

**NATIONAL ECONOMIC
AND SOCIAL COUNCIL**

*A Comparative Study of Output,
Value-Added and Growth in Irish
and Dutch Agriculture*

No. 24

NATIONAL ECONOMIC AND SOCIAL COUNCIL

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NATIONAL ECONOMIC AND SOCIAL COUNCIL

A Comparative Study of Output, Value-Added and Growth in Irish and Dutch Agriculture

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by

JOHN A. MURPHY

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PART I

THE COUNCIL'S COMMENTS ON "A COMPARATIVE STUDY OF OUTPUT, VALUE-ADDED AND GROWTH IN IRISH AND DUTCH AGRICULTURE"

I. Introduction¹

1. In February 1975, the Council published² projections of the growth in population and the labour force up to 1986. In a subsequent report³, some of the implications of the projections for employment and living standards were examined. If employment is to be provided in Ireland for the projected expansion in the labour force, then considerable growth is required in output, productivity and investment in the agricultural, industrial and services sectors. In order to assess the growth prospects at a sectoral level, the Council decided to begin by examining the potential for development in agriculture.

2. After consultations with farming organisations, expert advice was sought from Mr. L. Folkesson, Professor of Agricultural Marketing and Policy, the Agricultural College of Sweden, Uppsala; Mr. J. F. van Riemsdijk, Professor of Farm Management, Wageningen University of Agriculture, The Netherlands; Mr. R. Savary, until recently Secretary General of the International Federation of Agricultural Producers, Paris; and Dr S. J. Sheehy, Department of Applied Agricultural Economics, University College, Dublin. These experts met on a number of occasions and suggested a programme of work which was approved by the Council.

3. This Report is the first stage in the study of the potential for growth in the agricultural sector. It compares agricultural growth in Ireland and the Netherlands. It was prepared by Dr John A. Murphy, Department of Applied Agricultural Economics, University College, Dublin. Dr Murphy's study is published in full in Part II of this Report. The Council would welcome comments from farming organisations and other

¹Following discussions in the Economic Policy Committee and in the Council at its meeting on 22 July 1976, the successive drafts of the Council's comments on 'A Comparative Study of Output, Value-Added and Growth in Irish and Dutch Agriculture' were prepared by Tom Ferris in the Council's secretariat.

²*Population and Employment Projections: 1971-86*, NES, No. 5, February 1975.

³*Jobs and Living Standards: Projections and Implications*, NES, No. 7, June 1975.

interested parties on the implications of his analysis for the choice of policies and measures to accelerate the growth in Irish agricultural output.

4. Work is currently under way on further stages of the agricultural study, including an examination of new operators of farms and an assessment of the implications of an "assumed" high rate of growth in agriculture. It is the Council's intention, when these additional studies have been completed, to prepare a general report on the potential for development in Irish agriculture, and the strategies and policies by which this potential might best be realised.

II. The Present Study

5. The potential for higher employment and productivity in Irish agriculture has to be assessed, in the first instance, within the context of the level of production and the historic rate of agricultural growth. But international comparisons of agricultural performance are also relevant. In any comparison with a founder member of the EEC, however, the benefits of the CAP (in which Ireland only began to participate in 1973), are very important. But it is very difficult to isolate the CAP effects from those of other factors. A previous Council Report¹ indicated that productivity in Irish agriculture was considerably below that in a number of small EEC countries. For example, in 1971 gross agricultural product per head in Irish agriculture was only about half that of the Netherlands, Denmark, Belgium and Luxembourg. Similarly, the growth rate of Irish agriculture would appear to have been considerably lower than that of many EEC countries. A recent Irish study indicated that for the period 1960 to 1970 growth rates for the United Kingdom, the Netherlands and Italy were more than twice the Irish rate²; only Belgium and Denmark had lower growth rates.

6. The continuation of a low rate of growth in Irish agriculture would be undesirable for a number of reasons. First, if the economy is to achieve the rate of growth needed to improve the living standards of the

¹*Jobs and Living Standards: Projections and Implications*, NESI, No. 7, June 1975, page 7.

²S. J. Sheehy, "Agriculture in the Irish Economy" (page 6), published in *Phosphorus in Agriculture*, No. 65, September 1975.

whole community, then the agricultural sector, which is a relatively important sector of the Irish economy, must make a greater contribution to the overall growth. Second, there are implications for the welfare of the farm population. Within the EEC, annual changes in farm incomes are determined to a considerable degree by price agreements reached by the Council of Ministers. The principle of the Common Agricultural Policy is that all member countries receive the same price increases. It is therefore the countries which achieve the highest rates of growth that enjoy most benefits from these price increases. Even more significant for Ireland is the tendency of the community to increase guide prices¹ by amounts which are considered to be sufficient on the basis of the *average* volume changes of the nine countries. Consequently, to the extent that increases in farm incomes depend on such price increases², the benefits will be inadequate for the farming sectors that achieve less than average growth rates in the volume of gross agricultural product. Finally, a lower than average growth rate for Irish agriculture would result in a diminishing share of total EEC agricultural output. Any such reduction in market share would be very disadvantageous, especially for an industry which still has a considerable degree of comparative advantage within the EEC.

7. It was against this background that the study presented in Part II of this document was prepared. Its overall objective was to analyse selected aspects of agricultural growth in Ireland by comparing them with corresponding developments in a country which has achieved a high agricultural growth rate. It was felt that such comparisons would help to highlight some of those aspects of agriculture which had lagged behind in Ireland and to identify some possible reasons why progress has been constrained.

8. The country selected for comparison was the Netherlands. This choice was determined mainly by the fact that Dutch agriculture is

¹Guide prices are one of the forms of official prices fixed each year by the Council of Ministers on a proposal by the Commission for the main agricultural products. They are designed to act both as a target price and as a trigger for import control and buying support.

²It should be noted that not all increases in agricultural prices are due to changes in the EEC guide prices.

widely recognised as a dynamic industry showing a high growth rate. Indeed its growth rate has been the highest in the EEC.¹ In addition, Irish and Dutch agriculture are comparable to the extent that the climatic conditions in both countries are somewhat similar, which in turn results in a similar type and range of crops being produced. At the same time, the balance of production between livestock and agricultural crops is roughly the same in both countries.

9. In general, the analysis which has been carried out has focused on developments from 1956 to 1973. One distinction worth noting in relation to this analysis is that, during virtually all of this period, the Netherlands enjoyed the benefits of membership of the EEC; however, this applied to Ireland only in the very last of these years. The difference which membership of the Community has made to our agricultural sector may be judged from the growth rates which have been generated here during recent years. During the period 1971–75, the growth in the agricultural sector in Ireland, at over 5% per annum on average, has been higher than average growth in the Netherlands in the period under study in the consultant's report.

10. Throughout the study "agriculture" has been taken as corresponding to farm production (including horticulture), so that the report contains no comparisons for either the sectors supplying farm inputs or those processing and distributing farm products. While such comparisons would doubtless have provided useful information, especially with regard to the level and trends in employment, the time limits for the study precluded broadening it to include them. Another area which was not examined because of the time constraints is the differing attitudes of farmers towards expansion in the two countries.

11. The consultant's report in Part II is arranged in five chapters. The first deals with the relative importance of agriculture in the economies of Ireland and the Netherlands and traces the growth rates achieved in both countries. Chapter 2 seeks to refine the broad inter-country comparison by focusing on the rates of growth in yields and volume of particular agricultural outputs. In Chapter 3 the analysis concentrates on

¹S. J. Sheehy, *ibid.*, page 6.

production incentives; the main emphasis is on product prices and the relative costs of feed and fertiliser, but reference is also made to the use and cost of capital. Chapter 4 gives a summary statement of the performance of Dutch and Irish agriculture. The analysis here is confined to the period 1971–73 and deals with aggregate input/output relationships in the two agricultural sectors. Chapter 5 presents the summary and conclusions.

12. The report isolates those aspects of agriculture which display the greatest differences in performance and growth as between Ireland and the Netherlands. Some of the reasons for the differences are then explored. The general conclusion was that the level of yields in Dutch agriculture seemed to be significantly higher than in Ireland. The greatest differences seemed to occur in the yield of grassland and milk yields per cow. In the agriculture crop sector, Ireland's comparative position with regard to yields appeared to be considerably better than for grassland.

13. At an overall level, the slower growth in Irish agriculture seemed to stem from the relatively slower rate of improvement in grassland yield and the slower rate of expansion in enterprises which are labour/capital intensive rather than land intensive. For example, it was estimated that Dutch grassland productivity had increased at almost twice the rate achieved in Ireland. Again, Dutch agriculture had expanded into enterprises which are not too dependent on land, namely, pigs and horticulture. Another aspect of the study, which is of interest, is the extent to which Dutch farmers in general received higher value in terms of the prices which they got for their produce.¹ At an overall level, it is relevant to note that to the extent to which Irish agriculture were to progress towards the Dutch system and intensity of agriculture, it might be possible to maintain the Irish agricultural labour force at or close to its current level.

14. It is accepted that the results of international comparisons must always be treated with caution, especially because of differences in the

¹A comparison of input prices (in relation to the products which the inputs helped to produce) indicated that for dairy farming, in the period under review, both fertiliser and meals were relatively more expensive for Irish farmers.

definitions that are used. Nevertheless, the present exercise does present some interesting pointers for Irish agriculture. In particular, the comparison demonstrates how Dutch agriculture achieved extremely high levels of output even though it meant lower average value-added per unit of output. Such high levels were achieved through the injection of non-factor inputs, such as fertiliser and feeds, and of capital into the production process. In short, the exercise shows how it was possible for an agricultural industry, not too dissimilar to Ireland's, to arrange its resources in such a way as to achieve a rate of agricultural growth which has been the highest in the EEC.

PART II

A COMPARATIVE STUDY ON OUTPUT, VALUE-ADDED AND GROWTH IN IRISH AND DUTCH AGRICULTURE

by

JOHN A. MURPHY

(Department of Applied Agricultural Economics, University College
Dublin)

PREFACE

The aim of this study has been to analyse the past production performance of the agricultural sector of Ireland. This has been done through the medium of comparisons of its development from the late 1950s to the early 1970s with that of Dutch agriculture over the same period.

The origins of the study lie in the concern of the NESC regarding the potential of Irish agriculture to generate increased output. Therefore the choice of the Netherlands as a yardstick for comparisons is particularly appropriate since it has in the past achieved the highest rate of agricultural growth among the EEC countries.

It is not argued that the Irish growth rate of the past will be that of the future. Rather the aim of the study has been to identify the particular areas of agriculture which have in the past contributed to its low growth rate since such areas will have to be critically evaluated by those who might concern themselves with the future development of Irish agriculture.

Throughout the study every effort has been made to ensure that the inter-country comparisons are as valid as possible. The author is particularly grateful to Mr Homme Dijkstra, Agricultural University, Wageningen, Netherlands, for the assistance he provided in this respect. His co-operation in providing and interpreting Dutch statistical information made the study feasible and his suggestions with regard to methodology and presentation have been much appreciated. The study has also benefited from the guidance given by Dr S. J. Sheehy, Department of Applied Agricultural Economics, UCD, throughout the study and especially in the preparation of this report. I am also grateful to all those who provided comments on an earlier draft. Responsibility for the views and content of the report however, remains solely mine.

CHAPTER 1

THE ROLE AND DEVELOPMENT OF AGRICULTURE IN THE DUTCH AND IRISH ECONOMIES

1.1 Introduction

1. It is a well-known phenomenon that as economies develop the agricultural sector, while increasing in absolute size, diminishes as a share of the total economy. Thus, it is not surprising to find that the Dutch economy, being more highly developed than that of Ireland, has a proportionately smaller agricultural sector. The share of National Income arising in agriculture is shown in Table 1.1 on the following page.

2. Before discussing these figures it should be emphasised that inter-country comparisons of statistics, as presented in this table and most of the tables throughout the text, involve considerable practical difficulties. There may be problems of definition which relate to the precise nature of the concept being measured; such problems do not arise in Table 1.1 because the definition of the agricultural sector in the Netherlands is essentially the same as in Ireland. In both cases it relates to on-farm production. As such, it excludes the sector supplying non-farm inputs and the post-farm sector engaged in the processing and distribution of farm products.

3. There may also be problems of measurement methodology arising from the fact that data may have been drawn from different sources for the different countries. Furthermore, the individual sources may vary in the degree of accuracy in data collection. As far as could be ascertained, the measurement methods behind the figures of Table 1.1 are basically the same for both countries and there is no evidence to suggest that they differ significantly in the degree of accuracy.

1.2 Share of Income arising in Agriculture

4. It can be seen from the table that the share of National Income arising in agriculture amounted to only about 6% in the Netherlands in 1971-73 as against an average of 17.4% in Ireland.

TABLE 1.1

Percentage of National Income originating in Agriculture¹ in Ireland and the Netherlands, 1971-73

	Ireland (£m)			Netherlands (£m)			Exchange rate used ²
	Total	Agriculture	%	Total	Agriculture	%	
1971	1,463.4	228.3	15.6	12,063.1	686.9	5.7	8.69
1972	1,740.5	306.7	17.6	14,706.6	827.4	5.6	8.06
1973	2,098.0	397.0	18.9	19,870.6	1,204.8	6.1	6.80

Sources: *National Income and Expenditure*, 1973. Stationery Office, Dublin. *Irish Statistical Bulletin*, June 1975. Central Statistics Office (CSO), Dublin. *Nationale Rekeningen*, 1974. Central Bureau voor de Statistiek (CBS). *Landbouwcijfers*, 1975, CBS. The Hague.

Similar calculations show that in 1960, agriculture accounted for 10.6% and 24.5% of National Income in the Netherlands and Ireland respectively. It is somewhat difficult to make comparisons regarding the rate of decline as exhibited by these figures due to the very different starting levels (1960) in the two countries. It is worth noting, however, that the decline in the agricultural share from 1960 was of the order of 45% in the Netherlands compared to 30% in Ireland. This occurred despite the fact that, as stated in the introduction, Dutch agriculture has recorded one of the highest growth rates in Europe.

5. The very low *share* of National Income arising in agriculture in the Netherlands compared to Ireland is by no means due to a low *level* of net product in that sector. On the contrary, its net product has been

¹As measured by percentage of net national product at factor cost.

²The Dutch income figures have been converted to sterling to allow comparison of the absolute amounts. Current exchange rates were used (*Landbouwcijfers*, 1975). A discussion of the principle underlying such conversions is presented in Chapter 3.

approximately three times the Irish level. This suggests an alternative explanation for the low share arising in agriculture. The Netherlands is a country which in 1973 had a population of 13.5 million people compared with 10.2 million in 1950.¹ Its total area is 3.7 million hectares² giving a ratio of 365 persons per 100 hectares in 1973. In Ireland in that year the corresponding ratio was approximately 44 persons per 100 hectares.³ From these figures it is quite clear that the Dutch economy could not have evolved to its present situation without the benefit of a proportionately large non-agricultural sector.

1.3 Employment in Agriculture

6. Agriculture also assumes a less important role in the Netherlands than in Ireland on the basis of the percentage of employment provided by that sector. Employment figures as published by the Statistical Office of the European Communities (SOEC) are shown in Table 1.2.

TABLE 1.2

Numbers employed in Agriculture⁴ and percentage of total employment in Ireland and the Netherlands

Period	Ireland (000 persons)			Netherlands (000 man-years)		
	Total	Agriculture	% in Agriculture	Total	Agriculture	% in Agriculture
1971	1,047	273	26.1	4,612	320	6.9
1972	1,037	267	25.7	4,569	315	6.9
1973	1,041	260	25.0	4,583	309	6.7

Source: *General Statistics*, Monthly, S.O.E.C.

7. According to these data, agriculture (including forestry and fishing) in 1971-73 accounted for one quarter of those at work in Ireland as against less than 7% in the Netherlands. While these SOEC figures give an indication of the share of employment in agriculture in

¹*Landbouwcijfers*, 1975, p. 1.

²*Landbouwcijfers*, 1975, p. 8.

³Approximately 3.1 million people with a total area of 6.9 million hectares. *Yearbook of Agricultural Statistics*, 1975, Statistical Office of the European Communities, p. 2.

⁴Including forestry and fishing.

the two countries they do not provide a satisfactory basis upon which to make a direct inter-country comparison of the numbers employed in agriculture. The Dutch figures are in man-years which relate to the amount of time actually worked in agriculture. The Irish figures relate to the number of persons who consider agricultural work as their *main* employment. They take no account of the amount of time devoted to non-farm work by those persons nor, on the other hand, the amount of time devoted to farming by people who consider that an employment other than agriculture is their main occupation and who are therefore not enumerated in the agricultural work-force. In addition the Dutch farm labour statistics include a large number of farmers' wives.¹ In the Irish enumerations farmers' wives are not included in the work-force.

8. In view of these discrepancies, a more accurate picture of employment in agriculture is obtained by comparing the number of males permanently engaged in agricultural work in Ireland with a similar statistic for the Netherlands. The figures for 1971-73 are given in Table 1.3.

TABLE 1.3
Number of males engaged in agricultural work, 1971-73
(Permanent workers—000 persons)

	Ireland			Netherlands		
	Family	Non-family	Total	Family	Non-family	Total
1971	224.6	23.3	247.9	211.2	36.5	247.7
1972	220.3	22.2	242.5	205.0	35.4	240.4
1973	215.0	21.1	236.1	200.2	34.7	234.9

Source: *Landbouwcijfers*, 1975, p. 53. *Irish Statistical Bulletin*, Dec. 1974.

Note: The Dutch statistics relate to "regular" (permanent) workers in agriculture. Additional information (not given here) suggests that approximately 90% of these work more than 22.5 hours per week in agriculture and approximately 93% more than 15 hours per week. *Landbouwcijfers*, 1975, p. 53 and p. 55.

¹For example, in Dutch statistics relating to family-farm labour in 1970 there were 177,000 male farmers listed in the farm work-force and 79,250 wives. (*Landbouwcijfers*, 1975, p. 53.)

The figures in Table 1.3 show that the number of males permanently employed in agriculture is about the same in both countries. The table also indicates a slight difference in the composition of the permanent male work-force. In the Netherlands, 85% of that work-force is provided by the farm family compared to 91% in Ireland.

9. The most striking feature of the above statistics on labour engaged in agriculture is that they indicate a much higher labour: land ratio in Dutch agriculture than in Irish agriculture. The area of land in agricultural use in the Netherlands is 2.12 million hectares compared with approximately 4.83 million hectares in Ireland.¹ Thus, in 1971-73, there were on average 114 permanent male workers per 1,000 hectares in that country as against only 50 per 1,000 hectares in Ireland.

10. Statistics comparable to those of Table 1.3 indicate that 395,900 males were engaged in farm work in the Netherlands in 1959 and 440,500 in Ireland.² Therefore there was a decrease of 204,000 or 46% in Ireland compared with a decrease of 161,000 or 41% in the Netherlands over the period 1959 to 1973. Thus the decline in the agricultural work-force has been somewhat greater in Ireland. This is surprising since it would appear that there has been a much greater outward pull on labour from agriculture in the Netherlands. The economy of that country has experienced a high rate of growth and virtually full employment over the past two decades. According to the Dutch economists, Maris and de Veer, "the almost continuous over-spending and full employment exerted a strong influence on agricultural workers to leave agriculture and to look for employment in other industries which could offer relatively high wages and attractive working conditions".³ Nevertheless, in spite of this strong outward pull the decline in the farm labour force has been less than in Ireland both in absolute numbers and percentage-wise, and the labour: land ratio in the Netherlands is still substantially higher than in Ireland.

¹*Agricultural Statistics*, No. 2, 1974, SOEC 1972 areas. In each case, woods and plantations have been excluded. Rough grazing land has also been excluded from the Irish figure.

²Same sources as Table 1.3 Dutch figure from p. 54.

³Arjen Maris and Jan de Veer, "Dutch agriculture in the period 1950-1970 and a look ahead", *European Review of Agricultural Economics*, Vol. 1, pp. 63-78.

11. It should be noted that the figures presented in Table 1.3 include workers in horticulture which, as will be seen in Chapter 2, represent a very sizable branch of Dutch agriculture. In 1970 there were 52,500 males permanently engaged in horticultural work in the Netherlands.¹ This was approximately 20% of the total number employed in the agricultural sector in that year. Thus it is clear that the inclusion of horticulture contributed significantly to the relatively high labour: land ratio calculated for Dutch agriculture. Its impact in the Irish figures can only have been minimal.

12. In addition to the nature of the enterprises engaged in, comparisons based on the number of workers employed in a sector ignore the quality element of the labour force. While there is only limited documentary evidence as to the more important factors influencing labour and management quality, it is generally held that level of education and age are particularly significant. It has been possible to make some Dutch-Irish comparisons relating to the latter aspect. The age distributions of male farmers in Ireland and the Netherlands in 1971 and 1970 respectively are shown in Table 1.4.

TABLE 1.4
Age distribution of the population of male farmers in the Netherlands in 1970 and Ireland in 1971

Age	Ireland		Netherlands	
	Number	% of Total	Number	% of Total
<25 years	3,245	2.0	2,913	1.8
25-29 years	4,828	3.0	9,342	5.7
30-39 ..	19,990	12.3	34,763	21.4
40-54 ..	55,644	34.1	66,146	40.7
55-64 ..	42,221	25.9	36,967	22.8
≥ 65 years	37,052	22.7	12,322	7.6
Total	162,980	100.0	162,453	100.0

Sources: *Census of Population of Ireland, 1971*. Vol. V and *Landbouwcijfers, 1975*, p. 55.

¹*Tuinbouwcijfers, 1975*, p. 21, Table 31b.

13. The most striking aspect of the figures of this table is the very high concentration of farmers in the upper age brackets in Ireland compared with the Netherlands. Approximately 23% of Irish farmers were over 65 years of age as against only 7.6% of Dutch. At the other end of the scale, 28% of Dutch farmers were below 40 years of age compared to 17.3% in Ireland. Therefore, if the general view that quality of labour and management is inversely related to age is correct, especially in relation to the upper age brackets, these results indicate that for the purposes of agricultural development the age distribution of farmers in Ireland is significantly inferior to that which obtains in the Netherlands.¹

14. A matter of more significance for the future development of Irish agriculture is that the age distribution of Irish farmers is not likely to significantly improve over the next decade. In particular, it does not appear that the natural process of ageing and death will of itself reduce the proportion in the category aged 65 and over. On the contrary the opposite is likely. In a recent NESC study, Professor Brendan Walsh has made projections for the Irish family farm labour force (farmers and relatives) based mainly on 1966-71 "continuation rates".² They indicate that whereas in 1971 approximately 19% of male family farm workers were aged 65 and over, the proportion is likely to rise to 25% or more by 1986. These figures lend added urgency to the need for more successful retirement schemes to lower the "continuation rate" of Irish farmers in the upper age groups.

1.4 Size Distribution of Agricultural Holdings

15. Associated with the high number of workers engaged in agriculture in the Netherlands is the relatively high number of separate agricultural holdings. Although its land area in agricultural use is less than half that of Ireland, its number of holdings greater than one hectare is approximately 61% of the corresponding number in Ireland. The smaller size of Dutch holdings implied in these figures is shown by the size distributions given in Table 1.5. Roughly 50% of Dutch holdings are between one and 10 hectares in size compared with 38% in Ireland, while

¹It might of course also be postulated that the inferior age distribution in Irish farming has been both an effect and a cause of slow growth in agriculture.

²NESC. *Population and Employment Projections, 1971-86*. (No. 5) February 1975. Appendix C.

Ireland has almost three times more holdings over 20 hectares than the Netherlands. The average size of holding is approximately 30% greater in Ireland. Therefore, using area of holding as the criterion, Irish agriculture is very substantially superior to that of the Netherlands. This, to some extent at least, has compensated for the inferior age structure in Irish farming.

TABLE 1.5

Number of holdings by size in Ireland and the Netherlands, 1970
(000 holdings)

Size (hectares)	Ireland		Netherlands	
	Number ¹ (000)	% of Total	Number (000)	% of Total
1- 5	48	18	42.5	25.9
5-10	55	20	39.2	23.9
10-20	82	30	52.1	31.7
20-50	65	24	27.9	17.0
50 +	22	8	2.5	1.5
Total	272	100	164.2	100.0
Average size ²	17.6 hectares		13.4 hectares	

Source: *Landbouwcijfers*, 1975, p. 26 and *Irish Statistical Abstract*, 1970-71 p. 89.

16. It has not been possible to clearly establish the relationship between the number of holdings and the number of farm families in each country. Dutch statistics, however, show that in 1970 there were 165,000 "farm principals" or "farm heads" regularly engaged in farm

¹These are approximations. The numbers in the original source were evenly allocated within the acreage size groups in order to obtain estimated numbers in the required hectare groups.

²Obtained by dividing the total areas in agricultural use as given in *Agricultural Statistics*, No. 2, 1974, by the number of holdings.

work for 22.5 hours or more per week.¹ This is only 7% less than the Irish figure of 182,000 "farmers" shown in the 1971 census.² This indicates that the farmer:holding ratio in the Netherlands is higher than in Ireland. Therefore, it would appear that on average the actual amount of land farmed per farmer in Ireland may be considerably more than 30% above the corresponding Dutch figure. This aspect helps to offset the age distribution factor even further. It also reinforces the point that although only a very low proportion of the Dutch labour force is engaged in agriculture it still operates with a relatively high land:labour ratio. An interesting corollary of this point is that if Ireland were to progress towards the Dutch system and intensity of agriculture over the coming years it would be possible to maintain the agricultural labour force at, or close to, its current level.

