sale of the resultant flour and offal to merchants, brokers and other users. This has given the Board a very strong degree of control over the wheat and flour industry; as the Board represents all the major interests involved in the industry, the distribution of power within the Board is regarded as the main mechanism for ensuring that its authority is used in the interests of the community as a whole. The decision to end control over flour has been due to changes in economic policy; there has been no suggestion that the Wheat Board has not carried out its responsibilities to the full.

The Wheat Board has been concerned to bring improvements in the manner in which the existing wheat marketing system operates, without in any way undermining the fundamental character of the system itself. In particular it has implemented a new wheat marketing system designed to match the requirements of the milling industry more closely with those of the wheat growers. The aim of this new system is to improve the minimum standard of milling grade wheat. However the Board have regarded "the climate for change [as] being seriously inhibited by the Departmental Review of the wheat growers and flour milling industries"

(Wheat Board 1984), although what change might have occurred has not been specified.

The Annual Report of the Wheat Board for the year 1983-84 summarises the major achievements of the Board in the year to January 31, 1984 as:

- * the introduction of a new wheat payment and marketing system incorporating provision for the payment to wheat growers in advance of delivery;
- * the contract growing of premium wheat and wheat for feed and the disposal by the Board of lower scoring wheat not required for milling, without cost to the flour price;
- * the financing of the Board's operation through fully commercial operations without dependence on Treasury approval and Reserve Bank credit facilities for short term finance; and
- * the establishment of a basis for consultation with wheat growers, flour millers and the Board on the longer term future of the wheat and flour industries, and on the changes necessary in the light of C.E.R. with Australia.

The policy operating in the wheat and flour industry has, however, been a subject for concern. In mid 1983, the then Government set up a Departmental Review, undertaken by officials of the Department of Trade and Industry, the Ministry of Agriculture and Fisheries, the Treasury and the Customs Department. The Review was undertaken in conjunction with the Cabinet Economic Committee. The terms of reference of this Review were:

- (1) the flour quota system;
- (2) the determination of prices for wheat and flour, the terms on which payments are made and the financing of wheat and flour stocks;
- (3) the role of the Wheat Board in the marketing of wheat and flour; and
- (4) the impact of C.E.R. on the wheat growing and flour milling industry.

The report of this Review was presented to the Cabinet Economic Committee in February 1984, who decided that the views and comments of interested parties should be obtained and that the Wheat Board should report back to the Minister of Trade and Industry on the comments received and give an analysis of those comments, highlighting areas of consensus and disagreement. The Wheat Board was asked to report to the Minister by August 31, 1984.

The views of the Wheat Board have been set out in the Paper submitted to the Review team by the Board's deputy chairman Mr A.G.

Beadle (Wheat Board 1984).

- "(a) The Wheat Board Act provides the stable base necessary for the development of the wheatgrowing and flourmilling industries and is a relatively low-cost, non-subsidised, efficient means of marketing wheat and flour, the effectiveness of which has been evidenced in recent years by the increasing degree of users and consumer satisfaction with the quality of flour and flour-based products, at a price for flour which compares more than favourably with flour prices in other countries.
- (b) There is a definite need for a central marketing authority for wheat and flour with the implementation of C.E.R., if the maximum use is to be made of domestic wheat and an adequate balance is to continue to be maintained between the interests of the growers of wheat for milling, flour millers, flour users and consumers.
- (c) The alternative to Wheat Board control of the production and marketing of flour is likely to be a private monopoly to the disadvantage, and probable demise, of many independent flour users; a considerable reduction in the use of domestic wheat for milling to the detriment of arable farming; an increase in wheat imports; higher prices for users of flour, bran and pollard, and for consumers of flour and flour based products; and a substantial increase in overseas exchange terms in the cost of meeting New Zealand's needs for wheat and flour.
- (d) To allow the wheat and flour industries adequate opportunity to prepare for C.E.R., a continuation of the Wheat Board Act - substantially in its present form - is required for a further period (at least five years), with a review at the end of that period to determine what changes may be necessary in the light of experience under C.E.R."

The issues referred for consideration by the Departmental Review Team should be seen in the context of both the immediate problems facing the wheat growing and flour-milling industry and the more general longer term issues confronting the New Zealand economy. The more immediate issues are covered in part by the conclusion of the study by Borrell and Zwart (1982) that "the fact that policy constraints have been insulating the market from its true economic forces for a longer period [has] prevented structural adjustments within the industry". These economic forces include the economies of scale present in the milling and transport sections of the industry and inter-regional competition. While these issues came within the ambit of the Departmental Review of the wheat growing and flour milling industries, it is important to see the consideration of these industries in the context of both the agricultural trade policy stance adopted by New Zealand Governments and the steps to achieve greater economic growth through a more dynamic industrial sector which is being pursued as part of the Government general economic strategy. Policies in relation to the wheat and flour industries should not be isolated from the thrust of general government policies and policy decisions in these industries should be seen in this wider context.

The longer term issues for the future development of the wheat growing and flour milling industries arise both in the broader context of the restructuring of the New Zealand economy and more specifically in the terms of the agreement on Closer Economic Relations with Australia. Under this agreement, limited imports of flour are allowed in the schedule of import licencing. Exclusive Australian licencing for the eighteen month period to June 1984 to the value of \$100,000 has been agreed and the amount will increase in accordance with the C.E.R. formula of 15 per cent per annum in real terms until trade reaches \$1m, with a subsequent annual increase of 10 per cent. Initially 50 per cent of these licences are allocated to the Wheat Board or its nominees and to tender for specialty flours for the other 50 per cent. However, the real significance of the C.E.R. agreement, as far as the wheat industry is concerned, is the provision for free access for flour from Australia after 1995. While this gives more than a decade for the industry to prepare for the full competition from these imports, the provision for a growing volume of imports under licence will bring a much larger measure of competition from imports in the intervening years. At the same time the C.E.R. agreement provides for the Wheat Board to retain its control over imports indefinitely, for as long as the source of the imports continues to be Australia. It is far too early to see how free access for flour and control over wheat imports would work in practice but clearly the policy with regard to flour imports will change the wheat situation in New Zealand.