1.5 External Trade in Agricultural Products

17. There is a marked difference between the agricultural sectors of the two countries in terms of their contribution to total exports. Recent figures published by the EEC Commission show that in the early 1970s "Agricultural" exports amounted to approximately 25% of total exports in the Netherlands and 50% in Ireland.³ These proportions include such items as "beverages and tobacco", "wood, lumber and cork", "animal and vegetable fats and oils", as well as the more obvious agricultural goods. Even allowing for variation in the range of goods classified as "agricultural" the general picture is still likely to be that the percentage of exports accounted for by agriculture in Ireland is approximately twice that accounted for by Dutch agriculture. Of course these comparisons must be seen in the context of the domestic food requirements of the two nations, as well as the level of agricultural production. It has already been stated that the Netherlands has a population of 13.5 million people and 2.12 million hectares of land in agricultural use, whereas Ireland has a population of only 3.1 million people with 4.83 million hectares

¹*Landbouwcijfers*, 1975, Table 31e, p. 55. Comprised of 162,500 male "heads", plus an estimated 2,400 female heads (number working more than 15 hrs./week in 1971). The fact that the total exceeds the number of holdings in Table 1.5 may be due to the fact that the latter excludes holdings less than 1 hectare and this may exclude some viable horticultural "farms".

²*Census of Population*, 1971, Vol. IV, Stationery Office, Dublin.

³*The Agricultural Situation in the Community*, Report, 1975, Part III, Annex.

of land in agricultural use. When these factors are taken into account the export performance of the Dutch sector is quite remarkable.

18. The percentage figures, however, mask the extremely high level of Dutch agricultural exports in absolute terms by comparison with Ireland. It has been estimated that in 1973 Dutch agricultural exports amounted to 5,146 million UA (Units of Account) compared with 783 million UA exported from Ireland.¹ In terms of Sterling, this represents £2,630 million exports in the Netherlands versus £400 million in Ireland. According to the same publication, imports of agricultural products in the Netherlands for that year amounted to £1,985 million giving a trading surplus of £645 million. The corresponding surplus in Ireland for that year was £194 million. While these statistics would bear further examination with regard to proportions accounted for by re-exports and the relevance of classification, this could hardly alter the general picture that the Dutch agricultural sector, in spite of the high domestic demand for food, has been capable of generating exports on a greater scale than that achieved in Ireland. This position has been reinforced by a more rapid rate of expansion in Dutch agricultural production over the past two decades.

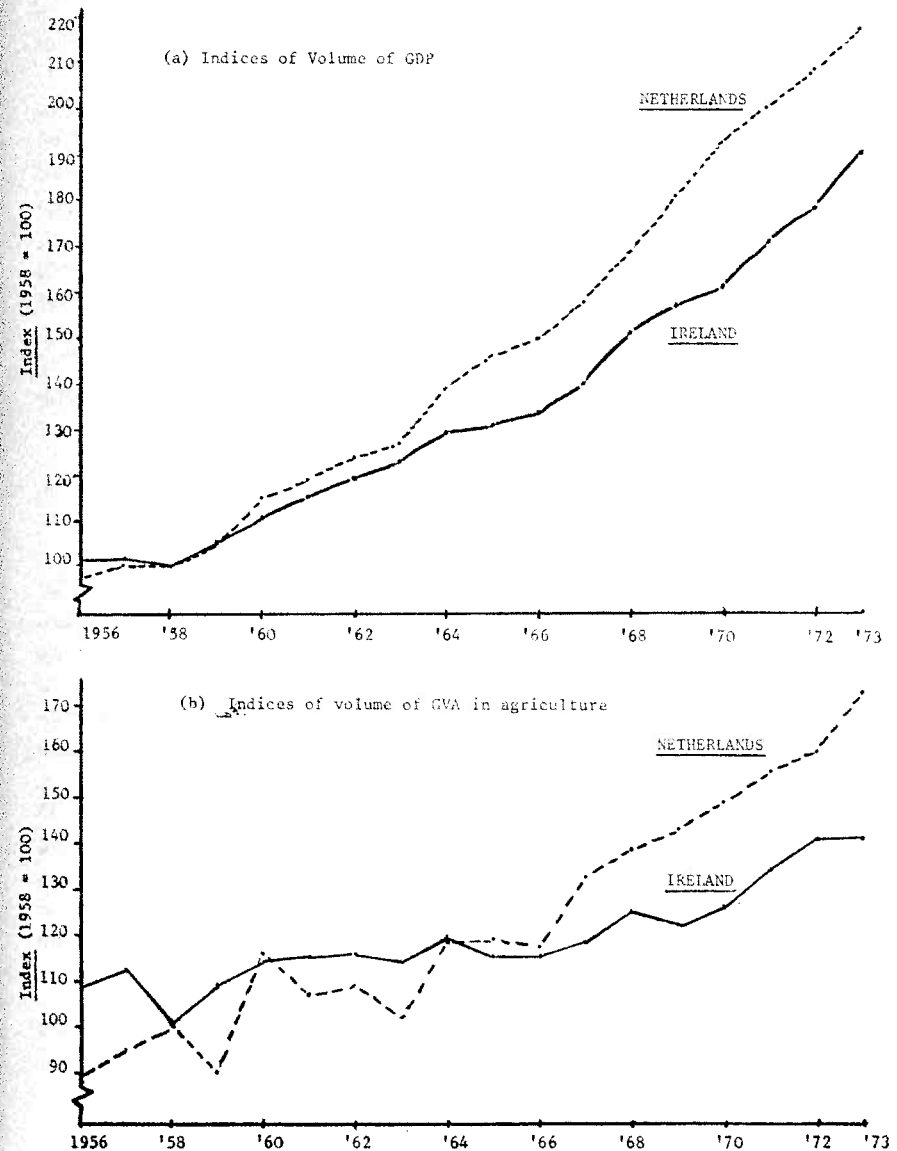
1.6 Growth in the Agricultural Sector

19. As stated in the introduction the agricultural sector of the Netherlands was selected for comparison with Irish agriculture primarily because of the relatively high growth rate it has achieved in the past. In Figures 1.1 (a) and 1.1 (b) the growth rates of both the total economy and the agricultural sector are graphed for the two countries. It can be seen from Figure 1.1 (a) that the rate of expansion of the Dutch economy from 1956 to 1973 was consistently greater than that achieved in Ireland over the same period. Over the seventeen years the volume of total gross domestic product increased by 124% in the Netherlands compared with 87% in Ireland giving an average annual growth rate of 4.9% in the Netherlands as against 3.8% in Ireland.

20. The divergence in performance was even greater in the agricultural sectors as can be seen from the graphs in Figure 1.1 (b). The underlying indices for these graphs are presented in Appendix Table 1.1 and

¹Yearbook of Agricultural Statistics, 1975. SOEC, p. 9.

Figure 1.1—The growth in volume of gross domestic product (GDP) and gross value added (GVA) in agriculture, Ireland and the Netherlands, 1956 to 1973.



Source: Appendix Table 1.1.

summarised below in Table 1.6. Comparing columns (1) and (2) it can be seen that the average growth rate of gross value added in agriculture in the Netherlands has been more than double that achieved in the Irish agricultural sector.¹

TABLE 1.6

Indices of gross value added in Agriculture in Ireland and in the Netherlands
(1958 = 100)

Period	Ireland (1)	Netherlands (2)
1. 1956-60	108.9	98.0
2. 1971-73	138.5	162.6
3. 2 ÷ 1	1.272	1.659
4. Average growth rate	1.7% p.a.	3.7% p.a.

Source: Appendix Table 1.1.

21. There is even reason for suspecting that the Irish volume index for gross value added overstates the growth rate in Ireland to some extent. This index shows year-to-year changes virtually identical to those in the index of volume of net agricultural output.² Since the latter has only the feed, seed and fertiliser inputs deducted from gross output the implication is that the remaining items for deduction have increased in volume at the same rate as the index of gross value added, i.e., at 1.7% per year. These items, which are subtracted from net output to obtain gross value added (at factor cost) consist of rates, machinery and repairs, transport, agro-chemicals, fuel and power, and the various services that farmers use such as veterinary services. Thus, they include the inputs most closely associated with the mechanisation and modernisation of Irish

¹In Table 1.6 and Figure 1.1 (b) the Irish "agricultural" sector includes forestry and fishing. In 1958 these accounted for only 2.4% of value added in the composite sector and 2.7% in 1973. Consequently their inclusion can scarcely have influenced the growth rate obtained.

²As given in the *Irish Statistical Bulletin*.

agriculture and consequently it is most unlikely that they have, on average, increased by only 1.7% per year. The matter should not, however, be over-emphasised since the items in question amounted to only 15-20% of gross agricultural output during the period under review.

22. In summary, the figures presented in Table 1.6 offer clear evidence that the performance of Irish agriculture in terms of growth in value-added has been extremely poor by comparison with Dutch agriculture. It should be reiterated, however, that the figures pertain mainly to the pre-EEC period in Irish agriculture when Irish farmers had to operate in an economic environment which was, in general, considered to be unfavourable in a number of respects. In Chapter 3 an effort is made to quantify the degree to which this was so. Before doing so, however, it will be found useful and interesting to identify the particular aspects in which the performances of Irish and Dutch agriculture have differed most. This is the objective of Chapter 2.

CHAPTER 2

GROWTH IN THE VOLUME OF AGRICULTURAL OUTPUT

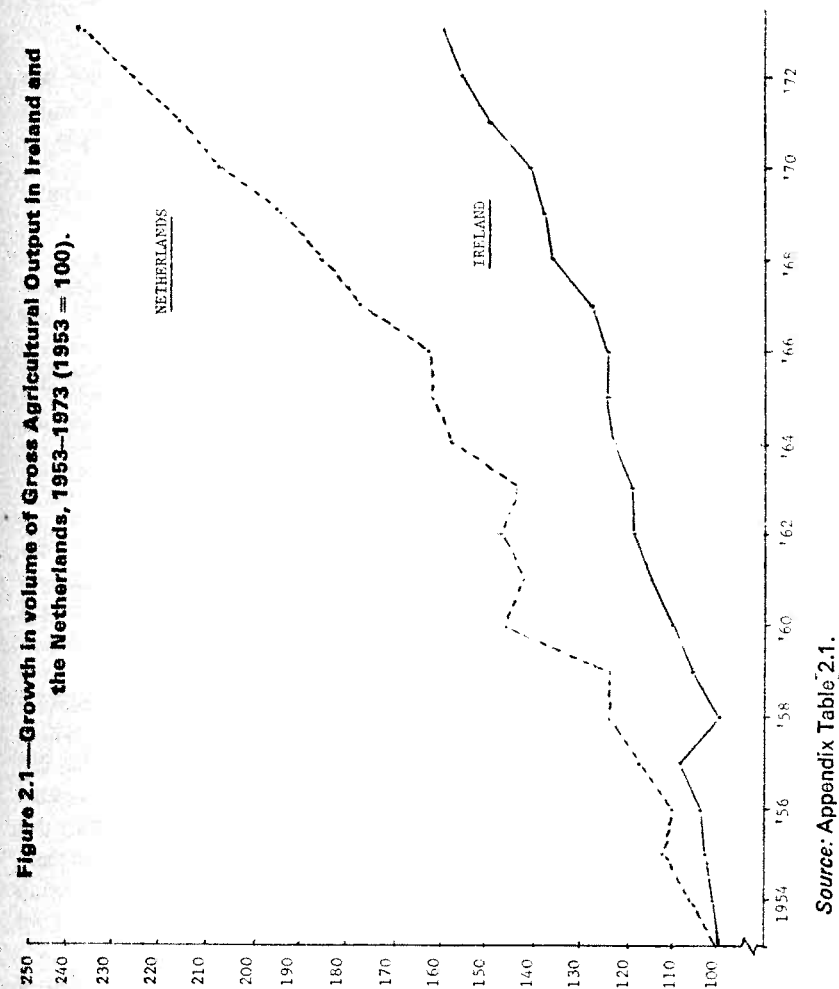
2.1 Growth of Agricultural Output

23. In the previous chapter it was shown that the volume of gross value-added in agriculture in the Netherlands increased at a rate of approximately 3.7% per annum from the late 1950s to the early 1970s. The growth rate in Irish agriculture was far below this figure; the official statistics would put it at 1.7% per annum. Value-added amounts to the difference between gross output and intermediate consumption of non-factor inputs. Consequently, it is useful to begin a more detailed comparison of the rates of change in value-added by looking at the development of gross output over time in the two countries.

24. In the Irish national accounts gross agricultural output (GAO) is defined as that part of total agricultural production which is sold off farms, or which is consumed by persons on farms, during the year of inquiry. It includes produce used for further agricultural production on the farms on which it was produced or which was sold by one farmer to another.¹ The same basic definition applies to the Dutch statistics on agricultural output, which are used in this and subsequent chapters. In addition, the value of changes in livestock numbers has been included in both cases, except where otherwise stated.

25. Indices for the volume of Gross Agricultural Output in Ireland and the Netherlands for the years 1953 to 1973 are presented in Appendix Table 2.1 and they are graphed in Figure 2.1. It can be seen that total agricultural output expanded much more rapidly in the Netherlands than in Ireland. This would appear to have been particularly so since 1966.

¹See, for example, the *Irish Statistical Bulletin*, June 1973, p. 96.



The overall change from the late 1950s to the early 1970s is summarised in Table 2.1 which also shows the expansion of the crop and livestock components of output.

TABLE 2.1

Volume indices for Gross Agricultural Output in Ireland (I) and the Netherlands (N)

(1953 = 100)

	Crops and turf		Livestock and livestock products		Gross Agricultural Output (GAO)	
	I	N	I	N	I	N
1. 1956-60	98.9	114.2	107.5	128.1	105.5	123.9
2. 1971-73	123.7	220.2	163.2	232.0	154.9	227.8
3. % increase	+25.1	+92.8	+51.8	+81.1	+46.8	+83.9

Source: Appendix Table 2.1.

Note: The figures in lines 1 and 2 are 5 and 3 year averages respectively. Five years was selected as the base period to reduce the impact of the 1958 crop output in the Irish data.

26. It can be seen that in Ireland the overall increase of 47% in total gross output evolved as a result of a rather small increase in the output of crops and turf coupled with a 52% increase in the output of the livestock sector. In the Netherlands over the same period total crop output (including horticulture) increased by nearly 93% and the output of the livestock sector increased by 81%. Thus, while the growth in both sectors was substantially greater than in Ireland, the most striking difference was in the crops sector.

27. A closer examination reveals, however, that the performance of the Dutch crop sector was enhanced considerably by a very rapid growth in output of horticultural products. The aggregate crop increase of 92.8% consists of an increase of 121.4% in horticulture crops and an

increase of 49.8% in agricultural crops. Horticulture crops now account for two-thirds of crop output and 20% of GAO in the Netherlands. In Ireland, on the other hand, horticulture now accounts for about 16% of crop output and 2-3% of total GAO.¹

TABLE 2.2

Contribution of the Agricultural Crop, horticultural and livestock sector to aggregate growth in gross agricultural output in the Netherlands, 1956-60 to 1971-73

	Growth %	Weight ²	Contribution to aggregate growth: % points
Agricultural crops	+49.8	.14	+7.0
Horticultural crops	+121.4	.20	+24.3
Livestock	+81.1	.66	+53.5
Total		1.00	+84.8 ³

28. The calculations of Table 2.2 show that 24.3 of the 84.8 percentage points of the overall growth in Dutch agriculture arose in the horticultural sector. In Ireland figures relating to the growth in volume of horticultural output are not available. However, since that sector contributes only 2-3% of the total Gross Agricultural Output its influence can only be minimal by comparison with Dutch horticulture.

29. A matter of more significance for the results in Table 2.1 is the inclusion of turf with the Irish crop sector. The volume of turf output fell from 3.132 million tons in 1953, when it comprised 18% of "crop and turf" output to 1.018 million tons in 1973 by which time it contributed only 6.6% of the output. Since this enterprise is not "agricultural" in the ordinary way and since it has no counterpart in Dutch agriculture it ought to be excluded from the comparison. When this is done the

¹Derived from figures presented later in Appendix Tables 4.2 and 4.3.

²Based on the value of output from each sector in 1961-70.

³The slight difference between this figure and that in the extreme right-hand column of Table 2.1 is due to the use of a single set of weights in Table 2.3.

Irish volume index (1953 = 100) for crops alone shows an increase from 105.8 to 144.8 or almost 37% between 1956-60 and 1971-73 compared with 25% when turf was included.¹

30. The comparison of changes in volume of gross output can now be restated excluding horticulture and turf. The exclusion of these leaves a dual tillage-livestock economy in both cases. The relative importance of the two sectors and the contributions of each to aggregate growth in output are shown in Table 2.3 for both Ireland and the Netherlands.

TABLE 2.3

Contribution of tillage and livestock to aggregate growth in the tillage-livestock sectors of Ireland and the Netherlands 1956-60 to 1971-73

	Netherlands			Ireland		
	Growth (%)	Weight (%)	Pts	Growth (%)	Weight (%)	Pts
1. Agr. Crops	+49.8	.18	+9.0	+36.8 ^a	.20 ^a	+7.4
2. Livestock	+81.1	.82	+66.5	+51.8	.80	+41.4
3. Total (1 + 2)		1.00	+75.5		1.00	+48.8

31. The weights attached to each sector in this table were derived from the sectoral contributions to Gross Agricultural Output during the decade 1961-70. They show that when horticulture and turf are excluded nearly the same balance exists between tillage and livestock in the two countries. The combined sectors show a 76% increase in volume of output in the Netherlands and 49% in Ireland. Considered individually it can be seen that the percentage growth in both sectors were higher in the Netherlands than in Ireland; the crops sector had a 22% faster growth and the livestock sector a 61% faster growth.

¹See Appendix Table 2.2 for the index of volume of crop output in Ireland, excluding turf.

^aIn these figures horticulture has been excluded by assuming that on average it accounted for 2% of total output and increased in volume at the same rate as crops in general (+36.8%) over the period.

2.2 The Agricultural Crop Sector

32. Expansion of gross output in any given sector may be the result of:

- (a) a change in the land use pattern in favour of that sector
- (b) an increase in the intensity of production methods and/or
- (c) a change in the proportion of the sector's production which is either sold off farms or consumed by persons on farms.

The first two factors determine the level of production while the third determines the proportion of production which is recorded as output in the national statistics.

2.2.1 Change in Acreage

33. The acreage of land under crops in Ireland and the Netherlands over the period 1956-73 is shown in Appendix Table 2.3 and the change over that period is summarised in Table 2.4.

TABLE 2.4

Crop acreage in 1956-60 and 1971-73 in Ireland and the Netherlands

	Acreage (000 hectares)		Percentage of total area in agricultural use	
	I	N	I	N
1956-60	682.0	892.0	14.6	38.5
1971-73	499.7	679.8	10.4	32.0
% change	-26.7	-23.8		

Source: Appendix Table 2.3 *Agricultural Statistics* No. 2, 1974, SOEC, for total area in agricultural use with estimate for 1973.

34. First, it can be seen from the table that the crop acreage has been larger in an absolute and relative sense in the Netherlands than in Ireland. Both countries have experienced a significant decline in acreage since the late 1950s. The extent of the decline has been almost the same in both cases and has amounted to approximately 25% of the

1956-60 acreage. However, the reduction has not been the same for all crops within the two tillage sectors. Since the per hectare value of production differs between crops, it is therefore possible that the overall effect on production of the decline in tillage area has not been the same in both countries.

35. In order to establish whether in fact this has been the case it is sufficient to consider the three main crops of the two countries—cereals, potatoes and sugar beet. In 1973 these accounted for 84% of total crop output (excluding horticulture) in the Netherlands;¹ in Ireland they accounted for 93% of crop output (excluding horticulture).² Considering these three crops together, it is shown in Table 2.5 that the aggregate volume of production has in fact been far more adversely affected by the area changes in Ireland than in the Netherlands. The acreage of potatoes declined by 55% in Ireland but increased slightly in the Netherlands. At the same time, the sugar beet acreage increased substantially in the Netherlands while increasing much more modestly in Ireland. Consequently, although the total acreage for the three crops declined by nearly the same amount in both countries, the pattern of tillage in the Netherlands turned more towards crops giving a high product per acre.

36. The net effect of the acreage changes is shown by the figures presented in line 4 of Table 2.5. These have been calculated on the assumption that for each crop the area changes have resulted in proportionate changes in production. Thus the figures in line 4 are weighted averages of the percentage changes in the acreages under the individual crops as given in line 3. The weights used were based on the estimated value of *production* for these crops in 1964-66. They were as follows:

	Cereals	Potatoes	Sugar Beet
Ireland	-43	-47	-10
Netherlands	-44	-33	-23

¹*Maandstatistiek van de Landbouw*, CBS, Aug. 1975.

²In arriving at this figure an estimate of £14 million horticultural output was deducted from the £83 million crop output for 1973 leaving £69 million, of which cereals, potatoes and sugar beet amounted to £64 million. *Irish Statistical Bulletin*, June 1975.

The results show that the overall effect of the acreage changes was to lower total production by less than 6% in the Netherlands and by over 30% in Ireland.

TABLE 2.5

The effect on crop production of changes in acreages over the period 1956-60 to 1971-73

	Acreage (000 hectares)							
	Cereals		Potatoes		Sugar Beet		Total	
	I	N	I	N	I	N	I	N
1. 1956-60	459	517	106	145	29.0	80	594.0	742
2. 1971-73	370	324	48	153	31.3	111	449.3	588
3. 2 as % of 1	80.6	62.7	45.3	105.5	107.9	138.8	75.6	79.2

Effect on total production

4. 2 as % of 1	Ireland 66.7%	Netherlands 94.3%
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Sources: Acreages: *Agricultural Statistics*, No. 2, 1974 SOEC. Data for weights: *Landbouwcijfers*, 1970 (value of grain and straw reduced by an estimate of 12% to obtain a value for grain only). Irish production data from *Agr. Stat.* No. 2, 1974 and valued at prices derived from output statistics in *Statistical Abstracts*, 1970-71.

2.2.2 Change in Yields

37. In addition to an acreage effect it is also possible that per hectare yields may not have risen at the same rate in the two countries. In order to investigate this possibility it is again considered sufficient to examine the yields of cereals, potatoes and sugar beet. The levels of these yields

and the changes in them are shown in Table 2.6. The level of yields is higher in the Netherlands in all cases. Regarding changes over time, however, Ireland has achieved greater percentage yield increases in cereals and sugar beet, although the increase in potato yields has not matched that of the Netherlands. However, the weighted average increase for the three together has been virtually the same in both countries, viz., 31.1% in Ireland and 30.4% in the Netherlands. It should be noted that this result is heavily influenced by the lower rate of increase in Irish potato yields since this crop has a weighting far in excess of its acreage weighting due to its high value per acre.

TABLE 2.6

The development of selected crop yields in Ireland and the Netherlands, 1956-60 to 1971-73

	Acreage (000 hectare) 1956-60	Yield 100 kg/hectare				% increase from (1) to (4)
		(1) 1956-60	(2) 1961-65	(3) 1966-70	(4) 1971-73	
A. Cereals: I	459	28.1	31.3	36.9	38.7	+37.7
N	517	33.3	37.6	38.8	43.2	+29.7
B. Potatoes: I	106	215	235	261	266	+23.7
N	145	257	292	338	372	+44.7
C. Sugar Beet: I	29	285	277	372	393	+37.9
N	80	422	423	467	469	+11.1
Weighted average increase ¹					I	+31.1
					N	+30.4

Source: Section on crop production in *Agricultural Statistics* No. 2, 1974, SOEC.

¹Same weights as used in Table 2.5.

38. As already indicated the levels of Irish yields are significantly below the corresponding Dutch figures. Although the greater rates of increase in Ireland have helped to reduce the differential in cereals and sugar beet, these were still 10 and 16% respectively below Dutch yields in 1971-73. In potatoes Irish yields are 28% lower with the gap actually widening over time. A weighted average for the three crops shows that Irish yields in 1971-73 were 19.2% below the Dutch yields.¹

2.2.3 Production versus Output

39. In the foregoing analysis, yield and acreage have been considered, as factors ultimately giving rise to the different rates of growth in crop output in the two countries. Their effects have been examined in relation to production (acreage × yield) rather than output. As already stated output is defined as that part of total agricultural production which is sold off farms or which is consumed by persons on farms during the year of inquiry. In the compilation of the national statistics some deviations from this definition arise in both countries. However, virtually all of these deviations have been maintained over time. Consequently, the changing ratios between output and production are in both cases a reflection of the changing proportions of crops directly utilised on the producing farms.²

40. Cereals and potatoes are the two crops most likely to show changing use patterns in this way since a considerable proportion of both have traditionally been used directly as animal or human feed. The results presented below in Table 2.7 show that for both of these crops output as a proportion of production has increased considerably in Ireland.

¹Using Fisher type weighting.

²In the Irish statistics relating to oats they also reflect the decline in the proportion of oats sold and repurchased by other farmers in an unprocessed state since this is excluded from output. Similarly for potatoes. Since barley sold and repurchased without processing is *included* in output it can be expected that the replacement of oats by feeding barley in the tillage sector has significantly increased the aggregate output: production ratio for cereals.

TABLE 2.7
Output as a proportion of production 1956-60 and 1971-73

	Cereals		Potatoes	
	Ireland	Netherlands	Ireland	Netherlands
(1) 1956-60	0.54	0.52	0.23	0.80
(2) 1971-73	0.69	0.79	0.35	0.84
(3) (2) as % of (1)	127.8	151.9	152.2	105.0

Source: *Landbouwcijfers and Irish Statistical Bulletin*.

In the Netherlands the change has been more marked in cereal usage while the proportion of total production of potatoes counted as output—which is at quite a high level—has scarcely changed at all over time.

41. Since the composition of output differs from that of production it is appropriate that, when assessing the effect of acreage and yield factors on *output*, the individual crops should be weighted according to their output values rather than their estimated value of production as was done for Tables 2.5 and 2.6. On the basis of the crop output values for the period 1964-66, the following weights are obtained:

	Cereals	Potatoes	Sugar Beet
Ireland	.52	.28	.20
Netherlands	.37	.35	.28

Using these weights it is now possible to summarise the factors which have governed the change in the combined output of the three major crops—cereals, potatoes and sugar beet. This is done by reference to the equation:

$$\text{Output} = A \times Y \times R$$

where A = acreage, Y = yield per hectare,

R = proportion of production recorded as output

The changes in each of the three factors are given in Table 2.8.

42. The combined effect for the three crops somewhat overstates the growth in output for the total crop sector in the Netherlands while the

TABLE 2.8

Summary of developments giving rise to changes in the combined output of cereals, potatoes and sugar beet over the period 1956-60 to 1971-73

Adjustment for change in:	Acreage (1)	Yield (2)	R (3)	Combined effect (1) × (2) × (3)
Ireland	0.762	1.338	1.291	1.316
Netherlands	0.990	1.297	1.210	1.554

Note: In calculatory the figures in columns (1), (2) and (3) the acreage, yield and R changes shown in Tables 2.5, 2.6 and 2.7 respectively have been weighted according to the weights given in paragraph 41. R has been taken as 1.0 for sugar beet in all cases.

global position is understated in the case of Ireland (see Table 2.3). These discrepancies, however, can be attributed mainly to the fact that the full range of agricultural crops is not taken into account in Table 2.8 and also to the fact that the measures of volume change which have been used are less refined than those used in compiling the official statistics relating to volume change.¹ The results in Table 2.8 however, offer sufficiently clear evidence that the major difference between the two countries has arisen through the acreage factor. This in turn has been as a result mainly of the sharp decline in the potato enterprise in Ireland. Over the period under review, the Irish acreage of potatoes declined by half whereas the Dutch acreage actually increased. In addition, the increase in Irish potato yields has been only half that achieved in the Netherlands (a 24% increase in Ireland as compared with a 45% increase in the Netherlands). When one considers the high value of production per hectare from this crop it is clear that these developments have contributed very significantly to the slower growth in Irish crop output.

2.3 The Livestock Sector

43. It was shown in Table 2.3 that the volume of gross output from the livestock sector in the Netherlands increased by over 80% between

¹In particular the tonnage data for production and output as used here have not been standardised for such factors as moisture content or sugar content as in the official statistics. Also the weighting system is considerably less detailed than that of the official series.

the periods 1956–60 and 1971–73 compared with just over a 50% rise in Ireland. During that same period the area under grass (including hay and silage) as shown in the Dutch agricultural census of May each year has remained almost constant at approximately 1.32 million hectares although it has shown a slight decline since 1970.¹ In Ireland statistics obtained from the farm census on June 1 of each year indicate that the acreage of hay, pasture and silage increased by approximately 8% between 1956–60 and 1971–73.² While statistics on grassland area must be somewhat less accurate than crop statistics due to the difficulty for enumerators in distinguishing between marginal grassland and waste-land, the general conclusion can be reached that the large increase in livestock output in the Netherlands was not the result of any significant increase in the country's grassland area.

44. If the above conclusion is correct then grassland productivity must have been a very important factor in the rapid development of the Dutch livestock sector. Before dealing with this aspect, however, it is of interest to observe the development of "non-grass based"³ enterprises of the livestock sector *viz.* pigs and poultry.

45. Perhaps the most outstanding development of the Dutch livestock sector between 1956 and 1973 was the very large increase in pig output. During the same period output in Ireland also increased substantially although not nearly to the same extent as in the Netherlands. Volume

¹*Landbouwcijfers*, 1975. CBS data obtained in an agricultural census in May of each year. The Dutch statistics on land use gave rise to some difficulties which it was not possible to solve satisfactorily. This arose mainly because the only breakdown of agricultural land by use was that obtained in the May agricultural census which relates only to registered farms. These figures show an overall decline in the agricultural acreage amounting to 10% from 1956–60 to 1971–73. This took place almost entirely in the agricultural crop area. However, an alternative source relating to *all* land shows the total agricultural area to have remained static (CBS *Bodemstatistiek*). Also since 1970 the May census excludes very small farms and this may have had a small effect on the post-1970 statistics on crop and grassland areas. All EEC statistics on Dutch land-use seem to be based on the May Agricultural census.

²*Irish Statistical Bulletin*, various issues.

³The use of this term is not meant to infer that cattle and sheep are totally "grass-based" enterprises in either country. A considerable proportion of their output is derived from concentrates especially in the Netherlands.

indices for both countries are plotted in Figure 2.2. These are to the base 1956–60 = 100 and the yearly figures are shown in Appendix Table 2.4 along with the output data from which they were derived.

46. It can be seen from the graphs that it was in the post-1965 period that the expansion rates began to diverge. From 1956 to 1965 output had been increasing by approximately 5% per annum in both countries. For the remainder of the period, however, the Irish growth rate dropped to 3% while the Dutch rate increased to 8%.¹ As a result the 1971–73 level of output in Ireland was just 74% higher than that of 1956–60 whereas the increase in the Netherlands over the corresponding period amounted to 145%. These increases represent average growth rates of 4.0% and 6.6% per annum, respectively, for the complete period.

47. Increases in pig output may originate from two sources:

- (a) Increased sow numbers and
- (b) Increased output per sow.

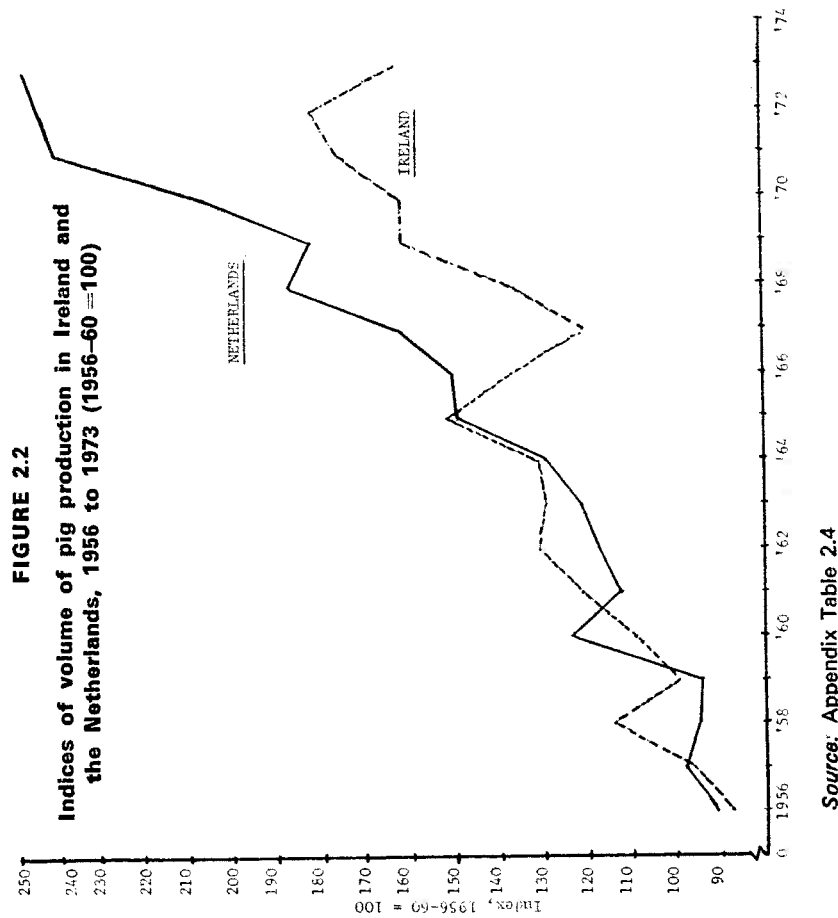
In Ireland the latter has shown a significant upward trend over the period under review. In 1956–60 output amounted to 13.3 pigs per sow. This increased to 14.6 in 1964–66 and 16.6 in 1971–73.² Thus, approximately one-third of the increase in pig output in Ireland between 1956–60 and 1971–73 was due to the long-term improvement in sow productivity with the remainder originating from an expansion of the breeding herd.

48. Intertemporal comparisons of output:sow ratios for the Netherlands are hampered by changes in the classification of sows in the national statistics. However, it would appear that the ratio was approximately 11 pigs per sow in both 1956–60 and 1964–66³ and 13 pigs

¹These growth rates are based on annual average output for the periods 1956–60, 1964–66 and 1971–73.

²Calculated by dividing the annual output as shown in Appendix Table 2.4 by the June inventory of sows, including gilts in pig, as given in the *Irish Statistical Bulletin*.

³Based on Dutch livestock inventory statistics for May of each year. *Landbouwcijfers*, 1960, 1965 and 1970.



per sow in 1971-73.¹ Thus these figures indicate that the rapid expansion in Dutch output over the latter half of the period was aided by a 20% improvement in sow productivity.²

49. The fact that pig output expanded by 145% in the Netherlands compared to only 74% in Ireland accounts for a significant proportion of the difference in expansion from the total livestock sectors of the two countries. In 1956-60 pigs accounted for 20% to 22% of gross output from the livestock sector of the Netherlands and 12-15% in Ireland. Consequently, whereas the pig enterprise has contributed about 30 points ($145 \times .21$) of the 81% increase in livestock output in the Netherlands only 10 percentage points (out of a total of 52%) have originated from this source in Ireland. Thus, if pigs are excluded, the growth in the remaining components of the livestock sector of the Netherlands amounted to 65% ($51 = 64.6 \times .79$) compared to 49% in Ireland.

50. In contrast to the substantial expansion in the pig sector of the Netherlands in the last two decades, the poultry population fell by 5%. There was a drop of similar magnitude in Ireland over the same period. Thus this enterprise has not been a source of difference in the growth in output from the livestock sectors of the two countries.

2.4 The Yield of Grassland

51. One of the most significant differences between Irish and Dutch agriculture lies in the yield of grassland. The most direct way to measure this factor is by the number of starch equivalents (SE) produced per acre. Basically this figure is arrived at by deducting non-grass feed (in SE's) from the estimated feed requirements of the total population of grazing stock. Thus the total feed supplied by grass, hay and silage is derived as a residual so that it may incorporate errors from a consider-

¹Using SOEC statistics for December inventories a ratio of 10.7 pigs per sow is obtained for 1964-66 and 12.8 pigs per sow for 1971-73. *Agricultural Statistics*, No. 6, 1974, page 32 and Appendix Table 2.4.

²The figures also indicate that the output : sow ratio in the Netherlands is significantly lower than in Ireland and consequently that there is scope for considerable expansion in Dutch pig output through increased productivity of the breeding herd. The reasons for the lower productivity were not investigated.

able number of estimations. Nevertheless, it can provide a useful guide as to the general trend in grassland yields.

52. Using this method O'Connor and Breslin¹ estimated yields of 1493 kg and 1653 kg SE per hectare for 1952 and 1964, respectively. A complete series of such estimates for Ireland would have been useful in this study but the limited time available did not permit such an exercise. It was therefore necessary to resort to a less satisfactory, although perhaps adequate, indicator of the trend in Irish grassland yields, viz. the number of grazing livestock units per hectare of grassland.

53. In constructing this type of series the population of grazing livestock units (LU) was estimated from the June 1 livestock census of each year using standard conversion rates² and dividing the result by the total area of pasture, hay and silage. The resulting series is presented in Appendix Table 2.5 and provided the basis for the estimate of yield change between 1956-60 and 1971-73 as given in Table 2.9. Appendix

TABLE 2.9

Estimated grassland yields in starch equivalents per hectare in Ireland and the Netherlands, 1952 and 1964, and the estimated change in yields from 1956-60 to 1971-73

	Ireland (1)	Netherlands (2)	(2) as % of (1)
1. S.E. per hectare: 1952	1,493 kg	2,800 kg	188
1964	1,653 kg	3,223 kg	195
2. Change in yield: 1956-60 to 1971-73	+16.3%	+30.0%	

Source: Appendix Table 2.4 and R. O'Connor and M. Breslin, *Ibid.*, for Irish yields in 1952 and 1964.

¹R. O'Connor and M. Breslin: *An Input-Output Analysis of the Agricultural Sector of the Irish Economy in 1964*, Paper No. 45. The Economic and Social Research Institute, 1968.

²Based mostly on conversion rates published by the British Ministry of Agriculture Food and Fisheries in *The Farm as a Business*.

Table 2.5 also contains a series of Dutch grassland yields in terms of starch equivalents per hectare and the percentage change in these yields from 1956-60 to 1971-73 is also shown in Table 2.9.

54. It can be seen from the table that the estimated increase in Dutch grassland yields has been almost twice that estimated for Ireland. This slow rate of grassland development in Ireland assumes even greater significance when one takes note of the fact that the level of yields in Ireland have been considerably below the Dutch levels. As shown in Table 2.9, Dutch yields in 1952 were estimated at 2,800 kg SE per hectare which was 188% of the Irish grassland yield in that year as estimated by O'Connor and Breslin. In 1964 the estimated Dutch yield was 195% of the Irish yield. The comparative position of Ireland has deteriorated even further since then. The figures in Appendix Table 2.5 indicate that in 1971-73 Dutch yields averaged 3,927 kg SE per hectare which is 216% of the yield implied by the Irish index in that table (approximately 1,820 kg SE per hectare).¹

55. Undoubtedly, the above comparisons are influenced by the fact that a greater proportion of Irish grassland is on hills and other poor grazing areas which reduces the average per hectare yield. An alternative source of comparison is the farm survey data published by An Foras Talúntais and similar data for Dutch farms published by the Landbouw-Economisch Instituut (LEI), The Hague². In the period 1966-67 to 1968-69 the average stocking rate on "mainly creamery milk" and "mainly drystock" farms (excluding hill sheep and cattle) surveyed in Ireland was 1.16 LU per *adjusted* forage hectare. During the same period survey data from "grassland" farms in the Netherlands showed on average stocking rate of approximately 1.97 LU per *non-adjusted* forage hectare.³ Thus, even in more comparable situations grassland

¹With regard to the reliability of the Irish index it is worth noting that it shows an increase of 11.5% in yield between 1952 and 1964 compared to 10.7% as estimated by O'Connor and Breslin.

²J. F. Heavey and B. C. Hickey. *Farm Management Survey, 1966-69*. An Foras Talúntais, Dublin, September 1973. Landbouw-Economisch Instituut, *Bedrijfsuitkomsten in de landbouw, 1966-67-1969-70*, The Hague, August 1971.

³This stocking rate for the Netherlands would appear to be biased downwards relative to the Irish rate due to the fact that LU equivalents used were in general about 10% lower than the Irish case.

farming in the Netherlands is based on a use of land of about double the intensity of Ireland.¹

56. The low level of grassland yields in Ireland compared to the Netherlands is all the more perplexing when one considers that the climatic conditions in Ireland are more favourable to grass production, mainly because of the longer growing season. Furthermore, one would have expected that diminishing returns might have acted as a restriction on further Dutch increases over the past decade. In spite of these factors however, grassland yields in the Netherlands have continued to improve and have done so at a rate far in excess of that achieved in this country.

2.5 The Cattle Sector.

57. The composition of grass output from the "grass-based" enterprises in Ireland and the Netherlands over the period 1971-73 is shown below in Table 2.10. It can be seen that approximately half the output in

TABLE 2.10
Composition of "grass-based" output in Ireland and the Netherlands, 1971-73

	Ireland %	Netherlands %
Milk	38	62
Cattle and calves	52	35
Sheep	6	1
Horses and other	4	2

Source: *Irish Statistical Bulletin*, June 1974 and *Landbouwcijfers*, 1975.

Ireland is accounted for by cattle and calves. Consequently it would have been desirable to compare the development of this sector with that of the cattle sector in the Netherlands. However, closer examination

¹It should be noted that the use of average stocking rate per *adjusted* acre merely corrects for differences in soil qualities on Irish farms. It does not answer the question as to what extent the average quality of Irish soil differs from that of the Netherlands.

has shown that there is in fact little basis for comparison due to the very different nature of the cattle enterprises of the two countries. In the Netherlands over the period 1971-73 calf slaughterings amounted to approximately 70% of the total value of cattle slaughterings and live exports from native stock¹. Over the same period calves constituted less than 1% of cattle output in Ireland and it has only been since 1974 that calf exports have assumed significant proportions.

58. Furthermore, with regard to the non-calf output of cattle the Dutch sector is very different from that of Ireland. The cattle are housed at an early age and subjected to a more intensive feeding programme and as such the enterprise is far less dependent on grazing than in Ireland. Consequently, it was decided that it would be more fruitful to focus the comparison of output changes from "grass-based" livestock on the other important product common to both countries, *viz.* milk. This is not to imply, however, that there is no useful information to be obtained from studying the Dutch beef sector. The present emphasis on beef from calves has emerged as the result of a steady movement away from a beef cattle system which was once more dependent on grass. At least one significant implication of this development must be that more land has been released for milk production and other enterprises as the dry cattle sector becomes less dependent upon grazing. This type of development is not without relevance for Ireland as a member of the EEC and its implications would be of great interest if they were studied.

2.6 The Dairy Sector

59. Inventory statistics show that there is now approximately the same number of cows in Ireland as in the Netherlands. This situation, however, has evolved from considerably different rates of herd expansion in the two countries over the past two decades as can be seen from the figures presented in Table 2.11. A comparison of the averages for the periods 1956-60 and 1971-73 shows an expansion in cow numbers amounting to 54% in Ireland. Over the same period Dutch farmers increased their cow numbers by just 30%.

¹*Landbouwcijfers*, 1975, p. 136.

TABLE 2.11

The development of the national cow herds of Ireland and the Netherlands, 1956 to 1973

	Ireland		Netherlands	
	(000)	Index	(000)	Index
1956-60	1,248	100.0	1,540	100.0
1971-73	1,924	154.2	2,001	129.9

Sources: *Irish Statistical Bulletin* and *Landbouwcijfers*, various issues.

If the comparison is made in terms of dairy cows¹ as distinct from all cows, the results are the same since in the Netherlands virtually all cows are dairy cows while in Ireland the percentage of the herd classified as "dairy" has remained at approximately 66% throughout the period.² Thus, while the total cow herds are now almost equal in size in the two countries, there are approximately 50% more cows supplying milk for sale in the Netherlands than in Ireland.

60. While cow numbers have been expanding more rapidly in Ireland than in the Netherlands, a less favourable pattern emerges when comparing the progress of milk per cow in both countries. From Table 2.12 it can be seen that yields increased by 12% in the Netherlands over the period 1956-60 to 1971-73. For the corresponding period in Ireland the yield increase is estimated to have been approximately 10%.

TABLE 2.12

The development of milk yields per cow in Ireland and the Netherlands, 1956-73

	Ireland		Netherlands	
	gals/cow	Index	gals/cow	Index
1956-60	486	100.0	870	100.0
1971-73	534	109.9	972	111.7

Sources: *Landbouwcijfers* 1975 and 1965. *Irish Statistical Bulletin*. Irish yields for 1970 and later were taken from *Production Yearbook*, Vols. 28-1 and 26, FAO.

¹Cows whose milk is sold either for human consumption or for manufacturing.

²Based on figures estimated by the Department of Agriculture and Fisheries, Dublin.

61. The marginally lower rate of increase in Ireland, however, becomes distinctly unfavourable when considered against the background of such a large difference in the actual yield levels in the two countries. In 1971-73 the average Dutch yield was approximately 180% of the average Irish yield. Clearly, if this difference is to be eliminated it will require very substantial measures aimed at lifting Irish yields at a rate far in excess of what has been achieved over the past two decades. To state the issue another way: if Irish cow yields merely continued to increase at the same rate as over the period 1956-60 to 1971-73 they would not reach the *present* Dutch average until the year 2090. Even with a long-term growth of 5% per annum—which would be a remarkable achievement in light of past performance—Irish yields would not reach the *present* Dutch levels until about 1988. Fortunately, however, developments since 1971-73 indicate an average rate of increase of the order of 10% per annum.

62. Besides the yield differences there are also significant differences between the two countries in terms of milk quality. In the late 1950s the average butter-fat content of milk produced in the Netherlands was approximately 3.70%. This was continuously improved upon in the intervening period and reached an average level of 3.92% in 1971-73¹. Published figures are not available for the average butter-fat content of Irish milk but it is generally held that it is now in the region of 3.55% and has shown little upward trend over the years.

63. In summary, this comparative analysis of the development of output from the livestock sector up to 1973 has highlighted some important factors:

(i) More than one-third of the growth in livestock output in the Netherlands can be attributed to expansion in the pig sector compared to one-fifth in Ireland where expansion has been somewhat erratic and slow by Dutch standards. The failure of the Irish pig sector to sustain a high rate of growth may be further emphasised by pointing out that in the late 1950s the proportion of livestock output accounted for by pigs was of the same general order of magnitude in the two countries. This means, therefore, that the pig enterprise in Ireland represented an

¹*Landbouwcijfers*, 1975 and 1965.

equally important source from which to generate growth in overall livestock and agricultural output. By comparison with its Dutch counterpart its contribution has been disappointing.

(ii) A further significant difference between the two countries with regard to livestock production arises from the relative levels of grassland yields. Although exact measurements and comparisons are difficult to achieve, the available evidence suggests that current per hectare yields in Ireland are only about half the level achieved in the Netherlands. Furthermore, Irish yields improved at a slower rate over the past two decades.

(iii) Cow numbers expanded more rapidly in Ireland than in the Netherlands. However, the slower rate of increase in grassland yields necessitated that this expansion entail a greater sacrifice of potential expansion in other enterprises than might otherwise have been necessary. The data presented above showed that the 54% increase in cow numbers from 1956-60 to 1971-73 was accompanied by an estimated 25% increase in grassland capacity—8% increase in area and 16% increase in average stocking rate. In these circumstances and in the absence of substantial meal feeding the increase in cow numbers was partly accommodated by less than proportional increases in sheep, cattle and horses.

(iv) In milk production the very low level of stocking in Ireland is further compounded by the fact that the average yield per cow is less than 60% of the Dutch average. If a serious attempt is to be made to remedy this situation it would seem necessary that Irish farmers aim for an average yield increase of at least 25 gallons per annum over the next decade. The difficulty of achieving a long-term improvement of this magnitude, however, can be gauged by the fact that the average annual increase from 1956-60 to 1971-73 amounted to only about one-tenth of this target. Contrary to general impressions the average annual increase in Dutch yields amounted to only 5.7 gallons per year. This figure, however, becomes respectable when viewed against the already high yields in that country.

CHAPTER 3

PRICES RECEIVED AND PAID BY DUTCH AND IRISH FARMERS

3.1 Prices Received by Farmers

64. The objective of the inter-country comparisons of the previous chapter was to identify important physical differences in the agricultural sectors of the two countries. The analysis showed that in the case of all the enterprises examined the average yields achieved by Dutch farmers were considerably higher than those achieved in Ireland. In terms of yield improvements over time it was seen that Ireland has been closing the gap in cereals and sugar beet but has made relatively poor progress in raising grassland and cow yields. In addition the pig sector has not achieved anything approaching the massive rate of expansion which has been taking place in the Netherlands since the mid-1960s.

65. Having established these physical differences the next issue is to investigate the factors which might have given rise to them. Basically these might be separated into three broad categories:¹

- (a) price incentives,
- (b) investment incentives,
- (c) attitudes towards expansion.

66. In the time available for this study it has only been possible to carry out a reasonably detailed analysis of the price factor and a very limited consideration of the investment factor. The third element has been omitted completely. This however should not be taken as any suggestion on the author's part that differences in farmers' attitudes towards expansion might not have been an important factor underlying the different growth rates of the two agricultural sectors.

¹Other casual factors, which might have been considered if time had permitted, would be: (a) education, extension and research inputs into agriculture, (b) the effect of the taxation system operating in the two countries and (c) the extent to which State aid (not related to prices) differed between the two countries.