6.3 Policy in Relation to Other Cereals

The policy followed by the State in relation to cereals other than wheat has basically been one of non-intervention. There are no statutory boards with far reaching powers, as in the case of wheat. There are no controls over imports, other than the general regulations relating to plant disease controls and to those designed ensure standards of purity and of germination in relation to imports of cereals for seed.

At the level of the individual farm, the farmer is free to grow and sell cereals and to sell them to anyone. The official list of aids provided to New Zealand farmers - the Rural Industry Incentives 1983-84 (Ministry of Agriculture and Fisheries 1984) makes no mention of assistance for the production of cereals as such. Of course all cereal producers have gained from the general incentives and aids provided for New Zealand agriculture - the special taxation arrangements, the provision of capital at advantageous interest rates from the Rural Bank, price subsidies for fertilisers, exemption from certain road user charges etc. Such arrangements have their counterpart not only in other sectors of agriculture, but in the manufacturing sector as well, and do not confer any special benefits on cereal producers.

The policy in regard to external trade in coarse grain has been more complex than is now the case. Prior to 1981, a system of export licencing and export permits operated, which aimed at ensuring that the needs of domestic grain users was met before any exports took place. The amount licensed for export was limited to the surplus over the

estimated domestic needs. With the change in pricing policies in regard to wheat, it was decided that the controls over the trade in other cereals was no longer appropriate; the system of licensing and permits was abandoned for a basically free trade situation in grain. It must be remembered that domestic users have in fact a substantial measure of protection against exporting at low prices due to the relatively high costs of shipping grain to overseas markets. Similarly, producers have a large measure of protection against cheap imports arising from the corresponding shipping costs into New Zealand.

6.4 Effects on Research Policy

The consequences of the different official policies in the cereals sector can be clearly seen in the expenditure and organisation of research into wheat production and utilisation as against that of other cereals. In the case of wheat the existence and work of the Wheat Research Institute is the focus of work on this cereal; there is no comparable organisation for other cereals either individually or collectively.

The Wheat Research Institute is a Division of the Department of Scientific and Industrial Research, as well as a de facto Research Association. Expenditure on research and testing of wheat in the year ended 31st March 1984 amounted to \$564,000, a 13 per cent increase in expenditure over the year earlier (Wheat Research Institute 1984). This was financed from levies on millers and baker flour, testing services and a substantial grant from the D.S.I.R. The levies are raised under the Wheat Research Levy Act of 1947, under which levies are also raised from wheat growers to fund part of the work undertaken by the Crop Research Division of the D.S.I.R. The Wheat Research Institute devotes a considerable amount of its resources to routine service work for various sections of the wheat and flour industry.

The emphasis on wheat research rather than on other cereals can also be seen in the resource allocation to the work on Agricultural Cereals by the Ministry of Agriculture and Fisheries. In 1983-84, the list of Agricultural Research in Progress (Ministry of Agriculture and Fisheries 1983) identifies 21 separate research projects specifically concerned with wheat, 8 specifically concerned with barley, 2 with maize and 1 with oats. This does not include research projects concerned with general cereal crops of an unspecified type. On the basis of this number of research projects, it would appear that wheat accounts for nearly twice as much research effort as the other three cereals combined, in spite of the much higher volume and value of production of other cereals. While research allocation need not be entirely based on output values, the large discrepancy at the present time is not based on any published evaluation of the optimum allocation within the cereals sector.

6.5 Consequences of the Two Cereal Policies

Any evaluation of the consequences of the two distinct cereal policies which currently operate in New Zealand is handicapped by the lack of any agreed objectives for these policies. There would seem to be little justification for quite different objectives between the two sub-sectors or, for that matter, between the policy for cereals and that for other agricultural products. In the New Zealand context of an efficient farm structural situation (Attwood 1984) the most appropriate policy objective is the maximising of the contribution of agriculture to the Gross Domestic Product, provided that no inter-sectoral income transfers are involved. This policy objective would imply a strategy of encouraging both wheat and other cereal production, provided any resource flows arise from the operation of market forces and not from official measures which lead to inter-sectoral income flows (apart, of course, from general taxation and social policy measures which apply universally).

Measured against such an objective, the benefits of the non-international policies for coarse grains appear to have been very considerable. While there are no detailed figures available of the value added on the farm of the different grain crops, the use of the gross value figures provides a useful proxy (on the assumption that the variable production costs are similar for each cereal per unit of output). In terms of total value the coarse grains have increased their share of total cereal output from just over 56 per cent in 1977-78 to 70 per cent in 1983-84. In terms of volume, the output of barley, oats and maize has grown from 446,000 tonnes in 1977-78 to an estimated 830,000 tonnes in 1983-84 - a virtual doubling of production. Nearly all of this increase has come in the years since 1981, when the regulatory trade controls were lifted.

In the case of wheat, the volume of output has changed only slowly over these years. Given the climatic uncertainties and the consequential year to year variation, the underlying trend is not all that strong, but the volume of output in three years 1981-82 to 1983-84 was some 5 per cent lower than in the three year period from 1977-78.

The factors affecting trends in output are, of course, much more than just official intervention measures. The strong international market in coarse grains in 1983-84 was undoubtedly a major stimulant to output, but the opportunities to take advantage of this market without licensing or other export controls has facilitated the expansion of production of these crops. At the same time the effects of the price freeze have acted in the other direction. It is a matter of judgement as to the consequences of intervention and other economic factors in cereal production; the fact that coarse grain output has grown rapidly demonstrates that the New Zealand grain grower is responsive to the signals from the market place.

SECTION 7

CONTRIBUTION OF CEREAL PRODUCTION TO THE NEW ZEALAND ECONOMY

7.1 Elements in the Contribution of Cereal Production

In an analysis of the production and utilisation of cereals in New Zealand, it is useful to assess the benefits generated for the national economy and for the various sectors in the economy which are directly affected. In the present state of knowledge, it is possible to consider only the direct effects, as the available data does not allow for the estimation, with any degree of confidence, of indirect benefits through the 'multiplier' effect. The assessment in this section of the paper is not therefore complete, for unquestionably there are considerable indirect economic benefits which derive from the production of cereals. Cereal growers like other producers spend their incomes on their farm businesses, and this expenditure provides jobs and incomes for many other people.

The difficulties of estimating the full benefits from cereal production arise in part from the fact that we do not know how much of the net aggregate income of growers comes from the production of cereals, nor is there available a detailed account of how farmers spend their net incomes, or the multiplier effect of such expenditures on the rest of the economy. In these circumstances, the consideration of the role of the cereals sector in the New Zealand economy will focus on four issues:

- (a) the value of output from the cereal sector, the estimated value added in cereal production and the consequential contribution to the Gross Domestic Product;
- (b) the margins earned in marketing of cereals;
- (c) the supply of cereals to meet consumer requirements for cereals and cereal based products;
- (d) the earnings of foreign exchange from cereal production.

7.2 Value of Cereal Output

The value of sales of grain off farms in 1983-84 was \$212m, an increase of 56 per cent over the previous year (Table 12). The growth in the two years after 1979-80 from \$90m to over \$150m was interrupted in 1982-83 by a 10 per cent fall in the value of output, only to show renewed growth in the following year. This growth in value was due

largely to the increase in the volume of output, as the official figures show only a small improvement in the average prices received by growers over these years. The price increases that were realised were well below the rate of inflation. In these circumstances the growth in the volume of production, particularly the large increase in 1983-84 has been surprising.

TABLE 12

Total Cereal Output 1977-78 to 1983-84

	Value (\$'000)	Volume (tonnes)	Average Price (per tonne)
77/78	88,276	770,000	114.6
78/79	91,806	749,000	122.6
79/80	89,016	708,960	125.6
80/81	124,479	750,855	165.8
81/82	151,263	808,549	187.1
82/83	136,499	747,000	182.7
83/84	212,760	1,124,385	189.2

Source: Derived from Table 13

While no direct information is available on the level of value added that has been achieved in cereal production, a measure of the amounts involved can be derived in the case of wheat from the Economic Survey of Wheat Growers: Enterprise Analysis (Lough & McCartin 1983A). The level of non-factor input costs (i.e. total costs excluding labour, capital and land charges) for the period 1980-81 to 1982-83 amounted to \$348 per ha. Average revenue was \$842 per ha. Value added was therefore \$494 per ha or just over 58 per cent of total revenue. This had to meet not only total labour costs, but also depreciation charges and interest on the capital invested in cereal production.

On the basis of these data, the value added as a whole in 1983-84 was of the order of \$124m. This is equivalent to 5 per cent of the estimated total contribution of agriculture to the Gross Domestic Product of \$2,426m (Ministry of Agriculture & Fisheries 1984).

The changes in the contribution of the four main cereals to the total cereal output are set out in Table 13. The most noticeable feature is the lack of any growth in production prior to 1983-84 except in barley. Even so, by 1982-83 wheat was still the most important individual cereal in both volume and value, this position changed in the following year, when the volume of barley output was double that of wheat. By 1983-84 barley accounted for almost half the value of total cereal output and slightly over half the total volume. Maize output

TABLE 13

Volume and Value of Cereal Production by Category of Cereal

Crop		77/78	78/79	79/80	80/81	81/82	82/83	83/84(e)
Wheat	Value	38,414	36,331	41,664	58,913	58,083	59,160	62,300
	Volume	324,000	290,000	301,355	320,837	286,860	290,000	293,930
Barley	Value	26,936	30,067	23,022	40,017	54,902	45,563	105,980
	Volume	235,000	239,000	207,404	247,016	313,154	283,000	588,780
Oats	Value	3,762	6,136	6,486	5,383	9,540	6,660	9,080
	Volume	40,000	45,000	47,689	34,724	41,844	36,000	55,040
Maize	Value	19,164	19,272	17,844	20,166	28,838	25,116	35,400
	Volume	171,000	175,000	152,512	148,278	166,691	138,000	186,635

(e) estimated

Footnotes: (1) 1982/83 is provisional
 (2) Values are in \$(000)
 (3) Volumes are in tonnes

Source: Department of Statistics Supporting data to the NZ System of National Accounts for 1977-78 to 1982-83. 1983-84 data from Federated Farmers, Arable Industry Strategy for Growth.

also grew sharply in that year, but to a level only a little above that which prevailed in the late seventies.