67. Two types of price comparisons have been carried out in the analysis which follows. Prices received by Dutch and Irish farmers have been compared directly, but prices of fertiliser and feed have been compared only in terms of their relationship to selected product prices. In the second case the statistics under consideration are output: input prices ratios and as such can be calculated and compared without converting from one weight or volume system to another and, more importantly, without converting from one currency to another. In direct Dutch: Irish price comparisons, however, these conversions cannot be avoided as, for example, when one attempts to compare a Dutch milk price expressed in guilders or cents per kilogram with an Irish price expressed in pence per gallon. There are also conceptual problems involved in direct inter-country price comparisons such as this.

68. In the conversion calculations of this study the weight and volume elements presented no difficulties and current exchange rates were used to express the Dutch prices in sterling. These rates are shown in Appendix Table 3.1 and are those recently adopted by the Statistical Office in the European Communities in converting national agricultural prices into Units of Account¹.

69. The conceptual problems arise from the objective of the exercise in hand. In the present study the price comparisons sought to establish the relative attractiveness of prices received by Dutch and Irish farmers. As such it was the domestic purchasing power of the money received by farmers in the two countries that was being compared. The question arises, therefore, as to whether current rates of exchange accurately reflect the relative purchasing powers of currencies.

70. In an inter-country comparison such as this, one would ideally prefer not to use exchange rates at all. Instead, comparisons of farm prices in terms of purchasing power might be done by pricing a representative bundle of consumer goods (including services) in both countries and then evaluating the prices received by both sets of farmers per 100 kg. of milk, grain, etc. in terms of "units" of consumer goods. Obviously the conceptual and practical difficulties of doing this for a large number of years are enormous and certainly placed it outside the

¹See *Agricultural Prices: Purchasing prices of agriculture* No. 1, 1975, SOEC.

bounds of feasibility for this study. It was therefore as the best feasible replacement for this method that a set of current exchange rates has been used.

71. It is not claimed that current exchange rates are at all times an exact reflection of the relative purchasing power of the two currencies in question. Such accuracy is not required. It is merely sufficient for the present purposes that over a fifteen year period they can act as an approximate guide to the intermediate and long-run shifts in the value of the pound and guilder to Irish and Dutch farmers, respectively. In this respect, however, one ought to note that some recent research suggests that in 1971 current sterling exchange rates were too low for the purpose of international comparisons of purchasing power¹. In particular, it suggests that relative to the "Benedelux"² currencies they gave estimates of the purchasing power of sterling which were approximately 13% below that indicated by a "pricing" method similar to the one described above³. Since this type of evaluation was not carried out for years other than 1971, it is not possible to ascertain what adjustments, if any, ought to be made for other years. Consequently all the price comparisons presented in this section are based on current exchange rates although the reader is reminded again that the results, for the early 1970s at least, may somewhat overstate the real prices received by Dutch farmers.

3.1.1. Cereal Prices

72. Appendix Table 3.2 shows the prices (unit values) paid to Irish and Dutch farmers for wheat, feeding barley and oats, over the period 1959 to 1973⁴. Their ratios in sterling are also presented, having been calculated by using the conversion rates referred to above and listed to Appendix Table 3.1. The findings are graphically summarised in Figure 3.1. They indicate that in general for the period 1959 to 1973 the

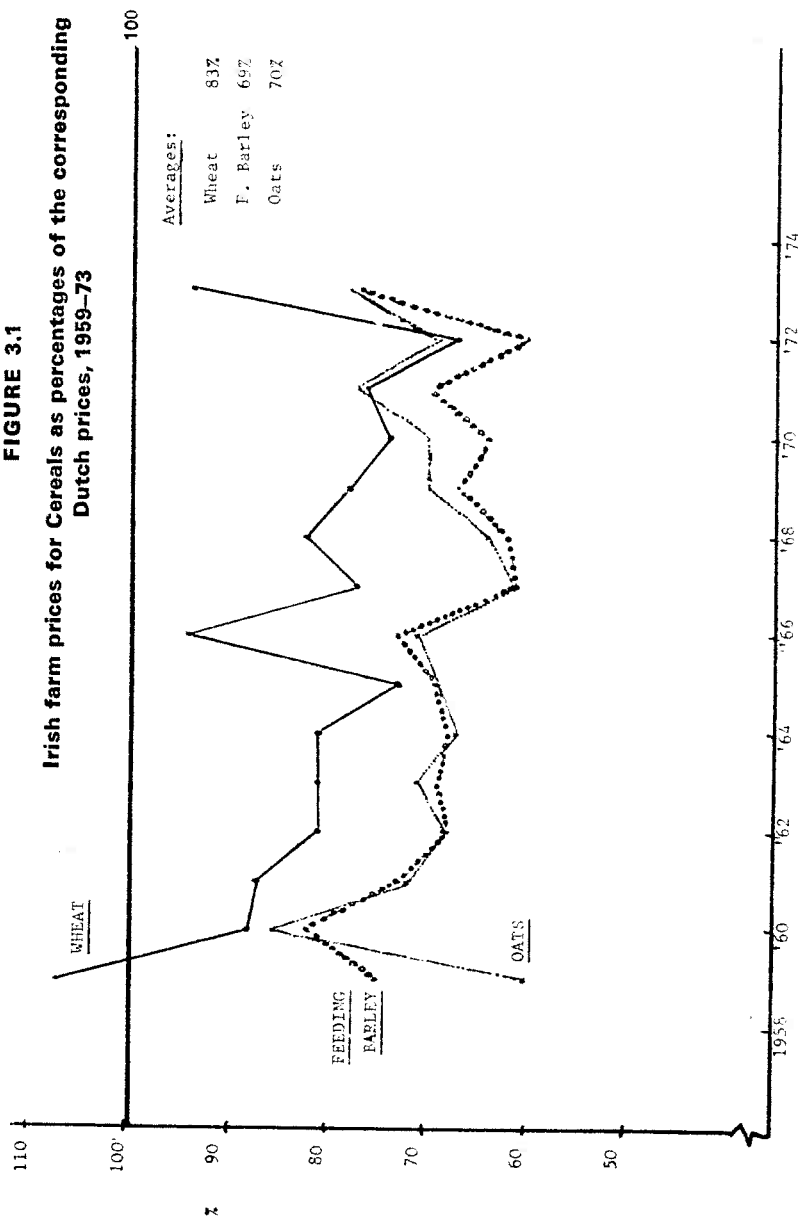
¹See *Jobs and Living Standards: Projections and Implications*, NESC Report No. 7, p. 23.

²"Benedelux" refers to Belgium, Luxembourg, the Netherlands and Denmark.

³Conclusion derived from Table 1, p. 24, *Ibid*.

⁴Throughout this chapter difficulties were encountered in obtaining comparable prices relating to the complete period spanned in the tables of Chapter 2. Consequently, rather than maintain uniformity in data periods, it was decided to restrict the price analysis where necessary to periods for which comparable data could be obtained.

FIGURE 3.1
Irish farm prices for Cereals as percentages of the corresponding Dutch prices, 1959-73



Source: Appendix Table 3.2.

real rewards per tonne to Irish farmers for their sales of cereals were substantially below that enjoyed by their Dutch counterparts. On average, the rewards for the sale of a tonne of wheat was only 83% of that which accrued to Dutch farmers. Only in 1959 was the Irish price superior, and the sharp increase in 1966 and 1973 only temporarily established a favourable balance.

73. The comparison for feeding barley and oats are even less favourable to Irish growers; on average the rewards were only about 70% of those enjoyed by Dutch growers. Furthermore, taking the period as a whole there was no long-term improvement in the ratios for any of the cereals.

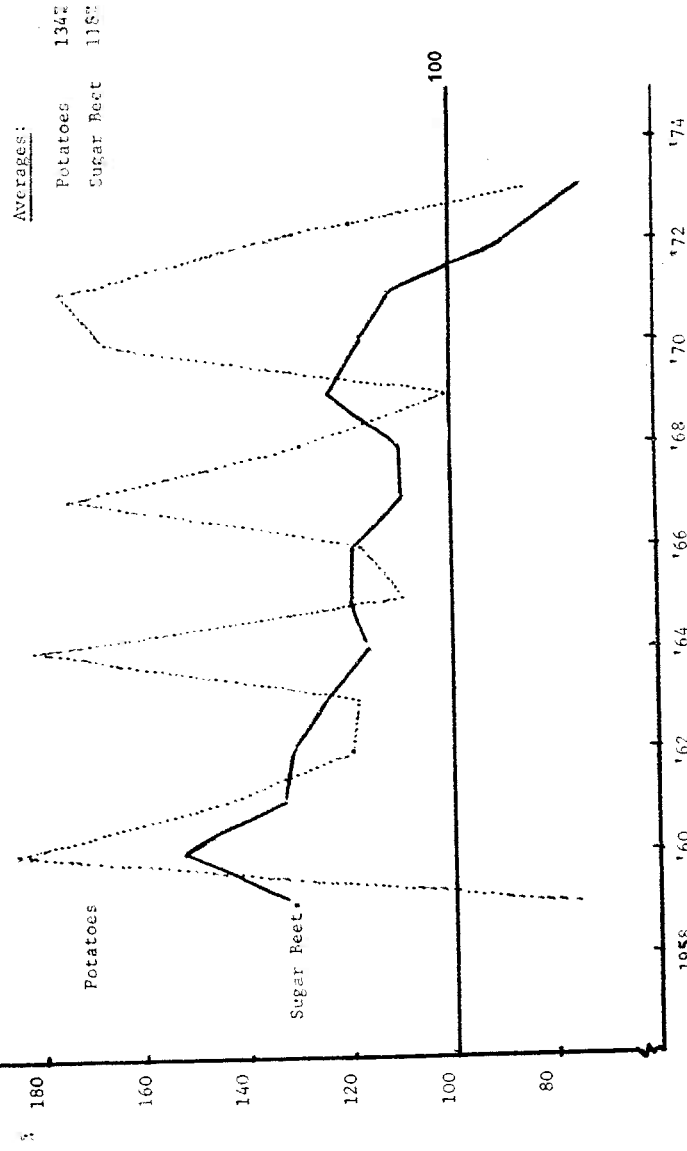
3.1.2. Potato and Sugar Beet Prices

74. The comparative position for potatoes and sugar beet is the reverse of that for cereals. From Figure 3.2 it can be seen that both crops and sugar beet were very favourably priced in Ireland over the period 1959 to 1973 being on average 34% and 18% respectively above the Dutch levels. In the case of sugar beet, however, the Irish advantage was steadily eroded and by 1973 its purchasing power is estimated to have fallen to 75% of that afforded by the Dutch price. It would appear from the graph that the relative price advantage to potato growers has also been declining.

75. The potato price ratio shows considerable cyclical fluctuation. Although it is the longer term trends that are of primary interest in this study, the Dutch and Irish potato price series are individually graphed in Figure 3.3. There it can be seen that both cycles move in harmony. It could be argued, however, that the fluctuations in the Dutch series ought to have presented the greater disincentive to production, since they have been more extreme in an absolute sense and, *a fortiori*, percentage-wise.¹ Thus the case can be made that the series of market prices has been more favourable in the Irish case on two counts: (a) the real level of financial reward afforded by it has been higher and (b) the cyclical fluctuations have been less acute than those experienced by Dutch farmers.

¹The greater absolute fluctuations on a lower level price series gave more extreme percentage changes.

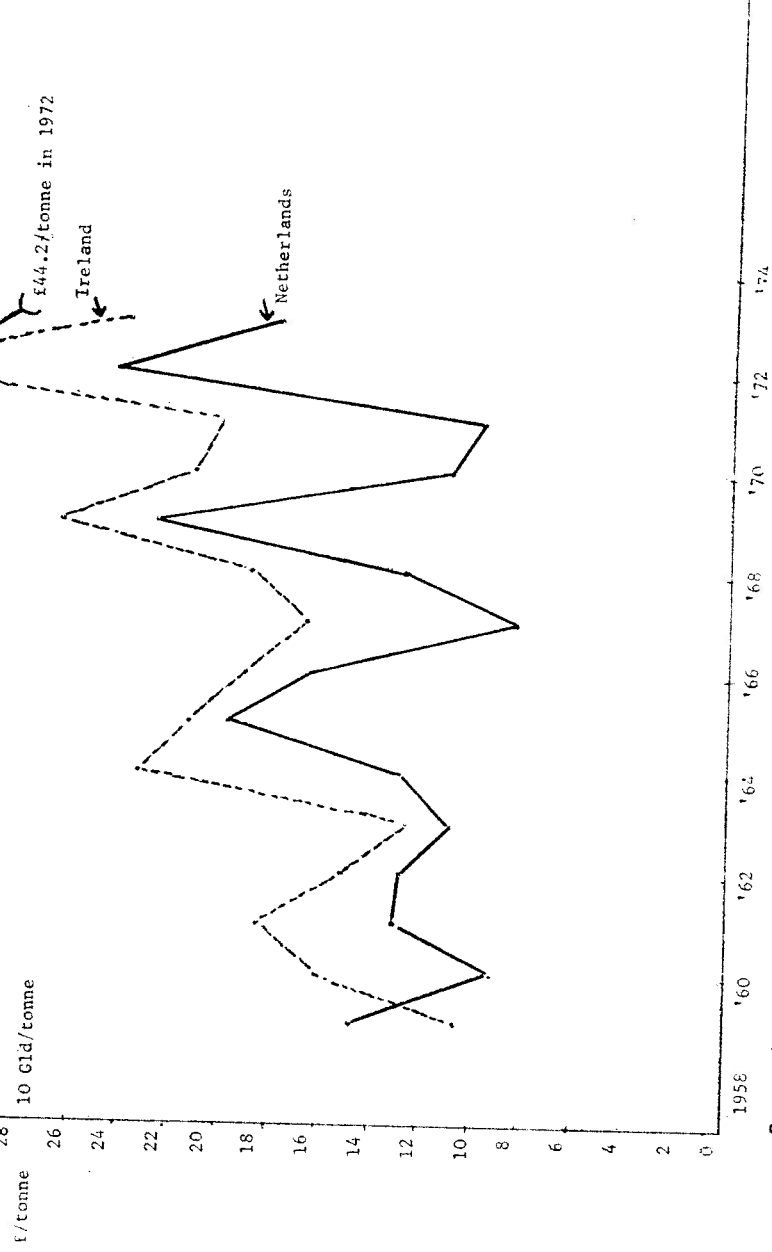
FIGURE 3.2
 Irish prices for potatoes and sugar beet (16% S.C.) as per-
 centages of those received by Dutch farmers, 1959-73



Source: Appendix Table 3.1.

Note: S. beet price relate to beet at 16.0% sugar content.

FIGURE 3.3 The evolution of farm level potato
 prices in Ireland and the Netherlands, 1959-73



Source: Appendix Table 3.3.

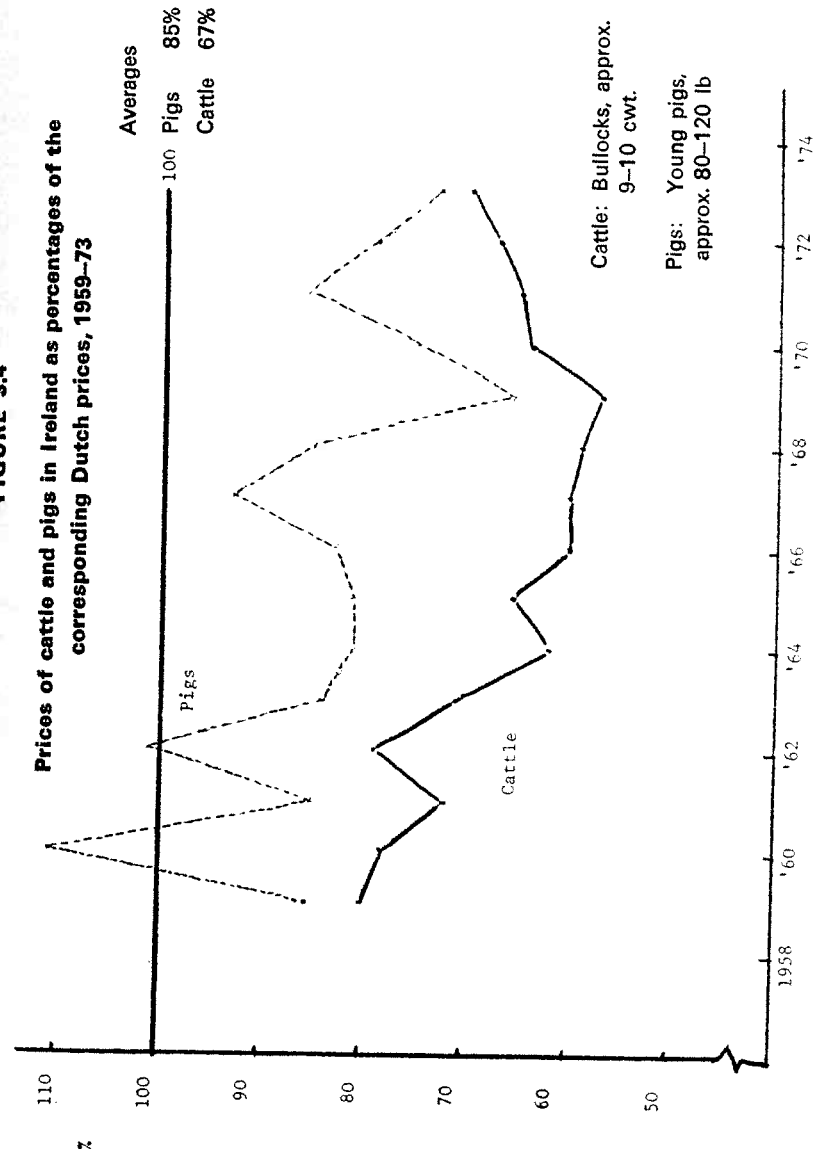
3.1.3. Cattle and Pig Prices

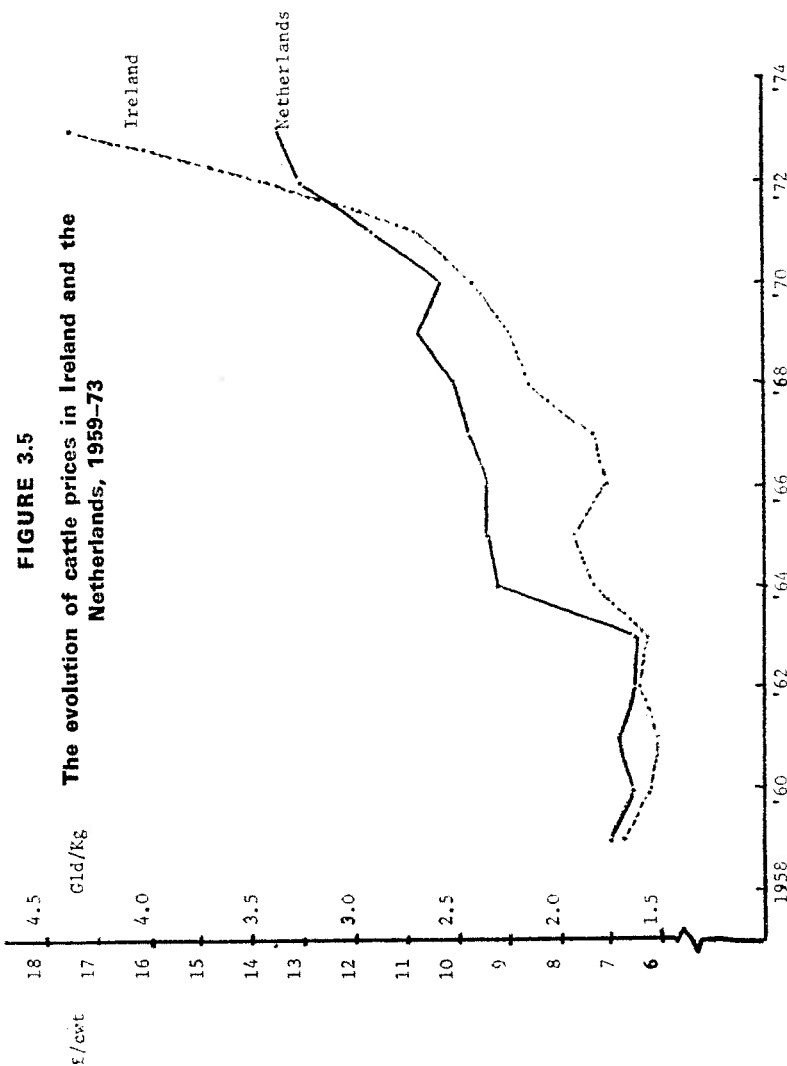
76. The comparisons between Irish and Dutch prices for cattle and pigs are summarised in Figure 3.4. The graphs indicate an unfavourable position for Irish producers similar to that which was observed for grains. On average the real value accruing to an Irish farmer from the sale of one cwt. of beef was only 67% of that obtained by a Dutch farmer. In 1959 the percentage was 80% but the relative position moved against the Irish farmer over the next 10 years and reached a low point of 57% in 1969. This evolved because the cattle price increases in Ireland over that period failed to keep pace with those received by Dutch farmers particularly in the year 1963-64—as may be seen in the graphs presented in Figure 3.5. Thereafter, however, Irish prices increased at a much faster rate so that by 1973 in spite of the falling value of the pound the real reward to farmers for beef had been restored to approximately 70% of that enjoyed by Dutch farmers.

77. The pig price comparison is based upon prices received for young pigs weighing approximately 80-120 lbs rather than pigs at slaughter weight. This was done mainly because of the fact that the author was unable to obtain a satisfactory price series for bacon pigs in the Netherlands over the complete period under review. In any case it could be argued that a comparison based on young pig prices is more relevant since it focuses attention on the returns to the primary producer who is the key decision-maker regarding the size of the pig herd. Also the prices of young pigs can be seen as a direct reflection of the attractiveness or otherwise of pig fattening.

78. The graph for pigs in Figure 3.4 shows that the revenue per lb for young pigs in Ireland was on average worth only 85% of that received by Dutch farmers. Furthermore, the comparison became distinctly less favourable over time, declining from a parity position in 1959-60 to 73% in 1973. In Figure 3.6 the Irish and Dutch prices are compared over time in their national currencies. It can be seen that the average rate of increase from 1959 to 1970 was approximately the same in the two countries. Therefore, the increasing advantage to Dutch producers over that period as indicated by the graph in Figure 3.4 arose mainly out of the fact that the exchange rate was declining. After 1970 the more rapid

FIGURE 3.4





Source: Appendix Table 3.4.

increase in the Irish price succeeded to a large extent in offsetting the relative decline in the value of the Irish currency.

79. It might also be noted from the national pig price series plotted in Figure 3.6 that the Dutch series shows a greater degree of fluctuation about the upward trend than is the case for Ireland. The smoother progress of the Irish series, therefore, might have been an offsetting influence against the unfavourable level of the series.

3.1.4. Milk Prices

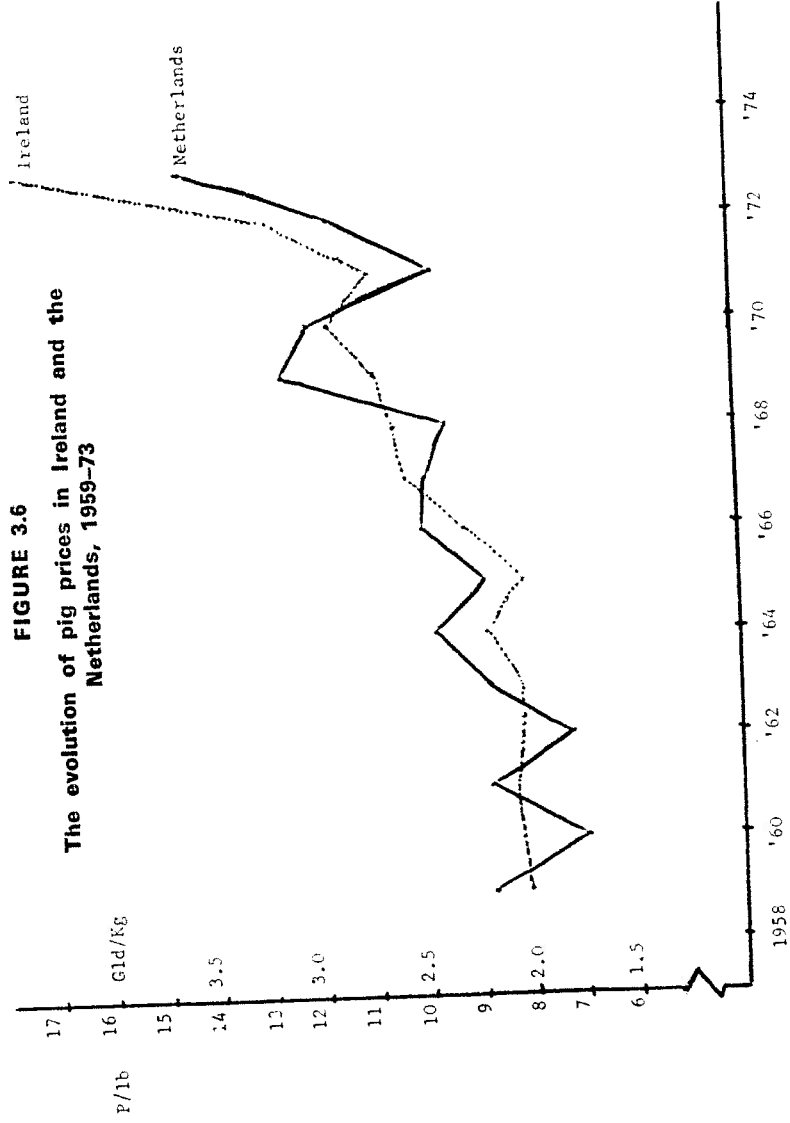
80. In Figure 3.7 the comparability of Irish and Dutch milk prices has been plotted for the period 1956 to 1973. The individual series in national currencies are given in Appendix Table 3.5 and the readers attention is drawn to the descriptive notes relating to that table.

81. The graph for prices at actual fat content shows that throughout the 17 year period from 1956 to 1973 the creamery milk price received by Irish producers was on average 33% below the Dutch price in real value terms. In 1956 the most favourable situation obtained, but over the next 12 years the Irish producer price failed to keep pace with the Dutch price (see Figure 3.8). Throughout that period the latter rose by 57% in national currency. The Irish price, on the other hand, rose by only 39%, so that by 1968 it represented a real return as low as 60% of that accruing to Dutch farmers. From 1968 to 1973 the order of increase was reversed and Irish producers received a 67% increase in price against only a 19% increase to their Dutch counterparts. However, since this was a period of rapidly diverging inflation rates, the relative advantage to Irish farmers was to a great degree eroded by devaluation. In general, therefore, the returns received by Dutch farmers have been considerably more attractive than those received by Irish farmers.

82. The higher position of the graph showing relativities for milk prices at 3.7% butter fat illustrates the fact that part of the difference in prices is due to the lower average fat content of milk in Ireland. The Dutch fat content rose steadily from 3.7% in 1956 to 4.0% in 1974.¹ Accurate

¹Landbouwcijfers, various issues.

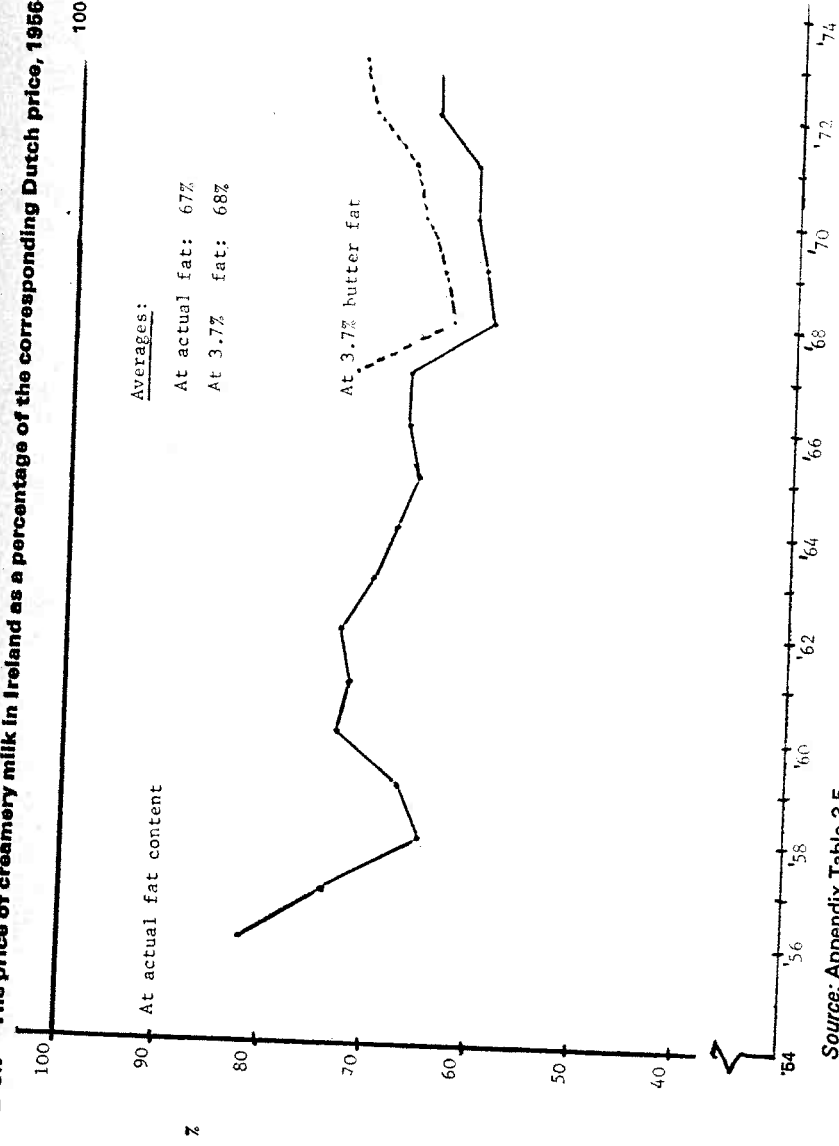
FIGURE 3.6
The evolution of pig prices in Ireland and the Netherlands, 1959-73



Source: Appendix Table 3.4.

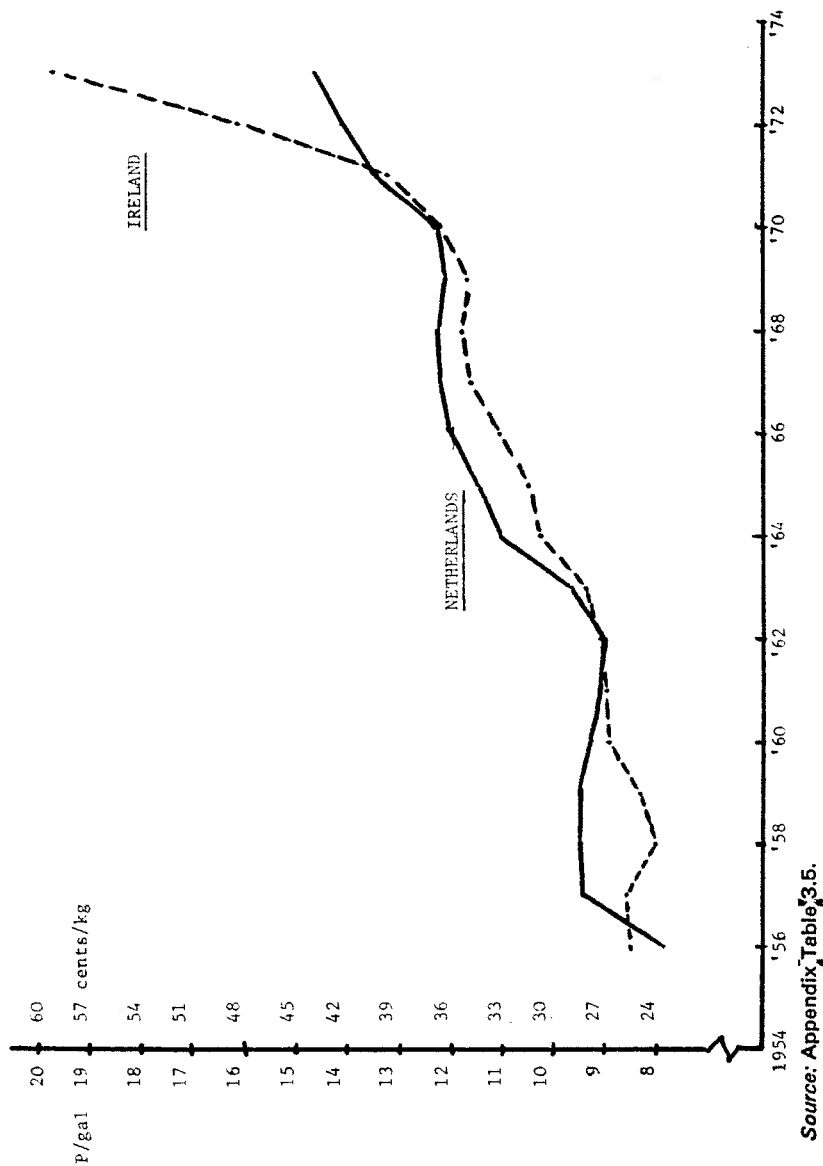
FIGURE 3.7

FIGURE 3.7 The price of creamery milk in Ireland as a percentage of the corresponding Dutch price, 1956-73



Source: Appendix Table 3.5.

FIGURE 3.8 The evolution of the price of milk in Ireland and the Netherlands, 1956-73



Source: Appendix Table 3.6.

statistics on this matter are not available for Ireland but it is generally felt that little progress has been made over the past ten years with the fat content ranging close to 3.55%.

3.1.5. Summary

83. Subject to the accuracy of current exchange rates in reflecting purchasing powers the general conclusion from the foregoing analysis must be that from the late 1950s to 1973 the rewards accruing to Irish farmers from the sale of their produce were considerably below those accruing to Dutch farmers. Amongst the products examined, the two exceptions to this finding were potatoes and sugar beet. It is difficult to be certain as to what the consequence of the less favourable price structure has been. This is so because in spite of the considerable amount of empirical research in the area of agricultural supply response, there has been virtually no in-depth motivational study of the manner in which farmers perceive prices as an incentive to increase production. In the absence of such information one can only put forward hypotheses.

84. One such hypothesis is that farmers are encouraged (or discouraged) to expand production by higher (lower) *real* prices for their produce. If this manner of motivation is shared to approximately the same degree by both Irish and Dutch farmers then the generally unfavourable price structure which Irish farmers experienced in the past can to some extent explain the lower level of intensity in Irish agricultural production. It might be countered that the potato and sugar beet exceptions disprove this argument. For these crops Irish growers have been paid a highly favourable price and yet their yields are lower than in the Netherlands. However, in a three or four year tillage rotation, it is doubtful if a single crop such as either potatoes or sugar beet will be subjected to above average intensity in production methods.¹

85. Furthermore, the graphs presented in Figures 3.1 to 3.8 indicate that the upward trends in Irish prices over the period 1959 to 1973 were for the most part not sufficient to lift the production incentive to the

¹Furthermore even if higher rates of fertiliser applications were adopted for these crops in Ireland, yields might not exceed Dutch levels due to the carry-over effect of previous crops.

level enjoyed by Dutch farmers. In fact the ratio of Irish prices to Dutch prices (in real terms) declined considerably over the period in the case of sugar beet, pigs, cattle and milk. Consequently it can be argued that the evolution of prices retarded the raising of the general level of Irish yields and production and consequently stultified the growth of agriculture.

3.2. Prices Paid by Farmers

86. In the following pages the relative costs of fertiliser and feed in Dutch and Irish agriculture will be compared. These two inputs together currently represent approximately 75% of the value of all non-factor inputs in Dutch agriculture and 70% in Irish agriculture.¹ Consequently they play a crucial role in the expansion (or contraction) of production and output. The purpose of the analysis will be to determine whether these inputs have been more highly priced in Irish farming than in the Netherlands. The procedure will be to consider their prices in relation to the prices of the products which they help to produce rather than to make direct inter-country comparisons as was done for the product prices. This avoids the necessity for using exchange rates.

3.2.1. Fertiliser Use and Prices

87. The large difference in crop and grassland yields identified in Chapter 2 suggested that Dutch farmers have resorted to artificial fertilisers on a far greater scale than Irish farmers. In fact, available statistics relating to fertiliser use indicate a great difference between the two countries in this respect. The relative position is summarised in Table 3.1. By far the most significant figures in this table are those of the last line which show that the average amount of fertiliser per hectare of land in agricultural use in the Netherlands in the early 1970s was about three times the level used in Ireland. The Irish rate of application compared even less favourably in the late 1950s, for the average application of 94 kg per hectare in 1970-71-1972-73 was the result of a threefold expansion in usage over the previous decade and a half. The Netherlands,

¹Factor inputs = land labour and capital. Percentages from *Landbouwcijfers*, 1975 and *Irish Statistical Bulletin*, June 1975.

on the other hand, in the same period expanded consumption by just 30%.

TABLE 3.1

Amount of fertiliser used in Ireland and the Netherlands

Total N, P₂O₅ and K₂O

	Ireland		Netherlands	
	000 tonne	Index	000 tonne	Index
1957-58—1959-60	149.6	100.0	471.4	100.0
1965-66	227.5	152.1	565.7	120.0
1970-71—1972-73	451.0	301.5	619.0	131.3
Kg per hectare in 1970-71—1972-73	94.0 kg/hectare		291.3 kg/hectare	

Source: *Agricultural Statistics*, No. 3, 1974. SOEC and *Agriculture in the Second Programme for Economic Expansion*, p. 158, Stationery Office, Dublin, July 1964.

88. It is in relation to the application of nitrogen that the fertiliser programmes of Dutch and Irish farmers have differed most. The very high rates of application adopted by Dutch farmers can be seen in Table 3.2.

TABLE 3.2

Amount of nitrogen used in Irish and Dutch Agriculture

Total N

	Ireland		Netherlands	
	000 tonne	kg per hectare	000 tonne	kg per hectare
1957-58—1959-60	20.4	4.5	209.7	91
1965-66	31.9	6.7	312.4	138
1970-71	85.7	18.0	405.3	189
1971-72	96.8	20.0	373.7	176
1972-73	129.7	27.0	376.3	178

Source: *Agricultural Statistics*, No. 3, 1974. SOEC and *Agriculture in the Second Programme for Economic Expansion*, p.158, Stationery Office, Dublin, July 1974.

The figures for the latter years shown in the table indicate that the average amount of nitrogen applied per hectare by Dutch farmers in the early 1970s was about five times the Irish rate. Even this represents a considerable improvement in Ireland over the late 1950s when the Dutch rate was about 20 times the Irish rate.

89. The average rate of potassic fertiliser usage in Ireland has been about half that of the Netherlands.¹ Perhaps the most surprising statistics, however, are those relating to the use of phosphatic fertilisers. In spite of the very high yields achieved in the Netherlands, especially from grassland, the average rate of phosphate (P_2O_5) application was in 1972-73 only 48 kg per hectare compared to 43 kg per hectare in Ireland. The reason put forward for this by Dutch agriculturalists is that because of the high intake of concentrates onto dairy farms the greater part of the phosphatic requirements of the soil are supplied from farmyard slurry and manure. Indeed the accounts of many highly stocked Dutch farms indicate zero purchases of phosphatic fertilisers. This is an economic aspect of high stocking rates that has attracted little attention in Ireland.

3.2.1.1. Fertiliser: Cereal Price Ratios

90. The figures presented below in Table 3.3 show for each country the cost of fertiliser relative to the value of grain. Specifically they show the number of kilograms of wheat, feeding barley and oats required to pay for a "standard" dressing of 125 kg of 10:10:20 fertiliser per acre.² This method of presentation is also used in subsequent tables relating to input costs. Before discussing the figures of Table 3.3 therefore, it is worth considering the general manner in which they might be viewed.

91. The figures presented are proportional to direct input:output price ratios and as such it can be argued from economic theory that they are a significant factor in the farmers decision as to how much fertiliser to

¹This and the following statements on rates of application of phosphatic fertilisers are based on data from *Agricultural Statistics*, No. 3, 1974, SOEC.

²This approximates the current recommendations for Irish cereal production. The ratios are in terms of N, P and K.

apply.¹ On the other hand, it might be argued that since fertiliser costs amount to only 10% or less of the per acre revenue from grain, farmers might not make adjustments in the rate of application in response to changes in the fertiliser:grain price ratio. In such cases it would be claimed that technical factors and standard recommendations from the advisory service and other sources determine the amount of fertiliser that is used. Nevertheless, even in the latter case, it is likely that the price of fertiliser in some way influences the degree to which such standard recommendations are adhered to.

92. A further point of view might be that, in an inter-country comparison such as this, one ought to compare the "real" price of fertiliser in the two countries. In this approach a "unit" of consumer goods would be taken as a numeraire by which to measure "real" costs. As already pointed out, this method is not within the bounds of feasibility. An equally valid approach, however, would appear to be one by which the "real" cost of fertiliser is expressed as the amount of end-product required to offset the cost of a unit or standard application of fertiliser. This is the approach implicit in the presentation of Table 3.3.

TABLE 3.3

The real cost of fertiliser in cereal production: kilograms of grain required to pay for 125 kg of 10:10:20

Average for	Wheat		Feeding Barley		Oats	
	I	N	I	N	I	N
1959-60—1961-62	120.5	156.7	175.8	186.7	164.0	162.5
1965-66—1967-68	117.9	143.8	161.4	165.1	161.4	163.5
1971-72—1973-74	123.5	144.8	155.7	160.7	149.8	168.4

Source: See Appendix Table 3.6 for details of calculations of fertiliser cost. Grain prices are given in Appendix Table 3.2. VAT when applicable has been included in both fertiliser and grain prices for the above calculations. For Ireland 1959-60 = 1959, etc.

¹Economic theory of production would recommend that fertiliser applications be increased until the value of the marginal product (from one extra kg of fertiliser) is merely sufficient to offset the cost of one kg of fertiliser. This makes the grain:fertiliser price ratio a significant influencing factor.

93. The calculations show that in the late 1950s and early 1960s the assumed "standard" of 125 kg of 10:10:20 per acre would have cost more in terms of final product in the Netherlands than in Ireland except in the case of oats. Consequently it cannot be argued that the comparatively unfavourable yields in Ireland in that period were due to higher fertiliser costs.

94. By comparison with the 1959–60—1961–62 situation the figures presented in the second and third rows of the table indicate that during the 1960s and early 1970s the real cost of fertiliser declined somewhat for the Dutch grower of wheat and feeding barley. A similar pattern emerged in Ireland in the case of feeding barley and oats. The real cost of fertiliser to Irish wheat growers declined very little and in fact was at its highest in the last of the three periods examined. The general conclusion from the figures of Table 3.3, therefore, is that in both Ireland and the Netherlands wherever significant shifts took place in real fertiliser cost these have been in favour of grain growers. The exceptions have been wheat in Ireland and oats in the Netherlands.

95. It is difficult to identify any causal link between the price comparisons documented in Table 3.3 and the comparisons of cereal yields in Table 2.6. The latter table showed that yields rose more rapidly in Ireland than in the Netherlands in a period when the movement of real prices of fertilisers was not particularly more favourable for Irish farmers than for Dutch farmers. Furthermore, throughout the period under review cereal yields have been lower in Ireland than in the Netherlands even though virtually all the comparisons in Table 3.3 showed lower fertiliser costs in Ireland.

96. At least two hypotheses might be advanced in relation to these "conflicting" results. First, it is possible that, even in the earlier periods, Dutch yields had reached an advanced stage of diminishing returns thus leaving little scope for yield improvements through increasing the rates of fertiliser application. Secondly, it might be argued that for at least the latter half of the period under review fertiliser prices and use have not been the *prime* determinants of the long-term trend in cereal yields but merely secondary factors tending to either augment or negate

improvements in yields brought about by the work of researchers, the Advisory Service, the media and other non-price factors.

97. This latter point of view appears particularly credible in the Irish case. It is widely felt that most cereal growers in Ireland have, for a number of years, applied fertilisers at, or close to, satisfactory rates—a practice which has been in sharp contrast to that adopted in the fertilisation of grassland. Thus it can be argued that the prices and usage of fertiliser have not been the cause of the lower cereal yields in Ireland but they have been due instead to differences in non-price factors such as suitability of soils and climate. Obviously it would require a much closer examination of the cereal production enterprises of the two countries to establish the relative importance of the various influencing factors. This was not possible in the limited time available for the present study.

3.2.1.2. *Relative Cost of Fertiliser Used on Grassland*

98. It was shown in the previous chapter that one of the most striking differences between Irish and Dutch agriculture has been the yields achieved from grassland. This is largely explainable by the very low rates of fertiliser application to grassland in Ireland. For the purpose of comparing fertiliser costs in the two countries, it was decided to consider a "standard" fertiliser application close to the Dutch average and examine its real costs in both countries. Furthermore, it was decided that this would be done in the context of milk production since dairy farming constitutes the broadest common base in the livestock sectors of the two countries.

99. Farm survey results for Dutch farms published by the Landbouw-Economisch Instituut (LEI) show that in 1972–73 the average fertiliser application on grassland farms was approximately 209 kg of N, 29 kg of P_2O_5 and 27 kg of K_2O per hectare.¹ This is the equivalent of 209 kg N, 12.8 kg P and 22.4 kg K and could be approximated by a "standard" application of 125 kg of 10:10:20 compound, plus 750 kg of calcium

¹*Bedrijfsuitkomsten in de landbouw. 1971–72—1973–74, LEI 1975.* Derived by taking an average of six regional figures for larger farms and two regional figures for smaller farms.

ammonium nitrate (26%N). In the absence of high levels of concentrate feeding in Ireland a higher level of P and K would be required. Consequently the "standard" application was set at 200 kg of 10:10:20 and 700 kg of 26% CAN.¹ The next step was to evaluate the cost of this amount of fertiliser in terms of gallons of milk in both countries. The results are given in Table 3.4.

TABLE 3.4

The Real cost of grassland fertiliser: gallons of milk required to pay for 700 kg of CAN + 200 kg of 10:10:20

Average for	Ireland			Netherlands			Ratio
	Fertiliser Cost £	Milk Price P/Gal	Gallons required	Fertiliser Cost gld	Milk Price gld/100 kg	Gallons required	(3) — (6)
	(1)	(2)	(3)	(4)	(5)	(6)	
1957-58/1959-60	25.95	8.40	309.1	257.5	28.37	194.6	1.59
1965-66/1967-68	23.30	11.12	210.0	250.8	36.13	148.6	1.41
1971-72/1973-74	27.86	16.43	172.4	260.7	42.97	129.7	1.33

Source: See Appendix Table 3.6. Irish milk prices are shown in Appendix Table 3.5. For Ireland 1957-58 = 1957, etc.

100. These calculations indicate that throughout most of the period under review fertiliser costs, in terms of gallons of milk, were 30-60% higher on Irish farms. There was a strong downward trend in the real cost for Irish grassland farmers. However, a similar though smaller improvement over time accrued on Dutch farms and in the early 1970s it required only 130 gallons of milk to pay for the "standard" fertiliser application in the Netherlands while the same application in Ireland required 172 gallons of milk. These results may be viewed against

¹It is not implied that these are the types of fertiliser used. The exercise is merely to simplify the calculation of a fertiliser price which incorporates N, P and K costs in realistic proportions.

(a) the lower yields and (b) the slower rate of improvement in grass production in Ireland than in the Netherlands. They offer a conventional economic explanation for the low Irish yields which may be seen as the result of Irish farmers having to pay a higher real price for their fertiliser over the years. The changing price ratios, however, offer no justification for the slower rate of improvement in Irish grassland yields. The reduction in real fertiliser prices was more pronounced in Ireland than in the Netherlands. Nevertheless, it may well have been that the unfavourable fertiliser:milk price ratio in Ireland dampened the influence of the Advisory Service, the media and others who sought to promote higher applications of fertiliser on grassland and in this way were an important factor in retarding development. The general conclusion to be drawn from Table 3.4, therefore, might be cautiously stated as follows: fertiliser costs have constituted a greater burden to Irish grassland farmers and this possibly is an important reason as to why they have not been willing to push grassland yields to the levels achieved by their Dutch counterparts.

3.2.2. Concentrate Use and Prices

3.2.2.1. Milk: Feed Prices

101. The figures presented in Table 2.12 of the previous chapter showed that for the period 1956-60 average milk yields in Ireland were only 55% of the levels achieved in the Netherlands. Furthermore, it was shown that exactly the same relationship obtained in the early part of the present decade. While there are undoubtedly some differences between the cow herds of the two countries in terms of genetic potential, it is almost certain that the greater part of the discrepancy in yields arises out of differences in husbandry, especially in the amount of concentrates fed to cows. It is quite usual for Dutch farmers to feed up to 1000 kg of concentrates per cow per annum and indeed higher amounts are fed in many cases. Such levels are rare exceptions in Ireland and it would appear that the majority of Irish dairy cows are fed less than 500 kg of concentrates per year.

102. In view of the large differences in the level of feeding it is of interest to examine the cost of meals in relation to the prices received for milk on Dutch and Irish farms. The top row of figures presented in

Table 3.5 show the average position of the Dutch farmer feeding 1000 kg of concentrates per cow. Specifically they give the number of gallons of milk required to pay for this amount of feed. The second row contains figures showing the number of gallons of creamery milk required to pay for 1000 kg of dairy meal in Ireland.

TABLE 3.5

Gallons of milk required for 1,000 kg of dairy meal in Ireland and the Netherlands

	1957-59	1965-67	1971-73	(c) + (a)
	(a)	(b)	(c)	
1. Netherlands ..	219	200	183	.84
2. Ireland ..	390	313	307	.79
3. 2 ÷ 1 ..	1.78	1.52	1.68	

Source: See Appendix Table 3-7.

103. It can be seen that for each of the three periods for which the comparison was made the cost of meal in terms of milk to the Irish dairy farmer was more than 50% above the level faced by Dutch farmers. Over time both sets of farmers experienced a reduction in the real cost of feed—the reduction being marginally greater in the Irish case. Concentrates therefore, have been comparatively cheap to the Dutch dairy farmer and this must have been a major factor contributing to the high level of feeding practised in that country.

104. The comparatively low level of feeding in Ireland can be illustrated in another way. In the 1971-73 period the Dutch figure of 183 gallons of milk required to pay for 1,000 kg of meals represented only 18.8% of their average milk yield at that time. A similar proportion of the average Irish yield would have financed the purchase of approximately 325 kg of concentrates. Even that figure is greater than what would be considered by most to have been the average level of concentrate feeding in that period.