7.3 Marketing Margins

The contribution of cereal production to the economy arises not only at the production level but also at the subsequent marketing level. Financial data on marketing are however not available in any complete form, and it is not possible to obtain any reliable estimate of the margins earned from this activity. In practise there are two areas of marketing for which information on the margins involved would be necessary for any evaluation of the efficiency of this function. The most important one would be that relating to the domestic disposal of grain from farm to the end user in New Zealand. This could in many cases involve a consideration of the costs of processing and distribution within the total marketing activity. The second area is that concerned with the margins earned in grain exporting, from farm to loaded on ship for export destinations.

Although internal marketing data is not available a measure of the export margin can be obtained by a comparison of the farm values of grain (which include direct marketing costs incurred by farmers e.g. in delivery of grain to the railhead) with the f.o.b. export values. Both of these sets of values are derived from official statistics (Table 14), but there are however difficulties in interpreting them. Not all of the crop grown in one season is exported in the year to which the export statistics refer; on the other hand a lagged comparison gives an even more disparate set of results than that shown in Table 14. Taking the period 1977-78 to 1983-84 as a whole, the average margin between farm and export values of barley was just over \$12.1 per tonne equivalent to 12.2 per cent of the farm value. This margin has to cover the transport of grain to the ship, loading charges, and the administrative costs and profits of those involved in the marketing function.

TABLE 14

Farm Gate and Export (f.o.b.) Prices of Cereals

	Barley			Maize		
	Farm Gate Price	Export Price	Price Difference	Farm Gate Price	Export Price	Price Difference
1977-78	114.6	118.3	+3.7	112.1	107.6	-4.5
1978-79	125.8	115.6	-10.2	110.1	105.4	-4.7
1979-80	111.0	135.9	+25.9	117.0	132.7	+15.7
1980-81	162.0	170.2	+8.2	136.0	148.2	+12.2
1981-82	175.0	180.4	+5.4	173.0	241.6	+68.6
1982-83	161.0	185.8	+24.8	182.0	182.9	+0.9
1983-84	180.0	207.5	+27.5	189.7	260.6	+70.9

Source: Derived from Tables 8 and 13

In the case of maize, the volumes expected were small in some years, and the year to year variations in the marketing margin appear to be even larger than those for barley. The effect of the price support scheme operating in the late seventies makes the comparison between farm and export prices invalid, as the scheme financed exports at a loss from levies raised in domestic production. For the years from 1979-80 onwards, the average margin between farm and export prices was \$33.7 per tonne, or 17.4 per cent of the farm price. This higher marketing margin in the case of maize would require further examination of the circumstances of the trade before any firm conclusion could be drawn as to the efficiency of the marketing of the two cereals. It would also be of interest to compare these margins with those of other major grain exporters, but the data on farm gate and export prices requires detailed examination and interpretation, which would require a considerable research effort to ensure that any conclusions were valid. This area of marketing margins is one that would justify further examination, but the absence of adequate data would seem to be a major difficulty.

7.4 Contribution to Domestic Food Requirements

The production of cereals in New Zealand provides for the major part of the total consumption of cereals and cereal products, both human consumption and that by farm animals. In the case of wheat, the years of adequate supply of wheat of milling quality such as 1977-79 has meant that almost all domestic consumption was met by domestic production. In other years, for example in the mid-seventies and again in 1983-84, a substantial part of domestic needs had to be met from imported supplies. Over the period since 1970-71, New Zealand grain growers have produced 80 per cent of total domestic needs.

The objective of self-sufficiency in wheat, put forward in the 1965 Wheat Board Act, has become of less significance with the movement towards the pricing of wheat by reference to market forces, particularly those prevailing internationally. There would appear to be relatively little importance now attached in New Zealand to wheat production as an element in a policy of food security. There is no reason to anticipate any major difficulties in meeting domestic needs for wheat in the foreseeable future. In the event of a sharp deterioration in the external supply situation on any continuing basis, it would clearly be possible to expand domestic production to meet any shortfall that might exist. While there might be some problems arising from the variability in the quality of wheat from one season to the next, these would not be insoluble. At the present time cereal imports are a consequence of the climatic situation in any particular year; in 1983-84 for example the imports of 125,000 tonnes were almost entirely required to replace non-millable wheat produced in that year. In times of scarcity, when imports were not readily available, the quality factor would probably be of lesser importance and lower grade grain could be used for human consumption on a more widespread basis. The food security issue, in these circumstances, is not of importance in the decisions on wheat policy.

In the case of cereals other than wheat, domestic production is well in excess of total domestic requirements. The operation of the licensing system for exports of feed grains in the seventies would appear to have been primarily for domestic price reasons rather than to ensure that supplies were actually available for grain users. It is doubtful if there has been any major food security aspect to coarse grain supplies.

Thus, while the domestic supply of cereals is of major importance in meeting internal demand, the rationale is an economic one, and not related to the concern for food security which exists in many other countries (where, in many cases, food security is a justification for a protectionist policy that has a large economic element, rather than a policy based on genuine security considerations).

7.5 Contribution to Foreign Exchange Earnings

The recent expansion of cereal exports has generated a considerable awareness of the potential for greater foreign exchange

earnings from this source. This potential is discussed in the report on the "New Zealand Arable Sector: Foreign Exchange Implications" (Lough and Brown 1983). Since this report was completed, the level of foreign exchange earnings from cereal exports has risen sharply. In the years under examination in the study by Lough and Brown i.e. 1979-80 to 1981-82, the level of earnings from cereal exports was relatively low, averaging only \$8m annually. Since 1981-82 the growth of cereal exports has led to over \$54m being earned in 1983-84. This seven-fold growth has reinforced the view that the arable sector generally, and cereal production in particular has the capacity to generate a considerably larger flow of foreign exchange into New Zealand than has been the case in the past.