105. One further aspect of the figures presented in Table 3.5 ought perhaps to be considered. In making the calculations for each country some difficulty was encountered in obtaining prices which related to dairy meal of the same specifications. It was finally decided to use a set of prices for compound dairy cattle feed published by the SOEC.¹ However, the feed descriptions accompanying the series indicate that the Dutch price relates to concentrate with a maximum 12% crude protein while the Irish price relates to a 14-16% crude protein level. It is quite likely, therefore, that the Dutch price is lower on that account. If instead, from the same source a series relating to Dutch cattle fattening compound at 12-18% crude protein had been used, the prices would have been higher by approximately 5%.² However, the net result in Table 3.5 would have been merely to raise the number of gallons of milk required in the Netherlands by approximately 10 gallons. In view of the inter-country differences this is an insignificant alteration. Similarly, it can be safely concluded that any other discrepancies which may exist within the sets of prices used, are not sufficiently serious to alter the general results obtained.

3.2.2.2. Pig: Feed Prices

106. In Chapter 2 it was pointed out that one of the greatest differences between the Dutch and Irish farm sectors lay in the development of the pig enterprise. Whereas pig production in the Netherlands more than doubled between the late 1950s and the early 1970s the increase in Ireland over the corresponding period amounted to only 30%. The divergence in growth rates, however, only became marked after the mid-1960s.

107. There are many factors which could have influenced the development of the Dutch pig sector one of which is the pig-feed price ratio. This ratio was calculated for the Netherlands and compared with the corresponding ratio for Ireland. The results of the exercise are presented in Table 3.6. The data used in compiling this table are given in Appendix

¹In *Agricultural Prices*, 57, 1973 (Table B17) and *Agricultural Statistics*, No. 1, 1974, (Table E6).

²Compare the prices in Tables E3 and E6 of *Agricultural Statistics* No. 1, 1974, SOEC.

Table 3.8. Due to pig price cycles a more complete series of prices is desirable when examining pig:feed ratios. For this reason the ratios for the period 1968–70 have also been tabulated. Bacon pig prices are used in the Irish case and "slaughter pig" prices in the Dutch case. A complete series of the latter was not available and for this reason the period 1961–64 has not been covered.

TABLE 3.6

Pig-feed price ratios in Ireland and the Netherlands

	1958–60	1965–67	1968–70	1971–73
1. Netherlands ..	7.24	6.73	7.45	7.07
2. Ireland ..	6.99	7.38	7.27	7.23
3. 2 ÷ 1 ..	0.97	1.13	0.98	1.02

Source: See Appendix Table 3.8.

108. In general these ratios give no indication as to why Dutch pig production has expanded so much over the past decade. In particular the ratio calculated for the 1965–67 period does not suggest any improvement in the output-input price relationship in those years. In fact the contrary would appear to have been the case. On the other hand, that period would appear to have been a favourable one for Irish pig producers with the ratio being the highest of the four periods examined.

109. The figures presented in Table 3.6 show no marked differences between the two countries in terms of the pig-feed price ratios which prevailed. This indicates that factors other than prices must have given rise to the divergence in growth rates in the post-1964 period. However, reservations must again be expressed about the comparability of the meals to which the SOEC prices relate. In particular the crude protein content of the selected Dutch compound is given as 16.5% (minimum) compared to 13–15% in the Irish case. It is difficult, however, to assess the impact of these differences.

TABLE 3.7

A comparison of pig-barley price ratios in Ireland and the Netherlands, 1969 to 1973

	1969	1970	1971	1972	1973	Average
1. Netherlands	8.32	7.52	6.97	7.27	8.99	7.81
2. Ireland ..	8.30	8.01	8.04	8.28	8.47	8.22
3. 2 ÷ 1 ..	1.00	1.07	1.15	1.14	0.94	1.06

Source: Appendix Table 3.8 and *Agricultural Statistics*, p. 68, No. 1, 1974, SOEC.

110. Non-comparability of meals can to some extent be evaded by simply comparing the pig-barley price ratios. This excludes the price differences for protein balancers used in the pig compounds of the two countries. On the other hand, barley prices are reasonably reliable as a basis for international comparisons since its feeding value is not likely to vary significantly from place to place.

111. Irish and Dutch prices for ground barley as published by the SOEC formed the basis for the price ratios presented in Table 3.7. These ratios support the evidence of the previous table that the price relationships facing Dutch pig producers have not been any more favourable than those in Ireland. In fact, for the five years examined the opposite has been true and on average the ratio was 6% higher in Ireland. Consequently, the overall conclusion from this limited analysis of the pig-feed price ratios must be that one must look to other causal factors for an explanation of the difference in the growth rates achieved by the pig sectors of the two countries. In view of the large contribution which that sector has made to the development of Dutch agriculture and, by comparison, the loss of potential value-added in the Irish farm sector it is a study worth undertaking.

3.2.2.3. Summary

112. This analysis of input prices has produced mixed results. The real cost of fertiliser to the Irish grain grower has been no higher than

that faced by his Dutch counterpart. In fact it has been considerably less in the case of wheat. In grassland farming, however, fertiliser has been relatively expensive for Irish farmers. In the late 1950s it took 50% more milk to meet the cost of a given fertiliser application in Ireland. Although some improvement did take place in later years the portion was still unfavourable in the early 1970s. Similarly, the real cost of concentrates to the Irish milk producer has been much higher than to the Dutch producer. On the other hand, there would appear to have been no price advantage to the Dutch pig producer. The analysis indicates that the pig-feed price ratio has been approximately the same in the two countries. It is possible that the greater rate of expansion in that sector derived from a difference in the cost of capital inputs.

3.3 The Cost of Investment in Agriculture

113. So far the analysis of this chapter has been directed towards a comparison of product prices as well as the use and real cost of non-factor inputs. The following material dealing with the level and cost of capital investment is more tentative in nature due largely to difficulties in obtaining satisfactory data. However, the importance of capital inputs in agriculture makes it necessary to attempt some analysis.

114. Figures presented in Chapter 1 indicated that the land input in Dutch agriculture is about half that of Irish agriculture while the labour input is approximately equal in both countries. As well as these factors the level of fixed capital (non-land) employed in the sector is also an important determinant of output. Furthermore, the growth of agricultural output is a function of the reorganisation of existing resources in the sector and the addition of new resources. In both Ireland and the Netherlands the amount of labour employed in agriculture has been steadily declining. Consequently the degree to which output can be maintained or expanded depends on the extent to which new capital is brought into the sector.

3.3.1. Growth in Investment

115. Irish statistical sources to date, have not published any figures for *total* new capital formation in agriculture. While researchers and international bodies, such as OECD, have made such calculations, the

author has refrained from making any Dutch-Irish comparisons of the *level* of capital formation because of the difficulties in ensuring comparability of the required data in terms of definition and coverage.

116. It is however, less difficult to obtain reliable indicators of the *change* over time in the level of capital formation and for this purpose a number of volume indices relating to the period 1963 to 1973 are presented in Table 3.8.

TABLE 3.8

Indices of the volume of fixed capital formation in Ireland and the Netherlands 1963-65 = 100

	Buildings		Machinery		Total fixed capital	
	I	N	I	N	I	N
1963-65	100	100	100	100	100	100
1967-69	82	133	141	114	111	136
1971-73	111	141	162	127	134	163

Sources: Netherlands: "Buildings and other works" (excluding land improvement) at constant 1970 prices in *Agric. Stat.* No. 4, 1974, SOEC p. 115. "Machinery and other equipment", SOEC, *Ibid.* p. 115.

Ireland: Machinery—*National Income and Expenditure*. Buildings: Investment in farm buildings as given in V. A. Dodd, "The Farm Buildings Industry in Ireland", paper read to conference on Rural Development in a Regional Context in Burlington Hotel, Dublin, 1976. Deflated by the capital goods price index for the building and construction sector, *Irish Statistical Bulletin*.

Total fixed capital. OECD, *National Accounts*, 1962-73. Vols. I and II. Tables relating to gross fixed capital formation at 1970 prices.

117. These figures indicate that the volume of investment in agricultural buildings increased at a slow rate in Ireland compared to the Netherlands and in fact declined during the latter half of the 1960s. On the other hand, the volume of investment in agricultural machinery has increased at a much faster rate in Ireland. In spite of this rapid increase the *level* of mechanisation in Ireland appears to be still considerably

lower than in the Netherlands. Recent SOEC statistics show that in 1973 the total tractor horse power in Dutch agriculture was 37% higher than that in Irish agriculture.¹

118. The indices for total fixed capital formation indicate that the volume of new capital brought into agricultural use in the Netherlands in the period 1971–73 was approximately two-thirds greater than that acquired in the period 1963–65, compared to an increase of just one-third in Ireland. These indices are based on an OECD series for gross fixed capital formation which is intended to cover such items as reproducible and non-reproducible goods, land improvement, breeding stock, draught animals and land transfer costs.² While the OECD admits to some intercountry “differences in definition and coverage”³ this is unlikely to bias the comparisons presented in Table 3.8 to any significant extent since these are strictly concerned with inter-temporal comparisons.

3.3.2. Cost of Investment

119. As for current inputs, the employment of capital inputs is also dependent on the price or cost of such inputs. In this section therefore it is proposed to examine the costs of investment in two enterprises—dairying and pigs. The examination will seek to attain two objectives: (a) to show how investment costs have changed over time in each country and (b) to show how the investment costs compare between the two countries.

120. The comparisons are based on the capital expenditure (net of grants) involved in establishing a 40 cow dairy herd and a 50 sow pig unit with fattening facilities. These expenses and the associated costs of financing them are presented in Table 3.9 on a per cow and a per sow basis for the years 1958, 1965 and 1972.⁴ As far as possible they are

¹*Agricultural Statistics* No. 3, 1974 SOEC p. 94.

²See OECD *National Accounts* 1962–73, Vol. 1 p. 187.

³See *Capital and Finance in Agriculture* Vol. 1. OECD, 1970, pp. 22–24.

⁴The figures are intended to reflect the average level of costs pertaining in the late 1950s, mid 1960s and early 1970s rather than in the specific years listed.

intended to indicate the *normal capital costs of establishment pertaining to the time and country in which the investment is assumed to have occurred*. Thus, for example, the average set of Dutch buildings in 1958 would include a hayshed. This would have been replaced by a concrete silage pit in the 1965 budget which in turn would have been replaced by a very low cost facility for high dry matter silage in 1972.

121. On an inter-country basis per head costs reflect differences in the normal standards adopted in relation to house space per sow or per cow. Similarly, it was decided not to standardise machinery types between the two countries. The same range of machinery was included in the Dutch and Irish Budgets and each item was priced at the *normal prices* paid for such pieces of equipment in the two countries. Thus the Dutch costs might include that of a higher horse power tractor than in the Irish case. Details of the Irish costs are given in Appendix Table 3.9 on page 119 along with similar figures for the Dutch budgets. The details relating to the associated loan repayments, are given in Appendix Table 3.10.

122. The repayments have been expressed in units of end-product in each case as it was felt that this provided a better yardstick for comparisons of the real cost of development in each case.¹ The following comments therefore, are based on the repayment costs as expressed in gallons of milk or kgs of pigmeat. For the dairy development the figures indicate that the amount of milk required to meet the repayments per cow increased by over 50% in both countries between the late 1950s and the early 1970s, although the Irish increase appears to have taken place only after the mid-1960s. Comparing across countries it can be seen that in each period the real cost of repayments have been approximately the same.² Thus, these results would suggest that, *ceteris paribus*, the cost of investment in dairying has been no higher for the Irish farmer than for his Dutch counterpart. However, the Dutch farmer may have found it easier to meet the costs by virtue of the fact that the average yield per cow in the Netherlands has been approximately 80%

¹The Dutch costs have been converted to sterling using current exchange rates in order to give the Irish reader an indication of the size of the sums involved.

²The differences are well within the range of error in the estimations involved.

TABLE 3.9

Capital expenditure and initial loan repayments involved in the establishment of a 40 cow herd and a 50 sow pig unit with fatteners, 1958, 1965 and 1972

	40 cow unit			
		Ireland	Netherlands	
		£/cow	Gld/cow	£/cow
Capital	1958	164	3,158	297
	1965	205	3,740	369
	1972	353	4,760	591
Repayments per annum	1958	22.6	359	33.5
	1965	28.3	463	45.6
	1972	68.9	810	100.5
Repayments in terms of gallons of milk	1958	276 gals.	268 gals.	
	1965	268 gals.	286 gals.	
	1972	425 gals.	406 gals.	
	50 sow pig unit			
		£/sow	Gld/sow	£/sow
Capital	1958	148	1,314	123
	1965	188	1,751	173
	1972	295	2,275	282
Repayments per annum	1958	15.0	127	11.9
	1965	17.6	175	17.3
	1972	38.3	276	34.3
Repayments in terms of kg of pigmeat (DW)	1958	67 kg.	55 kg.	
	1965	75 kg.	70 kg.	
	1972	117 kg.	92 kg.	

Sources: Appendix Tables 3.9 and 3.10 Exchange rates from Appendix Table 3.1. Milk and pig prices from Appendix Tables 3.5 and 3.8 respectively.

higher than in Ireland. This additional ability to pay, however, may have been offset to some extent by the higher meal costs necessary to achieve such yields.

123. In pigs also, the real cost of development has increased over time in both countries; the increase being of the order of 70% between 1958 and 1972. The inter-country differences in each of the three years indicate that the costs were lower in the Netherlands, perhaps as much as 20% in 1958 and 1972.

124. Apart from the above results some other general conclusions may be drawn from the data given in Appendix Tables 3.9 and 3.10. While capital costs were higher in the Netherlands than in Ireland when compared in sterling values, the cost per £1,000 borrowed was generally lower due to the lower interest rates. When capital and borrowing costs were combined, the resulting repayments were higher in the Netherlands for the dairy unit. This, however, was offset by the higher Dutch milk price. The estimated repayments for the sow unit were slightly lower in the Dutch case and this advantage was further reinforced by better pig prices.

125. In conclusion, the results presented in Table 3.9 indicate that the much higher rate of expansion in pig production in the Netherlands than in Ireland may have been aided to some extent by slightly lower development costs. For dairying there would appear to have been no significant Dutch advantage in terms of development costs. However, unlike its pig sector, the Dutch dairy sector has not been one of marked expansion. As was shown in Table 2.11 its cow herd expanded by only 30% from 1956-60 to 1971-73 compared to a 54% increase in Ireland.

CHAPTER 4

AGGREGATE OUTPUT : INPUT RATIOS

126. The analyses in Chapters 2 and 3 focused mainly on individual products and inputs of Dutch and Irish agriculture. It is now proposed to take a global view of the relationship between output and inputs. This will be done for the years 1971, 1972 and 1973 so that the results represent a summary of the development of the two agricultural sectors up to and including those years rather than a documentation of the progress of that development. While it would have been desirable to compute the global output : input ratios for the complete period from 1956 to 1973 such an undertaking would have required an excessive amount of time and would have been hampered by difficulties in obtaining a satisfactory range of price data for the whole period.

4.1 Output: Non-factor Inputs

127. The rapid increase in Dutch agricultural output necessitated a substantial increase in the use of feed and fertiliser inputs. It has thus become a sector of intensive production and this was underlined in Chapter 2 where the relatively high level of Dutch yields was documented. Since high yields and greater output are partly the result of a high level of inputs¹, it is of interest to examine the aggregate ratio between farmers' output and their expenditure on non-factor inputs. This is done in Table 4.1 for both Ireland and the Netherlands.

128. The ratios in this table show that Irish farmers on average received more than £3 in output for each £1 spent on non-factor inputs. In Dutch agriculture, on the other hand, the return was closer to a 2:1 ratio. These ratios reflect (a) the average physical ratio between output and inputs and (b) the ratio of product to input prices. It is of interest

¹Part being pure technological superiority i.e. greater output for the same level of inputs.

TABLE 4.1

Ratio of output to expenditure on non-factor inputs in Dutch and Irish agriculture, 1971, 1972 and 1973

	Ireland (£ million)			Netherlands (million gld)		
	Output	Inputs	Ratio	Output	Inputs	Ratio
	(1)	(2)	(1) ÷ (2)	(1)	(2)	(1) ÷ (2)
1971	387.8	134.9	2.87	12,648	5,902	2.14
1972	480.2	146.4	3.28	14,192	6,450	2.20
1973	618.4	190.7	3.24	16,682	8,010	2.08
Average	495.5	157.3	3.15	14,507	6,787	2.14

Sources: *Irish Statistical Bulletin*, June issues, 1974 and 1975, *Landbouwcijfers* 1975 and *Maandstatistiek van de landbouw*, Aug. 1975.

Notes to Table 4.1

Output includes subsidies related to sales and excludes those not related to sales in the Irish case. All subsidies are excluded in the Dutch output figures. These amounted to only 30 million guilders, 40 million guilders and zero in 1971, 1972 and 1973 respectively. Dutch receipts and inputs are exclusive of VAT. The appropriate Irish receipts and inputs for 1973 were reduced by 1% of the value of output for that year to correct for VAT. Inputs refer to all inputs other than land, labour and capital and does not include indirect taxes (such as rates) or depreciation.

therefore to remove the latter element from the calculations so as to arrive at a comparison in physical terms. This has been done by a method which is equivalent to revaluing Dutch output and inputs at Irish prices. The method may be illustrated by the following adjustment to the output figure for sugar beet in the Netherlands in 1971:

383 million guilders	=sugar beet output
65.9 guilders/tonne	=Dutch price for sugar beet (16% s.e.) in 1971
£8.62/tonne	=Irish price for sugar beet (16% s.e.) in 1971
383 × 8.62 = £50.1 million	=Dutch 1971 output valued at 1971 Irish prices.
<hr style="width: 10%; margin-left: 0;"/>	
65.9	

129. It should be noted that the guilder-sterling exchange rate is not invoked in the revaluation at Irish prices. Furthermore, it is not essential that the prices used are those which were actually applied in the original compilation of the value of output. Thus, for example, although Dutch cattle output might consist mainly of 4-5 cwt animals it is not necessary to use Dutch and Irish prices relating specifically to that weight category. It is only necessary to apply on Irish : Dutch price ratio which is approximately the same as the Irish : Dutch price ratio for 4-5 cwt cattle of Dutch quality. This latter aspect in particular simplifies the methodology considerably, especially since it removes any real necessity to establish the actual prices used in the original valuation of the Dutch output series although such a procedure is obviously desirable wherever it is possible. The use of prices relating to standardised products for the two countries, for example, sugar beet at 16% sugar content, milk at 3.7% butter fat, etc. means that quality differences are reflected in the revalued output series.

130. Using the above methodology it was possible to carry out a reasonably complete revaluation of Dutch output and inputs at Irish price levels. The full range of price ratios used is given in Appendix Table 4.1 and these are applied in the revaluation process carried out in Appendix Table 4.2. Over 90% of output from livestock and livestock products and over 85% of agricultural crop output has been repriced using reasonably relevant price ratios. The "other" categories have been converted at the average ratio obtaining in the corresponding product-group. In horticulture the price ratios used relate to vegetables only which constitute 40 to 50% of total horticultural output in the Netherlands.¹ In the input category specific ratios were applied to fertilisers and feed which amounted to approximately 75% of total inputs in the years under examination.

131. In general the Irish prices in sterling were between 5 and 15% of the corresponding Dutch prices expressed in guilders. Consequently, the revaluation process resulted in estimates of Dutch output and input

¹*Maandstatistiek van de landbouw*, Aug. 1975, CBS. The remainder consists mainly of flowers and plants (30-35%) and fruit (10-12%) and was revalued at the average price ratio obtained for vegetables.

at Irish prices which were approximately 5% to 15% of the original guilder value at Dutch prices. The notable exception to this was horticultural output where the limited number of price comparisons which could be made gave average ratios of .234, .234 and .274 for 1971, 1972 and 1973 respectively. This would suggest that the prices paid to Irish producers of horticultural products were much higher in relation to the corresponding Dutch prices than was the case for agricultural products. One of the consequences of this is that in the repriced output mix, horticulture assumes even greater proportions than in the original Dutch output series.

132. As already stated the objective of the repricing exercise was to obtain an intercountry comparison of output : input ratios which reflected volume differences only. The general findings are summarised in Table 4.2. They show that when a common price scheme is used, approximately the same output : input comparison is obtained as in Table 4.1 with Dutch agriculture producing £2.26 output for each £ of input¹ and Irish agriculture producing £3.15 for each £ of input. This illustrates a widely recognised feature of agricultural growth, namely that, as the sector develops output per unit of input declines.

133. Perhaps the most noteworthy comparison that can be made in Table 4.2 is that on average in 1971-73 the volume of Dutch agricultural output was approximately four times that of Ireland. This was accomplished on a substantially lower amount of land, approximately the same amount of labour, a greater use of capital and a substantially higher level of non-factor inputs. In fact the latter was 5.5 times the non-factor input of Irish agriculture (£868.3 million versus £157.3 million). These results clearly indicate the extremely intensive nature of Dutch agriculture especially in relation to production and input use per unit of land and labour. They do not, however, of themselves offer

¹The fact that the ratio has increased slightly from that shown in Table 4.1 indicates that on average the repricing at Irish prices resulted in a more favourable output : input price ratio than that used in the original Dutch valuation of output and input. This would appear to be contrary to the general findings of Chapter 3. However, horticulture was not included in the analyses of that chapter and it is mainly the relatively high Irish prices for vegetables which has given rise to the higher output : input ratios in Table 4.2.

TABLE 4.2

Ratio of output to expenditure on non-factor inputs using Irish prices for both Dutch and Irish agriculture, 1971, 1972 and 1973

	Ireland			Netherlands		
	Output	Input	Ratio	Output	Input	Ratio
	£ million	£ million		£ million	£ million	
1971	387.8	134.9	2.87	1,613.6	639.9	2.52
1972	480.2	146.4	3.28	1,848.9	808.4	2.29
1973	618.4	190.7	3.24	2,430.6	1,156.7	2.10
Average	495.5	157.3	3.15	1,964.4	868.3	2.26

Source: Appendix Table 4.2 and Table 4.1.

sure evidence of pure technological superiority¹ in Dutch agriculture. They may have derived from any of a number of possible situations, two of which are represented in Figure 4.1. These are (a) a situation where there is technological superiority in Dutch agriculture at all output levels and (b) a situation where the technological efficiency of the two sectors is the same.²

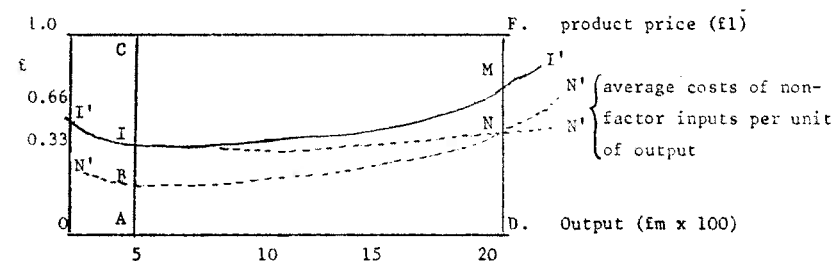
134. Let points I and N represent the observed positions of Dutch and Irish agriculture. In situation (a) these would be seen as derived from average cost curves such as I'I' for Ireland and N'N' for the Netherlands. Thus, for Ireland with a total output of approximately £500 million, point I indicates an average cost of £AI for every £ of output and point N indicates an average cost of £DN for every £ of output in the Netherlands where total output is approximately £2,000 million.

¹As defined by higher output from an identical bundle of inputs (land, labour, capital and non-factor inputs). This would arise, for example, where higher yields were totally or partly the result of better husbandry, breeds, crop varieties, etc. rather than a response to a greater use of inputs such as feed, fertiliser, sprays, etc.

²It is also possible that a sector could exhibit technological superiority at a high output level but not at a low output level and *vice versa*.

FIGURE 4.1

A hypothetical view of the output:input relationships of Dutch and Irish Agriculture



135. If these average cost curves accurately reflect the technological comparability of the two sectors, they also indicate that the Dutch sector would be capable of producing the Irish level of output with a smaller amount of non-factor input than that required by Irish producers, say £0.25 rather than £0.317 for every £ output (£AB rather than £AI).¹ This, then, would represent a position of clear technological superiority in Dutch agriculture at both output levels. In this case the lower output:input ratio for the Netherlands in Table 4.2 might be seen as the net effect of two components; (1) a higher level of average costs due to the high concentration of non-factor inputs and output on a given stock of factor inputs (land, labour and fixed capital) which is partly offset by (2) a reduction of average cost due to superior technological efficiency.²

136. An alternative explanation would be that of situation (b) where the two industries are operating on a common production function giving rise to a common average cost curve such as I'N'. This would imply that the lower output:input ratio for Dutch agriculture is solely the

¹Table 4.2 shows a non-factor input of £157.3 million and £495.5 million output for Irish agriculture in 1971-73, i.e. £0.317 for every £ output.