In their study, Lough and Brown showed that the level of foreign exchange earnings in Intensive Cropping Farms was nearly 59 per cent higher than from Sheep Farms, and 21 per cent higher than on mixed Sheep and Cropping Farms. These estimates of the rates of foreign exchange earnings allowed for the fact that Intensive Cropping Farms require to have a balance of cropping and livestock production and were not purely arable farms. However, as the proportion of the land in New Zealand of high actual or potential capacity for arable production which is under arable crops is estimated to be only 13.5 per cent, the problem of the balance between crops and livestock is not one of major significance on cropping farms generally, though it can of course be of importance on some individual farms.

In the light of the present external trade deficits, there is considerable pressure to expand the level of export earnings. There is no doubt that, in physical terms, there is considerable scope for increasing cereal production for export. The projected "conservative marketing and production levels [which] could be achieved by 1990" (Federated Farmers 1984) involve a total production of 1.63m tonnes of cereals, an increase of 0.5m tonnes over the 1983-84 outturn. As the growth in domestic consumption of cereals is likely to be small, virtually all of this increased production would, if actually realised, be destined for the export market. If this were to happen, the total volume of cereal exports would reach 750,000 tonnes and, at 1983-84 prices, generate foreign exchange earnings of \$150m.

The achievement of this level of export earnings from cereals depends on the market prospects for the sale of this grain at a price which would maintain the impetus to the expansion of cereal production that has existed recently. This in turn is dependent on the international grain market being firm, so that the prices are sufficiently remunerative to sustain the growth in cereal output in New Zealand. As discussed in Section 4, predicting the levels of supply and demand and consequently prices on the international grain market particularly in the medium term involves difficulties which cannot be resolved at the present state of knowledge. In the light of the recovery in US production in 1984, the potential for increased output in other countries, the current rates of growth in the main economies with commercial prospects for increased cereal consumption and the current situation on the futures market for grain, forecasts of a threefold increase in the volume of cereal exports from New Zealand would appear

to be optimistic. There is of course the possibility that the amount exported would grow sharply over a short period, as it has during 1983-84, but the maintenance of such growth rates over the medium to longer term would be difficult to achieve. Thus while the capacity of New Zealand cereal growers to respond to remunerative opportunities to produce for and sell on export markets has been clearly demonstrated, the availability of such opportunities over the medium to longer term remains one requiring further detailed study before any firm conclusion can be formulated.

7.6 Effects of Exchange Rate Policy

One of the major factors affecting both foreign exchange earnings and farm profitability from cereal production in New Zealand is the policy on exchange rates followed by the government. This issue extends far beyond cereal production; at the same time the level of earnings and production of cereal growers will be affected to a considerable degree by general economic policies of this character.

In the short term context, the decision in July 1984 to devalue the New Zealand dollar by 20 per cent has helped to sustain current and prospective prices of cereals in New Zealand, in the face of the decline in world prices during 1984. The net benefits to cereal growers from this devaluation will depend on the extent to which the prices of inputs are increased by devaluation and their net earnings in current terms are eroded by inflation generally. There is a belief that the Government "should operate a managed float for the New Zealand exchange rate to ensure that it operates at a realistic level. Such an operation would need to be in conjunction with sound management of the national economy (Federated Farmers 1984). The assumption that a policy of flexible exchange rates such as a managed float leaves monetary policy free to address domestic objectives has been seriously questioned. The experience of the 1970s has shown that flexible exchange rate policies have involved considerable short term volatility; this has involved exchange rates moving a long way from their comparative price - competitive equilibrium, which has been explained in terms of movements in exchange rate overshooting this equilibrium position. It is now recognised that such misalignments have involved serious costs, in terms of inefficient allocation of resources and increased risks and uncertainties in the countries concerned" (Goodhart 1984). This view was taken a stage further in a study of exchange rate policy in Ireland (a country with some similarities to New Zealand in terms of its general economic situation) which concluded that "it cannot be too strongly emphasised that devaluation is not a soft option which will solve all problems facing the economy - the other serious problems now facing us - the deterioration of the public finances reflected in an alarming balance of payments deficit - must be tackled as a matter of urgency by other measures" (Nearey 1982). It is now widely accepted that devaluation is a consequence of the underlying economic problems, not simply a cure for them. There is also a more general recognition that the "sound management of the economy" will only achieve a reduction of both balance of payments and budgetary deficits and create more stable

exchange rates provided the domestic pressures that such policies can be expected to generate do not lead to their reversal. The costs of policies of "sound economic management" would have to be accepted by society as a whole, including cereal producers. These costs should not be underestimated, neither should the difficulties of implementing economic policies which would reduce inflation to the point where it no longer jeopardises the prevailing level of exchange rates. There are virtually irresistible pressures to focus on the benefits, rather than the costs of economic policies that might be seen as favourable to primary producers, but the realities can be less beneficial than often expected.

7.7 The Role of Cereal Production

The general picture that emerges from a consideration of the role of cereal production in the New Zealand economy is that it is a small but not insignificant one. For most of the growers directly involved, this role is generally more important but not a critical one. Relatively few cereal growers are dependent on cereals as the main source of their income; for most of them livestock is more, and often far more, important. For the agricultural sector as a whole cereals contribute about 5 per cent of total value added and their contribution to aggregate farm income is likely to be of a similar magnitude.

In the face of the need to expand the net earnings of the agricultural sector and its contribution to the balance of payments, cereal production can play a useful part. This has become of growing importance at a time of difficulties in expanding sales of livestock products on export markets. Cereal production is unlikely to offer an alternative development path to the growth of the agricultural sector which would replace policies concerned with the expansion of livestock output, but it does provide a measure of diversification and one whose prospects at the present time appear to be somewhat better than those in the livestock sector as a whole.

SECTION 8

CONCLUSIONS

The years since 1980 have been some of the most dynamic in cereal production in New Zealand. By 1984 the situation in the cereal sector had in many respects become radically different from that which prevailed only a few years earlier. This capacity to change and adapt to new circumstances is of major importance to the further development of cereal production, although the future levels of demand and prices and the opportunities for productivity increases are not likely to be as favourable as they have been in very recent years.

The dynamism in this sector has resulted from the responses to the shifts in relative livestock/crop incentives and official policy. These policy changes do not appear to have been regarded as being of special consequence either at the time they were made or subsequently. In particular, the decision to remove controls over the external trade in feed grain (apart from those relating to plant health) while it had little immediate impact, has enabled the feed grain sector to become much more competitive in terms of the destinations and volume of exports. The response of grain producers has been of benefit to their own income position, to the development of the agricultural sector and to the natural balance of payments.

The benefits to the grain growers own income have not however been as marked as the growth of production would have implied. In general, margins in cereal production have not been particularly good when compared with those in other enterprises. This has been due to effects of the various price support mechanisms, particularly SMPs, which have raised the returns from livestock products but have played no part in the cereal sector. The movement of land into cereal production has been of help in reducing the need for price supports in the competing enterprises, and as this movement has been done at no cost to the national treasury it has been of benefit to the other sectors of agriculture as well as to the grain growers themselves.

The benefit to other sectors of farming also arises in the case of domestic feed grain users, who can buy their grain requirements at prices which reflect those on the international markets, minus the shipping charges involved in sales to external markets. Domestic feed grain users, particularly pig and poultry producers whose costs are dependent on the prices of feed grains more than on any other input, have been concerned that the growth of export markets might leave them with inadequate or at least more expensive supplies of grain. There is however no evidence to show that the termination of the policy of restricted export licences for grain (in order to ensure that domestic requirements were met before exports were allowed) has in any way been detrimental to domestic users. Cereal users in New Zealand will gain most from policies that generate substantial supplies of grain from

domestic production; if this leads to exportable surpluses over domestic requirements than, in a free market, the prices will be below those which prevail in international markets generally (as net returns from those markets involve substantial shipping costs which will be reflected in the prices paid for marginal supplies on the domestic market). This is likely to give lower average prices of feed grains than would prevail under a policy of deliberately restricted export opportunities, as that policy is likely to have an effect on the willingness of grain growers to expand their production.

Large scale domestic users of grain should therefore look to policies that encourage grain production, including unrestricted access to external markets, as the most effective route to lower grain prices and a greater certainty of supply. Such measures are likely to lead to greater efficiency of production of cereals, through for example a better market for new varieties of higher yielding and quality characteristics. Policies of this nature are in line with the general Government approach for a more market oriented economy; they have shown in the cereals sector that they are effective in generating greater output and new markets in a way which had not previously been achieved.

The change to an unregulated market in feed grain has led to benefits to the balance of payments situation, but the net overseas earnings from trade in grain have been relatively small. The cost of wheat imports in recent years has eroded the earnings from barley exports and, while cereal production has a considerable potential as a source of net foreign exchange earnings, these have yet to be achieved on any scale.

The adoption of the unregulated feed grain market has led to major changes in production and marketing, particularly of barley. In the case of wheat where the new pricing policy was introduced at the same time as the feed grain policy was changed, the impact of the new system is much more difficult to assess. It is not clear whether it has brought higher or lower prices than would have prevailed under the previous more arbitrary system of fixing prices by Government decision, after consideration of the representations from the various interested parties. Certainly the current system gives a much greater degree of predictability to the course of prices in the short to medium term, although even this was eroded by the consequences of the Price Freeze Regulations, whose imposition could not have been predicted in advance.

The current wheat system, even when operating under normal circumstances, has only partially met the need to generate efficiency in the production of wheat in relation to the locational, qualitative and other characteristics of demand. The adoption of a more strongly market oriented pricing system, which is implicit in the Government decisions which have been announced for the flour milling industry, should prove beneficial to producers as a whole, though some individual producers may find that such a system could work to their disadvantage.

What is evident is that the current pricing arrangements have not reversed the downward trend in the area under wheat that has prevailed since the later years of the 70s. There are strong grounds for the

view that the market forces policy adopted for feed grains has been a much more successful production stimulant than the interventionist policy that has been pursued for wheat, and that the adoption of revised price fixing arrangements in 1981 have not so far altered this position. The extension of the market policy to wheat can be expected to benefit both producers and processors, though not without some problems of adjustment.

One of the underlying problems in assessing the effectiveness of the cereals policy which has been followed in New Zealand is the absence of any clear statement of the objectives of that policy. This in turn reflects the "conclusion that the objectives of New Zealand agricultural policy were as elusive as the proverbial 'Scarlet Pimpernel' and as diverse as the various disguises he wore" (Quigley 1983). In the present economic and social situation of the New Zealand economy the view that "assistance measures should be neutral and not advantage the allocation of resources between or within sectors" (Federated Farmers 1984) is one which is gaining considerable support. However this is a desirable, but of itself not a sufficient, definition of the appropriate policy objective for the cereals sector. A more positive approach would be one which was designed to maximise the contribution from cereals production and utilisation to the Gross Domestic Product, but subject to the constraint that any measures to this end should not involve inter-sectoral income flows either from or to the cereal growers themselves, other than those which arise from the changes in cereal production which take place. Thus the growth in export opportunities through the withdrawal of the system of licensing and controls on feed grain exports has been instrumental in producing a greater gross product from the feed grain sector and therefore an increase in the contribution from this sector to the national Gross Domestic Product, without any direct income transfers being involved. In the case of wheat, the contribution to the national GDP could be increased if a more efficient production and marketing system were generated by the operation of market forces; in this case some equivalent system of "prudential supervision" which is operated by the Reserve Bank over the financial markets might be required to ensure that market power is not exercised to frustrate the efficient operation of the market system.