²The first component alone would lead to a position such as M for Dutch agriculture. This combined with the second would lead to position N.

result of a very intensive application of non-factor inputs and that there is basically no difference between the two industries in their state of technological advance. In particular the low level of Irish output and its high output: ratio would be seen as a symptom of unwillingness to inject sufficient inputs into the production process. Thus, for example, in milk production the implications would be that Irish yields are low because of unwillingness to use greater amounts of fertiliser and feed rather than any genetic inferiority of Irish cows or poor grassland husbandry.

137. The true comparative positions of Dutch and Irish agriculture may well be some combination of these two cases. It was not possible to clarify the position further with the present study.¹ This is unfortunate for it leaves unanswered the important question as to how Ireland could proceed to raise output and value-added in its agricultural sector. Is it solely a question of greater use of inputs such as capital, feed, fertiliser, etc. or is there a substantial technological gap that must be closed also?

138. Although this question cannot be answered, the primary message from Table 4.2 ought perhaps to be re-emphasised. Dutch agriculture is approximately five times more intensive than Irish agriculture in terms of non-factor input use. The end result of this greater investment in non-factor inputs coupled with a high level of capital investment has been the output and value-added in Dutch agriculture is substantially higher per hectare in the Netherlands than in Ireland.

4.2 Output and Value added per Hectare

139. The relative positions in this respect are summarised in Table 4.3. It can be seen that output per hectare in the Netherlands has been on average more than 900% of the level achieved in Ireland (926 v 102) while in terms of gross value-added the ratio has been slightly more than 7:1.

¹Indeed, it may be impossible to do so. One possibility would be to estimate separate production functions for Dutch and Irish agriculture and test then for comparability.

140. A more valid comparison of *per hectare* output, however, would be obtained by making the following adjustments:—

- Excluding pig and poultry products since these involve an element of double counting in the compilation of the figures for total agricultural output. Grain which is domestically grown, processed into feed and then domestically fed to pigs and poultry is counted twice in the total output figure.
- Excluding glasshouse crops since the main factor inputs are labour and capital rather than land.
- Adjusting the area in agricultural use for differing quality of soil.

In Table 4.4 the first adjustment has been made. In addition, all horticultural output and area has been excluded since it was not possible to obtain the required data for glasshouse crops only. No adjustment was made in the table for land quality.

TABLE 4.3
Agricultural output and gross value-added, in total and per hectare, in Ireland and the Netherlands (at Irish prices) 1971-73

	Output				Gross value added ¹ (£ million)			
	Total (£ million)		Per hectare ¹ (£)		Total (£ million)		Per hectare (£)	
	I	N	I	N	I	N	I	N
1971	388	1,614	80	754	249	953	52	445
1972	480	1,849	99	871	331	1,017	69	479
1973	618	2,431	128	1,152	427	1,234	88	585
Average	496	1,964	102	926	336	1,068	69	503

¹Per hectare of land in agricultural use as given in Appendix Table 4.3.

²At factor cost.

Other sources: Total output: Table 4.2. Gross value added: Appendix Table 4.2 and *Irish Statistical Bulletin*.

TABLE 4.4

Output per hectare of "land-based" products in Ireland and the Netherlands (at Irish prices) 1971-73

	Total output of "land-based" products (£ million)		£ per hectare	
	I	N	I	N
1971	321.3	579.5	66.7	286.3
1972	408.8	699.6	84.8	346.9
1973	526.9	905.0	109.0	452.7
Average	419.0	728.0	86.8	362.0

Source: Appendix Table 4.2 for Dutch output data (at Irish prices). Total poultry amounted to 1,042 million, 1,114 million, and 1,391 million guilders in 1971, 1972 and 1973 respectively and these values were converted to Irish prices by using the egg price ratios for those years as given in Appendix Table 4.1.

See Appendix Table 4.3 for other data. VAT at 1% was deducted where appropriate from the 1973 output for Ireland.

The effect of the adjustments was to reduce the figure for output per hectare in both countries. However, the reduction was proportionately much greater in the Dutch case giving a level of output per hectare (£362) which was 4.2 times the corresponding Irish figure.

141. It might well be argued by those familiar with the land quality of the two countries that any adjustment for this factor would further reduce the disparity between the figures for output per unit of land area. It was not possible to assess this matter. It is probably worth noting, however, that in the Farm Management Survey of 1966-69 carried out by An Foras Talúntais, the adjusted area of the farms surveyed, excluding hill sheep and cattle farms, amounted to 80% of the unadjusted area.¹ If a similar adjustment is made to the total area in

¹Farm Management Survey, 1966-69. An Foras Talúntais, p. 108. Total area of the surveyed farms in the matched sample was 24,315 hectares which was reduced to 19,406 adjusted hectares. Farms classified as "hill sheep and cattle" have been excluded from these calculations since they may include mountain grazing which is already excluded from the "area in agricultural use" as used in Tables 4.3 and 4.4.

agricultural use in Ireland as given in Appendix Table 4.3 the figure for output of "land-based" products per adjusted hectare would be £109 which is still less than one-third of the corresponding unadjusted Dutch figure.

142. The general conclusion therefore which must be drawn from these calculations relating to output of "land-based" products is that the intensification of Dutch agricultural production upon its utilised land area has resulted in an output per unit of land which is at least three times the average level achieved in Ireland. It has not been possible to carry out a similar refinement of the calculation of value-added per "hectare" because of the difficulty in allocating inputs to "land-based" and "non-land-based" products.

4.3 Output and Value-Added per Worker

143. Finally, the degree of intensification is examined in terms of output and value-added per worker in the farm sector. The most comparable employment statistics available for the two countries are those relating to male workers permanently employed in farm work. Consequently these have been used in deriving the *per capita* figures presented in Table 4.5. As in the previous two tables the values are at Irish prices so that the differences are entirely due to volume. It can be seen that the Dutch figures for output per worker are on average four times the corresponding Irish figures. This translated into an average gross value-added per male worker was more than three times that achieved in Ireland. This latter comparison perhaps more than any of the others, illustrates the effect of the high capital and non-factor inputs in Dutch agriculture.

144. The reader should be careful to understand the nature of the figures presented in Table 4.5, especially if they are used to compare *labour productivity*. In this regard it should be noted that they reflect also the inter-country differences in the amount of land and capital employed per worker. The average Dutch agricultural worker is assisted by a lower complement of land (Chapter 1) but an apparently higher complement of capital (tentative conclusion). It is difficult to say how

the comparative figures for output and value-added per worker in Table 4.5 would alter if some adjustment could be carried out to allow for the "land and capital" factor. There are conceptual problems involved in such an exercise and it is doubtful if the resulting figures could be given a useful interpretation.

TABLE 4.5

Agricultural output and gross value-added per male agricultural worker (permanent) in Ireland and the Netherlands (at Irish prices) 1971-73

	Output (£/head)		Gross value added (£/head)	
	I	N	I	N
1971	1,565	6,516	1,004	3,847
1972	1,979	7,691	1,365	4,230
1973	2,616	10,349	1,808	5,253
Average	2,053	8,149	1,392	4,443

Source: Total output and value-added from Table 4.3 divided by the number of male workers permanently engaged in farm work as given in Table 1.3.

CHAPTER 5

SUMMARY AND CONCLUSIONS

145. This study has sought to analyse the level and growth of agricultural output in Ireland over the period 1956 to 1973. The analysis has been carried out in the form of a comparative exercise in which the performance of Irish agriculture was compared with that of Dutch agriculture. In such an exercise any of a number of countries could have been selected to provide a basis for comparison. However, it was felt that Dutch agriculture was particularly suitable because: (a) it has for a long number of years achieved a consistently high growth rate, in fact the highest in the EEC¹ and (b) it has an enterprise mix roughly similar to that of Ireland if one excludes horticulture.

146. It was found that for the period under review the volume of gross agricultural output increased at an average annual rate of 2.8% in Ireland compared to 4.5% in the Netherlands. In terms of gross value-added this resulted in a growth rate of only 1.7% in Ireland as against 3.7% in the Netherlands. The period in which these very different rates of development took place, viz. 1956 to 1973, was for the most part one of uncertainty for Irish farming due to the poor market outlets available for its products. This factor no doubt contributed to the low Irish growth rate. With entry to the EEC market conditions have improved and since that time there has been a significant increase in the growth rate. It is hoped that the higher growth rate will continue. However, some concern must be expressed at the manner in which "growth" was achieved in 1975. In that year a significant share of the increased volume in value-added was due to the fact that fertiliser consumption dropped considerably. It is difficult to see how growth can be *sustained* at a high level under such conditions. The figures presented in the beginning of

¹S. J. Sheehy, "Agriculture in the Irish Economy" published in *Phosphorous in Agriculture*, No. 65, September 1975.

Chapter 3, Section 2 showed that the average rate of fertiliser use in the Netherlands was three times that of Ireland. This undoubtedly has been one of the major reasons for the extremely high output per acre achieved in Dutch agriculture. In this respect, however, it might be reiterated that the average rate of phosphate application in the Netherlands was in that period only slightly higher than in Ireland. It is the view of many Dutch agriculturalists that high phosphate applications are not necessary to sustain intensive stocking rates on dairy farms where cows are fed high amounts of concentrates—the greater part of the phosphate requirements of the soil on such farms being supplied from farm yard slurry and manure.

147. The objective of the Dutch-Irish comparisons in Chapter 2 was to obtain a clearer understanding as to how the two agricultural sectors have differed most in terms of the level and growth of output. It was found that in all cases examined the level of yields in Dutch agriculture have been significantly higher than in Ireland, the greatest differences being in grassland yields (SE per hectare) and milk yields. In terms of growth in total output two particular developments served to widen the difference between the two countries. These were: (a) the relatively slow rate of improvement in grassland yields in Ireland and (b) the slower rate of expansion in enterprises which are labour and capital intensive rather than land intensive.

148. It was estimated that Dutch grassland yields increased at almost twice the rate achieved in Ireland and on average they may now be twice as high as in Ireland. Since Ireland relied to a great extent on "grass-based" enterprises, the slow growth in grassland yields was a major contributing factor to the comparatively low growth rate of its agricultural sector. If this should continue it will deny Irish agriculture the opportunity to gain a larger share of the EEC market for products such as milk, beef and mutton. This would be a disappointing development for a country which, it is widely felt, holds a considerable degree of comparative advantage within the EEC in the production of such products.

149. The Netherlands has also achieved rapid expansion in two enterprises which are not very dependent on land—pigs and horticulture.

This is an important growth requirement for a country which has already exploited the crop and grass producing potential of its limited land resource to such a high degree. It is an area in which the Irish agricultural sector has failed to keep pace, although pig production has shown considerable long-term expansion.

150. In the agricultural crop sector the comparative position of Ireland with regard to yields, appears to be considerably better than for grassland. In terms of acreage the long-term trend has been towards a decline in tillage in both countries. In Ireland, however, the decline has been greater in potatoes. Because of the high output and high level of value-added from this crop its decline has had a strong negative impact on the growth in volume of output for the entire crop sector.

151. The inter-country price comparisons of Chapter 3 were to some extent inconclusive because of conceptual difficulties in decisions as to what represents a "better" price for the farmers of one country compared with another. Current exchange rates were used, with reservations, to provide a basis for comparing the product price of the two countries. To the extent that these rates reflect relative purchasing powers, the price comparisons show that throughout most of the period under review, the Irish farmer generally received prices which were of less value to him than the prices paid to Dutch farmers. The two exceptions to this rule were potatoes and sugar beet.

152. Input prices were examined in relation to the products which the inputs helped to produce. In the main area of concern—dairy farming—it was found that both fertiliser and meals have in the past been relatively expensive for Irish producers. Comparisons were not made for the years beyond 1973. A more up-to-date statement of relative price positions, therefore, would be of great interest since they would indicate the extent to which EEC price supports and other non-CAP market developments have provided a better price environment for Irish farmers. This would be a matter of significance for the future growth prospects of Irish agriculture. It was seen, however, as being outside the scope of the present study which sought to analyse growth in the 1956–73 period.

153. In pig production no particular price incentive to increase production could be found in the Dutch figures—at least nothing markedly different from the Irish situation. Consequently the study has left unanswered the reasons for the higher rate of expansion in Dutch pig production.

154. The aggregate output:input relationships of Chapter 4 provided some very interesting results. It was found that in terms of Irish prices Dutch agricultural output in 1971–73 was four times that of Ireland and value-added amounted to three times the Irish level. This is a remarkable result in view of the fact that the agricultural land base of that country is less than half that of Ireland and the labour input appears to be approximately the same—at least in numbers. In fact the figures in Table 4.3 indicate that the gross value-added per hectare in the Netherlands was seven times that achieved in Ireland if pigs, poultry and horticulture are included, and slightly over four times the Irish level if these are excluded. When measured in terms of gross value-added (from all products) per male permanent worker a figure of £4,443 is obtained for the Netherlands and £1,392 for Ireland (Table 4.5). These results underline the most crucial difference between Irish and Dutch agriculture—*viz.* the degree to which Dutch farmers inject non-factor inputs (and capital) into the production process. They do so, even to the extent that Dutch agriculture yields a lower average value-added per unit of output, but this is more than offset by the extremely high level of output.

155. It has not been possible to investigate differences in labour and management quality in the agricultural sectors of the two countries. However, the age distributions of male farmers shown in Table 1.4 of Chapter 1 indicate that approximately 23% of Irish farmers are over 65 years of age as against only 7.6% of Dutch farmers. It can be safely hypothesised that the high concentration of farmers in the upper age bracket has contributed to the comparatively poor performance of Irish agriculture as measured by the average gross value-added per worker. On the other hand, the size distribution of Irish holdings is considerably better than that of The Netherlands; the average farm size being 31% higher. This has helped to offset the effect of the unfavourable age distribution on the level of gross value-added per worker.

156. In conclusion the study has, in the author's opinion, provided a basis upon which guidelines and targets for possible development plans for Irish agriculture could be established. It has identified the growth areas of a comparable agricultural industry and provided estimates of the growth rates achieved. In so far as they have been achieved elsewhere, therefore, the latter could serve as relevant targets for Irish agriculture if no restraining conditions peculiar to the Irish situation can be identified. In this sense the study has been viewed by the author, not as an end in itself, but rather as an aid to those who may concern themselves with the future development of Irish agriculture.

APPENDIX TABLES

APPENDIX TABLE 1.1

Volume indices for gross domestic product and value-added in agriculture,
Ireland and the Netherlands (1958 = 100)

	Gross domestic product		Gross Value-added in Agriculture	
	Ireland	Netherlands	Ireland	Netherlands
1956	101.9	97.0	108.5	89.0
1957	102.2	100.0	112.7	95.0
1958	100.0	100.0	100.0	100.0
1959	105.6	105.0	109.1	90.0
1960	110.8	114.0	114.3	116.0
1961	115.4	119.0	115.4	107.0
1962	119.6	124.0	116.4	109.0
1963	123.1	127.0	114.4	102.0
1964	129.7	138.5	119.7	119.3
1965	131.1	146.2	115.3	119.3
1966	133.5	150.1	115.1	117.3
1967	140.3	157.8	118.0	131.6
1968	150.8	169.3	124.9	138.7
1969	157.3	180.9	122.3	142.8
1970	161.2	192.4	125.6	149.2
1971	170.6	200.1	133.6	155.2
1972	178.1	207.8	140.6	159.6
1973	190.4	217.4	141.3	173.1

Sources: Irish data—GDP and GVA in agriculture. *National Income and Expenditure*, various issues and Central Statistics Office.

Dutch data—GDP. *Nationale Rekeningen*, 1964 and 1974. GVA in agriculture. *Landbouwcijfers*, various issues and *Maandstatistiek van de landbouw*, CBS, August, 1975.

Notes

1. GDP and GVA in agriculture at factor cost for Ireland and market prices for the Netherlands. The 1956 and 1957 index values for GDP in Ireland were based on the values of GDP at constant 1958 market prices. The indices of GVA in agriculture for those years were based on the volume of Net Agricultural Output relative to 1958.

2. GVA in agriculture includes horticulture, forestry and fishing in Ireland. It includes horticulture in the Netherlands.

3. The Dutch indices for GVA in agriculture in 1970 and later years were linked to the earlier years by means of a constant price series published in *Agricultural Statistics*, No. 4, 1974. Statistical Office of the European Communities (SOEC), Luxembourg. This was necessary because of discontinuity in the original index series between 1969 and 1970.

APPENDIX TABLE 2.1

Volume indices for Gross Agricultural Output in Ireland (I) and the Netherlands (N) (1953 = 100)

Year	Total Gross Output		Crops ¹		Livestock and Livestock products	
	I	N	I	N	I	N
1953	100.0	100.0	100.0	100.0	100.0	100.0
1954	100.7	106.0	91.8	102.8	103.4	107.0
1955	102.6	112.0	96.1	111.3	104.5	111.0
1956	103.5	110.0	98.9	98.9	104.9	114.0
1957	108.0	117.0	106.6	106.8	108.4	121.0
1958	99.8	123.5	80.4	118.3	105.6	126.0
1959	106.4	123.5	103.0	111.4	107.4	128.5
1960	109.8	145.7	105.5	135.5	111.1	151.2
1961	114.6	142.1	105.3	128.1	117.4	149.9
1962	118.0	147.0	113.0	131.7	119.5	153.7
1963	118.4	143.3	103.6	126.9	122.8	151.2
1964	122.9	157.6	100.2	155.1	129.6	155.7
1965	124.0	161.9	89.4	150.9	134.4	164.8
1966	123.7	163.3	89.7	154.8	133.9	166.3
1967	127.7	177.6	101.2	173.7	135.5	178.4
1968	136.6	186.2	120.9	178.2	141.0	189.0
1969	136.9	194.8	119.3	183.3	141.7	198.1
1970 ²	140.8	208.4	123.6	191.0	145.8	215.5
1971	149.9	216.7	132.7	208.0	154.7	222.0
1972	155.5	227.1	124.2	217.6	163.8	232.7
1973	159.3	239.6	114.1	235.0	171.0	241.4

Sources: Irish Statistical Bulletin, Landbouwcijfers and Maandstatistiek van de landbouw.

¹Including horticultural output in Ireland and the Netherlands and including turf in Ireland. See Appendix Table 2.2 for construction of the Dutch index.

²For 1970, the Dutch volume indices were changed to a new base. In doing so no overlap with the old series was provided. In order to overcome this deficiency, it was necessary to derive a link by using data on output at constant 1970 prices published in *Agricultural Statistics*, No. 4, 1974. SOEC.

APPENDIX TABLE 2.2

Indices of gross output of non-horticultural, horticultural and all crops in the Netherlands and crop output excluding turf in Ireland

Year	Netherlands				Ireland	
	Tillage	Weight ¹	Horticulture	Weight ¹	All crops	Crops excluding turf
1953	100.0	0.49	100.0	0.51	100.0	100.0
1954	111.0		95.0		102.8	97.5
1955	124.0		99.0		111.3	98.7
1956	102.0		96.0		98.9	103.2
1957	116.0		98.0		106.8	114.5
1958	127.0		110.0		118.3	86.7
1959	99.1		123.2		111.4	109.9
1960	146.1	125.4	135.5	114.5		
1961	125.7	0.42	129.8	0.58	128.1	115.7
1962	135.9		128.7		131.7	125.0
1963	124.5		128.7		126.9	114.1
1964	154.3		155.7		155.1	111.5
1965	131.9		164.7		150.9	98.9
1966	136.9		167.3		154.8	99.7
1967	164.3	0.41	180.2	0.59	173.7	115.0
1968	164.3		187.9		178.2	139.3
1969	165.5		195.6		183.3	137.9
1970 ²	163.2		210.3		191.0	143.6
1971	177.9	0.36	225.0	0.64	208.0	155.5
1972	174.6		241.8		217.6	145.2
1973	177.9		267.1		235.0	133.6

Sources: Irish Statistical Bulletin and Landbouwcijfers, various issues.

¹Based on the relative value of gross outputs in these periods.

²See footnote ¹ for Appendix Table 2.1.

APPENDIX TABLE 2.3

The acreage of cereals and all crops (excluding horticultural crops) in Ireland and the Netherlands, 1956-73 (000 hectares)

Year	Ireland		Netherlands	
	Cereals	Total	Cereals	Total
1956	447.0	676.0	526.0	915.9
1957	476.0	700.2	529.0	899.6
1958	481.0	708.6	518.0	879.7
1959	437.0	658.3	505.0	877.5
1960	454.0	666.8	506.0	887.4
1961	436.0	636.6	522.0	871.8
1962	432.0	631.7	510.0	832.5
1963	403.0	601.6	488.0	810.5
1964	388.0	571.9	481.0	802.3
1965	377.0	553.2	484.0	800.8
1966	339.0	502.3	462.0	772.8
1967	356.0	518.1	437.0	751.3
1968	363.0	519.9	420.0	742.5
1969	358.0	505.7	405.0	720.5
1970	377.0	521.8	361.0	692.8
1971	386.0	524.5	348.0	678.8
1972	372.0	500.2	331.0	685.6
1973	351.0	474.4	292.0	674.9

Sources: Cereals: *Agricultural Statistics*, No. 2, 1974, p. 111, SOEC. Total for the Netherlands: *Agricultural Statistics*, No. 2, 1974. Subdivision 1.0 (p. 35) less (1.53 + 1.6 + 1.74) and 1973 figure from *Landbouwcijfers*, 1975, p. 60.

Total for Ireland: Area under corn, root and green crops, flax and fruit, from *Irish Statistical Bulletin* less area under fruit, vegetables and other horticulture as given in subdivisions 3.1 and 1.6 of *Agricultural Statistics*, No. 2, 1974, and in *Yearbook of Agricultural Statistics*, 1975, SOEC. An area of 6,300 hectares was assumed for subdivision 1.6 for the years 1956 to 1959.

APPENDIX TABLE 2.4

Volume and indices of pig output in Ireland and Netherlands, 1956 to 1973
Indices (1956-60 = 100)

Year	Ireland		Netherlands	
	Thousand pigs	Index	Thousand pigs	Index
1956	1,041	80.7	3,868	91.4
1957	1,241	96.6	4,093	96.7
1958	1,474	114.3	4,012	94.8
1959	1,284	99.6	3,980	94.0
1960	1,407	109.1	5,217	123.2
1961	1,563	121.2	4,734	111.8
1962	1,687	130.8	4,970	117.4
1963	1,672	129.7	5,117	120.9
1964	1,692	131.2	5,463	129.0
1965	1,954	151.5	6,317	149.1
1966	1,767	137.0	6,352	150.0
1967	1,554	120.5	6,860	162.0
1968	1,772	137.4	7,913	186.9
1969	2,083	161.6	7,726	182.5
1970	2,085	161.7	8,742	206.5
1971	2,269	176.0	10,214	241.2
1972	2,350	182.3	10,343	244.3
1973	2,104	163.2	10,511	248.3

Sources: Irish output data: *Irish Statistical Bulletin*, Dutch output data: Slaughtering (*Landbouwcijfers*) plus net live exports. Output excludes inventory changes in both cases. *Trade Yearbook* FAO, Rome.

APPENDIX TABLE 2.5

Estimated productivity of grassland—SE/hectares in the Netherlands and LU/hectares in Ireland, 1952 to 1973

Year	Ireland		Netherlands	
	LU/hectare	Index (1956-60 = 100)	KgSE/hectare	Index (1956-60 = 100)
1952	0.90	95	2,800	93
1953	0.91	96	2,900	96
1954	0.93	98	2,800	93
1955	0.92	97	2,800	93
1956	0.93	98	2,700	89
1957	0.91	96	3,000	99
1958	0.93	98	3,200	106
1959	0.96	101	2,700	89
1960	1.02	107	3,500	116
1961	1.01	106	3,400	113
1962	0.99	104	3,100	103
1963	1.00	105	3,200	106
1964	1.08	106	3,230	107
1965	1.05	110	3,230	107
1966	1.04	110	3,400	113
1967	1.03	108	3,400	113
1968	1.01	106	N.A.	—
1969	1.02	107	N.A.	—
1970	1.04	112	3,730	124
1971	1.09	115	3,770	125
1972	1.08	114	3,810	126
1973	1.14	120	4,200	139

Sources: Irish stocking rate from livestock numbers and area under grass, hay and silage from *Irish Statistical Bulletin*, Dutch grassland yields: Supplied by H. Dijkstra, Agricultural University, Wageningen, Netherlands.

APPENDIX TABLE 3.1

Rates of exchange used in comparing Irish and Dutch prices and values

Year	June-June Years			Calendar Year			
	U.A.'s per		Exchange Rate (1) ÷ (2)	U.A.'s per		Exchange Rate (1) ÷ (2)	
	£ (1)	Guilder (2)		£ (1)	Guilder (2)		
1956 to 1960-61	2.80	0.263	10.646	1956-60	2.80	0.263	10.646
1961-62-66-67	2.80	0.276	10.145	1961-67	2.80	0.276	10.145
1967-68-70-71	2.40	0.276	8.696	1968-71	2.40	0.276	8.696
1971-72	2.398	0.2802	8.5582	1972	2.288	0.284	8.0563
1972-73	2.123	0.2839	7.4780	1973	1.957	0.288	6.7951
1973-44	1.883	0.2949	6.3852	1974	1.873	0.298	6.2852

Source: *Agricultural Prices: Purchasing prices of agriculture*, No. 1, 1975. Internal Information series, SOEC.