An efficient marketing system, both in feed grains and wheat, requires that there is information available to growers and users of grain in the current and likely future trends in the levels of supply and demand on the market.

The information system available to grain processors and traders is far more detailed than that available at the present time to individual grain producers. It would therefore be desirable to develop a system of market intelligence for growers, in spite of all the difficulties involved in such developments. The outlook conferences now held in a number of major producing countries has gone some way towards filling this need and it would be useful if some positive steps to this end result from the current examination in New Zealand of the benefits of such conferences.

Over the longer term, the contribution of a price and volume forecasting system remains in doubt. The influence of general economic and political developments, productivity changes and alternatives in consumption patterns is extremely difficult to assess. In the case of New Zealand cereal production, the view that the total volume of output could increase by 500,000 tonnes to 1.63m tonnes by 1990 on the basis of "conservative marketing and production levels" (Federated Farmers 1984) is realistic only if it is assumed that the international market for cereals remains buoyant for the remainder of the present decade. The general signs of such buoyancy are not strong, and it would be optimistic to expect that the factors generating a strong market would remain favourable. It is this general state of the market, rather than the specific proposals that have been put forward for higher machinery depreciation rates, longer term finance from the Rural Bank and averaging for tax purposes, which will determine the trends in cereal production over the years to 1990. These specific proposals for assistance to aid arable production are of relatively marginal significance in their likely impact on producers decisions about their levels of cereal output. The more general issues raised on a strategy for growth of the arable industry of a managed float of the exchange rate, the sound management of the internal economy and a policy of neutral assistance for industry generally are all in line with the current economic policies being pursued by the Government. In these circumstances, the pursuit of a larger contribution from the cereals sector to GDP will be successful if the policies of a more competitive economy are achieved.

The consequences of external factors for New Zealand cereal production during the eighties represent a major change over the position in the previous decade, when internal factors were dominant. The considerable structural changes which have already occurred in recent years in feed grains, and to a lesser extent in the wheat and flourmilling industries, are likely to continue. It is clear that wheat growing and marketing will also be subject to the general prescription that "one of the most difficult, but important problems of the day - both for the Government and the private sector - is how to replace those interventions from the past which have become barriers to economic progress and now seem misguided or no longer appropriate, with a framework which is more conducive to promoting economic efficiency and enhancing future growth prospects, while at the same time seeking to minimise the costs of adjustment which this process may entail" (Reserve Bank 1984). The farming sector generally and the cereal producers in particular have shown their capacity to exploit opportunities for change, given that the general economic climate is supportive.

The widely held view that the comparative advantage of pastoral agriculture in New Zealand over that in other countries justifies a concentration of official policy on this part of the agricultural sector to the exclusion of arable production is misguided. While the market prospects for sales of arable production, and particularly cereals remain strong, at a time when prospects in some livestock sectors are weak, then the switch of some resources into grain production is beneficial. Policies which facilitate such resource adjustment to meet market changes are in the longer term interests of

producers and the economy; this involves in particular the avoidance of policies which discriminate in favour of particular farm enterprises. The problems on the external markets are likely to remain sufficiently strong to justify resource flows into those farming enterprises which compete successfully without the need for Government support. Cereal production is one of the farm sectors which has demonstrated its capability of such competitive action.

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APPENDICES

TABLE A1

Total Area Under Cereals 1973-1984

Hectares ('000)

Year Season Ending	Wheat	Oats	Barley	Maize	Total
1973	107.7	15.1	73.8	12.9	209.5
74	67.4	21.5	87.1	12.5	188.5
75	57.7	19.0	104.5	20.6	201.8
76	103.7	12.8	84.7	26.0	227.2
77	96.2	16.8	74.3	28.6	215.9
78	91.0	16.2	70.8	24.8	202.8
79	87.2	18.4	77.5	22.3	205.4
80	86.0	18.7	66.5	19.4	190.6
81	81.2	12.6	67.4	17.2	178.4
82	71.5	15.9	88.5	18.8	194.7
83	70.9	21.7	81.7	17.2	191.5
84 (P)	63.9	13.3	122.8	20.7	220.7

(1) See footnotes to Table A3

P = Provisional

TABLE A2

Total Production of Cereals 1973-1984

Tonnes ('000)

Year Season Ending	Wheat	Oats	Barley	Maize	Total
1973	376.1	45.0	258.3	117.5	796.9
74	214.6	63.2	241.6	88.3	607.7
75	179.9	50.2	262.9	157.6	650.6
76	388.2	41.8	285.5	184.5	900.0
77	354.0	58.0	272.1	210.4	894.5
78	328.8	51.5	258.7	174.5	813.5
79	295.0	58.2	263.6	179.0	795.8
80	305.8	62.0	228.3	156.5	752.6
81	325.7	45.1	271.4	152.1	794.3
82	292.1	60.9	355.8	170.1	878.9
83	300.8	79.7	346.4	142.8	869.7
83-84 (P)	293.9	55.0	588.8	186.6	1124.3

(1) See footnotes to Table A3

TABLE A3

Cereal Yields per Hectare 1973-84

(tonnes)

Year Season Ending	Wheat	Oats	Barley	Maize	Total All Cereals
1973	3.49	2.98	3.50	9.13	3.80
74	3.18	2.94	2.77	7.05	3.22
75	3.12	2.64	2.52	7.67	3.22
76	3.74	3.27	3.37	7.09	3.96
77	3.68	3.46	3.66	7.37	4.14
78	3.61	3.18	3.65	7.05	4.01
79	3.39	3.17	3.40	8.03	3.87
80	3.56	3.12	3.43	8.07	3.95
81	4.01	3.59	4.03	8.83	4.45
82	4.09	3.83	4.02	9.05	4.51
83	4.24	3.67	4.24	8.30	4.54
84 (P)	4.59	4.14	4.79	9.01	5.09

P = provisional

Source: For seasons prior to 1984, Department of Statistics 1984.
Ministry of Agriculture and Fisheries.

Note: The data from the Department of Statistics relates to area harvested, while that from the Ministry of Agriculture to area sown.

TABLE A4

Cereal Balance Sheet: Supply and Utilisation

(A) WHEAT ('000 tonnes)

	Year						
	1977	1978	1979	1980	1981	1982	1983
SUPPLY:-							
Total Production	354.0	328.8	295.0	305.8	326.3	292.1	300.8
Changes in Stocks	+11.7	-8.8	+6.7	-7.7	+5.0		
Gross Exports	1.8	1.4	0.5	0.5	0.4		
Gross Imports	-	5.2	47.8	59.3	46.3		
Available Supply	340.5	341.4	335.6	372.3	367.2		
UTILISATION:-							
Animal Feed	30.5	33.1	35.3	61.1	54.0		
Seed	11.4	11.4	10.5	10.4	10.6		
Manufacture	-	-	-	-	-		
Waste	10.6	9.8	8.9	9.2	9.8		
Gross Food	287.9	287.1	280.9	291.6	292.8		
Total Disposal	340.4	341.4	335.6	372.3	367.2		
Extraction Rate (%)	78	78	78	78	78		
Net Food	224.9	223.9	215.7	232.6	230.8		
Flour Production	220.1	218.8	214.0	222.9	223.6	220.9	
Wholemeal	5.4	6.2	6.2	5.5	5.7	6.4	
Consumption Per Head (kilos)	72	72	69	74	73		

Source: Department of Statistics, Monthly Abstract of Statistics

TABLE A5

Cereal Balance Sheet: Supply and Demand

(B) OATS ('000 tonnes)

	Year					1982	1983
	1977	1978	1979	1980	1981		
SUPPLY:-							
Total Production	58.0	51.5	58.2	62.0	45.2	60.9	79.7
Changes in Stocks	-	-	-	-	-		
Gross Exports	0.1	-	-	0.1	0.2		
Gross Imports	-	0.5	-	-	-		
Available Supply	57.9	52.0	58.2	61.9	45.0		
UTILISATION:-							
Animal Feed	40.9	33.9	39.2	42.3	25.0		
Seed	1.9	2.2	2.5	2.5	2.5		
Manufacture	4.5	4.8	5.0	5.1	5.5		
Waste	2.3	2.1	2.3	2.5	1.8		
Gross Food	8.3	9.0	9.2	9.5	10.2		
Total Disposal	57.9	52.0	58.2	61.9	45.0		
Extraction Rate (%)	54	54	54	54	54		
Net Food	4.5	4.9	4.7	5.1	5.5		

Source: Department of Statistics, Monthly Abstract of Statistics

TABLE A6

Cereal Balance Sheet: Supply and Utilisation

(B) BARLEY ('000 tonnes)

	Year						
	1977	1978	1979	1980	1981	1982	1983
SUPPLY:-							
Total Production	272.1	258.7	263.6	228.3	272.7	355.8	346.4
Changes in Stocks	-						
Gross Exports	35.9	46.2	40.3	62.4	33.8		
Gross Imports							
Available Supply	236.2	212.5	223.3	165.9	238.9		
UTILISATION:-							
Animal Feed	148.3	108.7	114.5	55.9	126.9		
Seed	7.0	7.9	8.7	7.2	7.2		
Manufacture	70.0	85.6	89.5	93.6	93.8		
Waste	10.9	10.3	10.6	9.2	10.9		
Gross Food					0.1		
Total Disposal	236.2	212.5	223.3	165.9	238.9		

Source: Department of Statistics, Monthly Abstract of Statistics

TABLE A7

Cereal Balance Sheet: Supply and Utilisation

(D) MAIZE ('000 tonnes)

	Year						
	1977	1978	1979	1980	1981	1982	1983
SUPPLY:-							
Total Production	210.4	174.5	179.0	156.5	153.0	170.1	142.8
Changes in Stocks	-	-	-	-	-	-	-
Gross Exports	18.3	19.2	62.9	25.4	11.3	-	-
Gross Imports	-	0.1	-	-	-	-	-
Available Supply	192.1	155.4	116.1	131.1	141.7		
UTILISATION:-							
Animal Feed	180.0	144.5	105.0	120.8	131.4		
Seed	0.5	0.4	0.4	0.3	0.3		
Manufacture	1.5	1.6	1.6	1.7	1.8		
Waste	8.4	7.0	7.2	6.3	6.1		
Gross Food	1.8	1.9	1.9	2.0	2.1		
Total Disposal	192.2	155.4	116.1	131.1	141.7		
Extraction Rate %	85	85	85	85	85		
Net Food	1.5	1.6	1.6	1.7	1.8		

Source: Department of Statistics, Monthly Abstract of Statistics

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