APPENDIX TABLE 3.2

Farm-level prices¹ of cereals in Ireland and the Netherlands in national currencies and their ratios in sterling, 1959-73

Year ²	Common wheat			Feed barley			Oats		
	I £/tonne	N gld/tonne	I/N	I £/tonne	N gld/tonne	I/N	I £/tonne	N gld/tonne	I/N
1959	30.7	303.9	1.07	18.2	257.3	0.75	18.3	325.0	0.60
1960	25.4	306.3	0.88	18.8	244.5	0.82	21.1	261.9	0.86
1961	25.9	301.1	0.87	19.0	263.4	0.73	21.1	296.0	0.72
1962	24.9	309.8	0.81	18.2	270.6	0.68	20.2	299.8	0.68
1963	26.7	334.8	0.81	18.1	267.8	0.69	19.8	282.4	0.71
1964	28.4	357.1	0.81	19.7	295.4	0.68	20.9	318.5	0.67
1965	26.0	359.1	0.73	21.7	318.3	0.69	22.3	329.3	0.69
1966	33.2	359.1	0.94	22.3	310.6	0.73	22.0	313.9	0.71
1967	31.7	358.1	0.77	21.7	308.8	0.61	21.4	304.7	0.61
1968	33.3	351.5	0.82	22.1	310.3	0.62	22.3	302.5	0.64
1969	31.7	351.5	0.78	23.5	304.0	0.67	22.6	280.5	0.70
1970	31.3	367.5	0.74	23.8	322.0	0.64	24.0	300.0	0.70
1971	31.6	357.0	0.76	26.0	317.5	0.70	26.0	286.5	0.77
1972	34.0	377.5	0.67	26.4	330.0	0.60	29.8	322.0	0.69
1973	55.4	377.5	0.94	43.0	350.0	0.78	42.0	349.0	0.77
	Average		0.83	Average		0.69	Average		0.70

Sources: Prices in national currencies: *Agricultural Markets*, Special Number, June 1975, EEC Commission, Directorate-General for Agriculture. Exchange rates: See Appendix Table 3.1.

¹These are unit values and are at farm level. As such, they do not refer to grain of any particular quality but rather to the quality obtaining in the particular price year. They represent the average price received by farmers. All prices are exclusive of VAT, i.e. 4% from Dutch prices from 1969 onwards and 1% from 1973 Irish prices.

²For the Netherlands, 1959-1959-60, etc.

APPENDIX TABLE 3.3

Farm-level prices of potatoes and sugar beet in Ireland and the Netherlands in national currencies and their ratios in converted currencies, 1959-73

Year	Potatoes ¹			Sugar Beet ²		
	I £/tonne	N gld/tonne	I/N	I £/tonne	N gld/tonne	I/N
1959	10.6	147.5	0.76	6.65	54.0	1.31
1960	16.1	92.5	1.85	6.77	47.3	1.52
1961	18.5	130.5	1.44	6.67	50.9	1.33
1962	15.2	129.5	1.19	6.79	52.4	1.31
1963	12.7	109.5	1.18	6.96	56.7	1.24
1964	23.4	131.0	1.81	7.51	65.4	1.16
1965	21.4	199.5	1.09	7.80	66.3	1.19
1966	19.1	165.5	1.17	8.06	68.7	1.19
1967	16.8	84.0	1.74	8.31	63.1	1.14
1968	19.0	128.0	1.29	8.36	63.2	1.15
1969	26.6	228.0	1.01	8.45	59.5	1.23
1970	21.3	111.0	1.67	8.58	63.5	1.17
1971	20.2	98.0	1.76	8.62	65.9	1.12
1972	44.2	244.0	1.35	8.56	71.6	0.89
1973	24.1	180.0	0.85	8.93	75.6	0.75
	Average		1.34	Average		1.18

Sources: Prices in national currencies: *Agricultural Markets*, Special Number, June, 1975. EEC Commission, D.G. for Agriculture. Conversion rates—Appendix Table 3.1.

¹For human consumption. Unit values.

²Prices at 16% sugar content and including the value of pulp.

Note: VAT was deducted from the Irish prices for 1973 at 1%. Dutch statistical sources (*Landbouwcijfers*) indicate that the Dutch prices as published in *Agricultural Markets* are exclusive of VAT.

APPENDIX TABLE 3.4

Market prices of cattle and pigs in Ireland and the Netherlands in national currencies and their ratios in converted currency, 1959-73
(Liveweight prices)

Year	Price of bullocks (9-10 cwt)				Price of pigs (80-120 lb)			
	I	N		I/N	I	N		I/N
	£/cwt	gld/kg	£/cwt		p/lb	gld/kg	p/lb	
1959	6.70	1.75	8.35	0.80	8.1	2.21	9.4	0.86
1960	6.20	1.67	7.97	0.78	8.2	1.74	7.4	1.11
1961	6.10	1.69	8.46	0.72	8.3	2.19	9.8	0.85
1962	6.40	1.62	8.11	0.79	8.2	1.82	8.1	1.01
1963	6.26	1.75	8.76	0.71	8.2	2.19	9.8	0.84
1964	7.26	2.23	11.62	0.62	8.8	2.43	10.9	0.81
1965	7.70	2.33	11.67	0.66	8.1	2.21	9.9	0.82
1966	7.03	2.35	11.77	0.60	9.2	2.49	11.1	0.83
1967	7.29	2.43	12.17	0.60	10.3	2.48	11.1	0.93
1968	8.61	2.51	14.66	0.59	10.5	2.38	12.4	0.85
1969	9.00	2.68	15.66	0.57	10.8	3.14	16.4	0.66
1970	9.66	2.57	15.01	0.64	11.7	3.01	15.7	0.75
1971	10.77	2.82	16.47	0.65	10.9	2.43	12.7	0.86
1972	13.66	3.25	20.49	0.67	12.8	2.90	16.3	0.79
1973	17.46	3.36	25.12	0.70	17.6	3.63	24.2	0.73
Average				0.67	Average			0.85

Sources: Irish Statistical Bulletin and Landbouwcijfers, various issues.

Notes: Irish cattle price at auction marts (excluding Dublin). Dutch price relates to slaughter steers, 2-4 years, 1st quality at 55-60% killing-out rate (57.5% used in conversion from deadweight to liveweight price) which were directly available for 1970, 1972 and 1973. The prices from 1958 to 1969 were obtained by using prices of comparable cattle and indices of cattle prices. A similar method was used to obtain Irish prices for 1959-62. Irish pig prices relate to young pigs, 80-119 lb, at auction marts. The Dutch prices relate to young pigs weighing 40-50 kg. All prices exclusive of VAT.

APPENDIX TABLE 3.5

Price of Creamery Milk in Ireland and the Netherlands in national currencies and their ratios in sterling, 1956-73

Year	Price at actual fat content				Price at 3.7% butter fat		
	I p/gal	N cents/kg	N ¹ p/gal	I/N ¹	I p/gal	N ¹ p/gal	I/N ¹
1956	8.54	23.64	10.39	0.82			
1957	8.63	28.43	12.49	0.69			
1958	8.18	28.48	12.51	0.65			
1959	8.38	28.58	12.56	0.67			
1960	8.98	27.96	12.28	0.73			
1961	9.05	27.48	12.28	0.72			
1962	9.14	27.14	12.51	0.73			
1963	9.44	29.16	13.44	0.70			
1964	10.32	33.15	15.28	0.68			
1965	10.55	34.66	15.98	0.66			
1966	11.12	36.23	16.70	0.67			
1967	11.69	36.86	17.33	0.67	12.88	16.96	0.72
1968	11.84	37.10	19.96	0.59	12.32	19.44	0.63
1969	11.73	36.51	19.64	0.60	12.32	19.24	0.64
1970	12.28	37.15	19.98	0.61	12.84	19.47	0.66
1971	13.30	40.57	21.82	0.61	14.22	21.17	0.67
1972	16.20	42.66	24.77	0.65	16.98	23.84	0.72
1973	19.80	44.23	30.44	0.65	21.19	29.48	0.72
Average				0.67	Average		0.68

Sources: Irish price at actual fat content: 1965-74, B. Kearney, *Farm and Food Research* (5), No. 2, 1974. The data for the remaining years were also kindly provided by B. Kearney. They include the value of skim milk whether returned to the farm or not.

Dutch prices at actual fat content: Based on prices published in *Landbouwcijfers*, various issues. These include payments added to the milk price by Co-operatives for profits arising from non-dairy activities. This was included in the Dutch published statistics from 1962-63 onwards and an estimate of 0.50 cents per kg was added for each year back to 1958-59 before which these payments were non-significant. The Dutch prices which are published for April-April years were converted to calendar year prices by using weights based on the seasonality of production. They include the value of skim milk.

Prices at 3.7% fat: Irish prices from *Agricultural Markets*, Special Number, June 1975. EEC Commission, D.G. for Agriculture. Dutch prices from *Landbouwcijfers*, 1975.

Conversion rates: Appendix Table 3.1.

All prices are exclusive of VAT.

APPENDIX TABLE 3.6

Fertiliser prices and Dutch milk prices used in the calculation of Tables 3.3 and 3.4

Year	10N:10P:20K		"Calcium Ammonium" Nitrate (26% N)		Dutch milk price
	I £/100 kg	N gld/100 kg	I £/100 kg	N gld/100 kg	gld/100 kg
1957-58	3.94	40.7	2.89	25.0	28.46
1958-59	3.83	40.4	2.77	25.4	28.64
1959-60	2.88	39.8	2.42	25.4	28.00
1960-61	2.60	36.8	2.12	—	—
1961-62	2.38	37.6	2.08	—	—
1965-66	2.80	40.9	2.57	24.5	34.90
1966-67	2.78	41.5	2.51	24.0	36.56
1967-68	2.84	41.5	2.50	23.6	36.94
1971-72	3.48	40.7	2.70	24.7	41.39
1972-73	3.85	41.4	2.88	24.5	42.96
1973-74	4.08	46.4	3.10	25.8	44.55

Sources: *Irish Statistical Bulletin* and *Landbouwcijfers*, various issues.

Note: For the pre-1970 years, the Irish price for 10:10:20 was imputed from the per unit prices of elemental N, P and K from Nitrogenous fertilisers, Superphosphate (granular) and Muriate of Potash respectively, to which was added a fixed sum of 80p per tonne in 1957-58-1961-62 and £1.20 per tonne in 1965-66-1967-68.

The Dutch price series for 10:10:20 was constructed from prices published in *Landbouwcijfers* as follows:

$$\begin{aligned}
 125 \text{ kg of } 10:10:20 \text{ (N-P-K)} &= 100 \text{ kg of } 12-10-18 \text{ (N-P}_2\text{O}_5\text{-K}_2\text{O)} \\
 &+ 100 \text{ kg Superphosphate (19\% P}_2\text{O}_5) \\
 &+ 30 \text{ kg "Kalizout" (40\% K}_2\text{O)} \\
 &+ 2 \text{ kg of CAN (26\% N)}.
 \end{aligned}$$

In all cases published prices for CAN at 20.5% N and 23% N were adjusted upwards to 26% N on a pro rata basis.

All prices exclude VAT. For Ireland, 1957-58 = 1957, etc.

APPENDIX TABLE 3.7

Calculation of the number of gallons of milk required to pay for 1,000 kg of dairy meal

Year	Netherlands				Ireland		
	Meal gld/ 100 kg	Milk		Gals per tonne of meal	Meal £/100 kg	Milk p/gal	Gals per tonne of meal
		gld/ 100 kg	gld/ gal				
1957	29.97	28.43	1.33	225.3	3.26	8.63	377.8
1958	28.13	28.48	1.33	211.5	3.30	8.18	403.4
1959	29.36	28.58	1.34	219.1	3.26	8.38	389.0
1965	33.94	34.66	1.62	209.5	3.36	10.55	318.5
1966	34.96	36.23	1.69	206.3	3.51	11.12	315.6
1967	34.86	36.86	1.72	202.7	3.57	11.69	305.4
1971	36.87	42.19	1.97	187.2	4.29	13.30	322.6
1972	35.62	44.37	2.08	171.3	4.47	16.20	275.9
1973	40.98	46.00	2.15	190.6	6.42	20.00	321.0

Sources: Meal prices, 1971-73: *Agricultural Statistics*, No. 1, 1974, p. 91, with VAT (4%) added to Dutch prices. Prices for earlier years were related to the 1971-73 prices by means of indices for animal feed prices published in *Irish Statistical Bulletin* and *Landbouwcijfers*.

Milk prices: Appendix Table 3.5 with VAT added; 1% to the 1973 price for Ireland and 4% to 1971-73 Dutch prices.

Conversion to guilders per gallon: 100 kg = 21.38 gals.

APPENDIX TABLE 3.8

Calculation of pig-feed price ratios

Year	Netherlands			Ireland		
	Meal gld/100 kg	Pigs gld/100 kg	Ratio	Meal £/100 kg	Pigs £/100 kg	Ratio
1958	31.05	232	7.47	3.35	22.45	6.70
1959	31.15	228	7.32	3.25	23.14	7.12
1960	30.45	211	6.93	3.15	22.55	7.16
1965	37.70	249	6.60	3.25	23.53	7.24
1966	38.55	267	6.93	3.35	24.81	7.41
1967	39.05	260	6.66	3.45	25.87	7.50
1968	39.00	272	6.97	3.70	26.75	7.23
1969	38.74	316	8.16	3.66	27.15	7.42
1970	41.85	302	7.23	3.91	27.94	7.15
1971	41.91	274	6.54	4.19	29.57	7.06
1972	42.12	300	7.12	4.45	32.63	7.33
1973	51.69	391	7.56	6.08	44.40	7.30

Sources: Meal: 1969-73—*Agricultural Statistics, No. 1, 1974*, SOEC (Table F 2) Earlier years: *Irish Statistical Bulletin* and *Landbouwcijfers*. The latter provided an alternative price series for Dutch pig meal which was used as a basis for extrapolating the SOEC series.

Irish pig prices: *Irish Statistical Bulletin*; dead-weight prices for bacon pigs averaging 63-68 kg (dead-weight).

Dutch pig prices: *Landbouwcijfers*; dead-weight prices for slaughter pigs, 80-90 kg (live-weight), derived from live-weight prices by using 78% killing-out percentage as implied by similar conversions carried out by the SOEC in *Agricultural Statistics, No. 1, 1974*.

All prices include VAT.

APPENDIX TABLE 3.9

Capital expenditures involved in the establishment of (a) a 40 cow dairy enterprise and (b) a 50 sow pig enterprise. 1958, 1965 and 1972

(a): 40 Cow Unit (I: £/cow. N: guilder/cow)

		1972	1965	1958
1. Building costs:				
Milking parlour, dairy, collecting yard, housing, hay/silage unit and manure storage facility	I	150	88	71
	N	2,500	2,200	2,000
2. Machinery:				
Milking machine, cooling equipment, tractor, front loader, trailer, mower and manure spreader	I	73	46	39
	N	660	440	358
3. Springer heifer				
	I	130	71	54
	N	1,600	1,100	800

(b): 50 sow/fattening unit (I: £/sow. N: guilder/sow)

		1972	1965	1958
1. Building costs:				
Per sow cost of building space for 38 dry sows, 12 farrowing/suckling sows, 12 gilts, 2 boars, 150 weaners and 250 fatteners	I	260	153	124
	N	1,960	1,490	1,070
2. One in-pig gilt				
	I	35	25	24
	N	315	261	244

APPENDIX TABLE 3.10

Interest rates and loan terms used in calculating repayments on capital expenditure (Table 3.9)

Interest rates (% per annum)

		1972	1965	1958
Buildings, machinery and livestock	I	9.5	6	6
	N	8	6	5

Term of loan (years)

		1972	1965	1958
Buildings	I	20	20	20
	N	20	20	20
Machinery and livestock	I	5	7	7
	N	5	7	7

Note: The term of loan has been standardised for the Netherlands and Ireland. This expedient was resorted to in the absence of adequate information on the distribution of loans according to term in each country. As far as can be ascertained, however, the number of years adopted in the present exercise is broadly representative of the position in both countries.

APPENDIX TABLE 4.1

Price ratios used in valuing Dutch output and inputs in 1971, 1972 and 1973 at Irish prices

Item	Price used	1971	1972	1973
<i>Livestock and livestock products</i>				
1. Cattle	I: £/cwt L.W.	10.69	13.63	17.26
	N: guilder/cwt L.W.	143.2	165.1	170.6
2. Pigs	I: £/cwt D.W.	15.02	16.57	22.32
	N: guilder/cwt D.W.	133.8	146.5	190.9
3. Milk	I: £/gal	0.1422	0.1698	0.2119
	N: guilder/gal	1.841	1.920	2.003
4. Eggs	I: £/100 eggs	1.41	1.45	1.92
	N: guilder/100 eggs	10.27	10.33	12.99
<i>Agricultural crops</i>				
5. Wheat	I: £/tonne	31.6	34.0	54.8
	N: guilder/tonne	357.0	377.5	377.5
6. Feeding barley	I: £/tonne	26.0	26.4	42.6
	N: guilder/tonne	317.5	333.0	350.0
7. Oats	I: £/tonne	26.0	29.8	41.6
	N: guilder/tonne	286.5	322.0	349.0
8. Sugar beet	I: £/tonne	8.62	8.56	8.93
	N: guilder/tonne	65.9	71.6	75.6

Item	Price used	1971	1972	1973
<i>Agricultural crops—(contd.)</i>				
9. Potatoes	I: £/tonne	20·2	44·2	24·1
	N: guilder/tonne	98·0	244·0	180·0
<i>Horticultural crops</i>				
10. Cauliflowers	I: £/100 kg	14·73	17·42	19·83
	N: guilder/100 kg	66·25	69·77	69·29
11. Brussels sprouts	I: £/100 kg	12·69	14·45	16·66
	N: guilder/100 kg	62·24	65·08	90·00
12. Lettuce	I: £/100 kg		12·75	21·90
	N: guilder/100 kg		67·41	69·15
13. Tomatoes	I: £/100 kg	29·89	22·40	28·94
	N: guilder/100 kg	106·98	104·97	112·38
14. Carrots	I: £/100 kg	7·09	7·27	8·76
	N: guilder/100 kg	31·93	26·25	28·05
<i>Feed</i>				
15. Pig and poultry meal	I: £/100 kg	4·98	5·26	7·32
	N: guilder/100 kg	40·30	40·50	49·70
16. Cattle compound	I: £/100 kg	4·10	4·28	6·26
	N: guilder/100 kg	37·15	36·30	43·34
<i>Fertiliser</i>				
17. Nitrogen (N)	I: £/100 kg N	10·4	11·09	11·92
	N: guilder/100 kg N	86·85	93·98	96·15

Item	Price used	1971	1972	1973
<i>Fertiliser—(contd.)</i>				
18. Super-phosphate (P ₂ O ₅)	I: £/100 kg P ₂ O ₅	6·15	7·17	10·32
	N: guilder/100 kg P ₂ O ₅	83·75	84·68	87·26
19. Basic slag	I: £/100 kg P ₂ O ₅	6·06	6·69	7·94
	N: guilder/100 kg P ₂ O ₅	61·38	64·75	69·94
20. Muriate of potash	I: £/100 kg K ₂ O	3·44	3·82	4·25
	N: guilder/100 kg K ₂ O	35·82	37·48	39·68

Sources: 1, 2 and 4: I; *Irish Statistical Bulletin*. N; *Landbouwcijfers*, 1975. 3, 5-9: I and N; *Agricultural Markets* 1975, EEC Commission, D G for agriculture. 10-14 I and N; *Agricultural Prices; Fruit, Vegetables and Potatoes*, S8, 1973 and 1974, SOEC. 15-19; I and N; *Agricultural Statistics No. 1*, 1974, SOEC.

Further notes on prices used: I. N: slaughter steers, 1st quality, average 57·5% killing out. I: 9-11 cwt bullocks. 2. I and N: bacon pigs as in Appendix. 3. I and N: milk at 3·7% butter fat. 4. I and N: Hen eggs. 5, 6, 7, 8 and 9 as used in Chapter 3. Unit values for grain, and beet at 16·0% sugar content with pulp included. 10, 11, 12, 13 and 14. N: Growers price, I: Wholesale price at Dublin market less 10%. 15. N: Pig fattening compound at 16·5% crude protein. I: Broiler compound at 16-18% crude protein. 16. N: 12-18% C.P. I. 12-16% C.P. 17. I and N. From Calcium Ammonium Nitrate (26% N). 18. I and N: From superphosphate (19% P₂O₅ and 8% P). 20. I: From Muriate of Potash, 50% K N: From Muriate of Potash, 0% K₂O.

All prices are exclusive of VAT, since Dutch agricultural output and input values are given exclusive of VAT.

APPENDIX TABLE 4.2

Revaluation of Dutch agricultural output and input at Irish prices 1971, 1972, 1973

	1971		1972		1973	
	At Dutch prices million guilders	At Irish prices £ million	At Dutch prices million guilders	At Irish prices £ million	At Dutch prices million guilders	At Irish prices £ million
1. Livestock and livestock products						
Cattle	1,675	124.9	2,081	171.8	2,464	249.3
Milk, butter, etc.	3,341	258.0	3,748	331.5	4,030	426.3
Pigs	2,205	247.4	2,574	291.1	3,419	399.7
Eggs	416	57.1	428	60.1	555	82.0
Other	742	66.8	811	78.5	995	110.0
Total	8,379	764.2	9,642	933.0	11,463	1,267.3
2. Agricultural crops						
Wheat	222	19.7	221	19.9	261	37.9
Barley	113	9.3	97	7.7	120	14.6
Oats	53	4.8	38	3.5	40	4.8
Other grain and straw	78	6.8	46	4.0	23	3.1
Potatoes	467	96.3	639	115.8	821	109.9
Sugar beet	383	50.1	390	46.6	405	47.8
Other agricultural crops	202	28.7	120	16.6	190	24.8
Total	1,518	215.7	1,551	214.1	1,860	242.9
3. Horticultural crops	2,751	643.7	2,999	701.8	3,359	920.4
4. Total agricultural output	12,648	1,613.6	14,192	1,848.9	16,682	2,430.6
5. Inputs						
Fertilisers	488	58.4	470	52.3	520	63.1
Feed	3,920	419.5	4,270	541.8	5,610	822.1
Other inputs	1,494	162.0	1,710	214.3	1,880	271.5
Total inputs	5,902	639.9	6,450	808.4	8,010	1,156.7
6. Gross value-added at market prices (4-5)	6,746	973.7	7,742	1,040.5	8,672	1,273.9
7. Subsidies	30	3.4	40	4.8	0	0
8. Indirect taxes	208	23.9	230	28.5	270	39.7
10. Gross value-added at factor cost	6,568	953.2	7,552	1,016.8	8,402	1,234.2

Sources: Original output and input data: *Landbouwcijfers, 1975, Meandstatistiek van de landbouw*. August 1975, and *Agricultural Statistics*, No. 4, 1974 (fertiliser), SOEC. The following classifications were made: Output of hay was switched from the livestock sector to agricultural crops and onions have been transferred from agricultural crops to horticulture. Conversion ratios: From Appendix Table 4.1. The ratio used to convert the "other" component in cash subgroup was the average conversion ratio for the specified components of that subgroup. For horticulture an unweighted average of the ratios for items 10 to 14 was applied to the total output figure. For feed the ratios for items 15 and 16 were combined using 0.75 and 0.25 respectively as weights, and applied to the total feed input. For fertiliser the ratios for items 17, 18, 19 and 20 were combined using 0.73, 0.15, 0.03 and 0.09, respectively as weights, and applied to the total fertiliser input. Subsidies and indirect taxes have been converted by applying the guilder-sterling exchange rate as given in Appendix Table.

APPENDIX TABLE 4.3

Area, inventory and output data used in the calculations of Tables 4.3 and 4.4

	1971		1972		1973	
	I	N	I	N	I	N
	Land area (1,000 hectare)					
1. Agricultural use	4,825.2	2,139.9	4,829.3	2,123.8	4,840.8	2,110.2
2. Horticultural use	10.4	115.3	8.5	107.1	9.1	110.7
1-2	4,814.8	2,024.6	4,820.8	2,016.7	4,831.7	1,999.5

Irish Output and inventory charges (£ million)

1. Total output		387.8	480.2	624.6
2. Less: pigs	output	45.0	49.3	61.8
3.	inventory charge	-0.1	-1.3	+0.5
4. Less: poultry and eggs	output	9.7	11.5	17.0
5.	inventory charge	+0.5	-0.1	+0.3
6. Less horticultural output		11.4	12.0	13.8
1-(2+3+4+5+6)		321.3	408.8	532.2

Sources: Total area in agricultural use; *Agricultural Statistics*, No. 2, 1974, SOEC. Horticultural area; *Landbouwcijfers* 1975, p. 60 and Irish Department of Agriculture and Fisheries.

Output and inventory: Items 1 to 5, *Irish Statistical Bulletin* and Central Statistics Office, Dublin. Item 6, Department of Agriculture and Fisheries.

Note: Item 6 excludes hops, ornamental and nursery crops, since estimates for these were not available for 1971-73. In 1974 they amounted to 5% of horticultural output, *Farm Bulletin*, February 1975.

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