CENTRE FOR
EUROPEAN AGRICULTURAL STUDIES

THE DEVELOPMENT OF AGRICULTURE IN GERMANY AND THE UK

4. A COMPARISON OF OUTPUT, STRUCTURE AND PRODUCTIVITY

D.K. BRITTON

WYE COLLEGE
(University of London)
ASHFORD, KENT
1981

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CONTENTS

Page

APPENDICES (continued)

AGRICULTURE IN GERMANY AND THE UK:

A COMPARISON OF OUTPUT, STRUCTURE AND PRODUCTIVITY

INTRODUCTION

The main purpose of this study, which is one of a series of Anglo-German studies undertaken by the Centre for European Agricultural Studies with the support of the Anglo-German Foundation for the study of Industrial Society, is to examine the following questions:

a) is it possible, from the statistics available, to reach any broad conclusions as to the relative productivity of British and German agriculture in recent years?

and b) how far might any difference in productivity, derived from comparisons relating to the respective agricultural sectors in their entirety, be attributable to differences in the farm-size structure between the two countries?

It will be shown that although it is difficult to establish categorically the extent to which British farmers are in general more efficient or less efficient than German farmers - especially if it is agreed that there is more than one way of measuring efficiency - the greater prevalence of small farms in Germany clearly puts German farmers at a disadvantage. It is estimated that the farm-size factor gives British farmers an initial advantage of about 11 per cent, in terms of the resources of labour, capital and land needed to produce a given volume of agricultural output.

The implications of this possible 11 per cent advantage for structural policy within the EEC have not been worked out, but they are an obvious follow-on for further research. It raises questions such as the costs compared with the benefits of pursuing and eventually overcoming this degree of inefficiency.

It could be argued that when advocating changes in the allocation of resources, it is the marginal productivity and not the average productivity of particular resources in given situations which should be the measure of efficiency. Marginal productivity is easy to say, but very much more difficult to measure.

This Miscellaneous Study is presented as a contribution to the continuing debate about the relative competitiveness of the various economic sections of the EC Member States, a debate which is now heightened by the presentation of the EC Commission's proposals for the reform of the budget and of the Common Agricultural Policy, with their increased emphasis on structural change.

It must be remembered that the present size and cost structure of a Member State's agriculture is in part determined by the national goals set for its agriculture by the individual Member States. A drive for a greater degree of self-sufficiency in food supplies, or

a higher proportion of workers to be employed in agriculture, will give rise to an agriculture different from one whose objectives are different.

This report draws upon the results of work carried out by Dr. Helmut Schrader, of the Bundesforschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, and by Professor Denis Britton and Dr. Berkeley Hill, of Wye College, University of London. The author wishes to acknowledge with thanks the assistance of those who joined in discussion of the procedures and results of the study, especially Professor Dr. Wilhelm Henrichsmeyer (University of Bonn) and Sir Con O'Neill (formerly a member of the Council of CEAS).

SUMMARY

... Total production from German agriculture is almost twice the amount produced from British agriculture. This appears to have been a fairly stable relationship (1973-77).

(Basis: national sector accounts, using 1970 national prices and 1970 exchange rates).

... The total employment of labour in German agriculture is also about twice the amount employed in British agriculture; but the German level of employment has fallen more rapidly than in UK, so that the ratio between the two countries fell from 2.5 in 1970 to 1.9 in 1977.

(Basis: annual labour units, adjusted for part-time employment).

... Gross labour productivity (output per labour unit) has recently been about the same in the two countries. Previously (before 1974), when many more people were employed in German agriculture, the comparison was much more favourable to UK.

(Basis: 1970 national prices, 1970 exchange rates, annual labour units adjusted for part-time employment).

... Net labour productivity (net value added per labour unit) was also about the same in the two countries in 1976, but in earlier years was lower in Germany than in UK.

(Basis: as gross labour productivity, but deducting value of goods and services purchased for current production purposes, together with depreciation allowance on machinery and buildings).

... An alternative measure of total agricultural production, using grain-equivalent units instead of monetary units, indicates that the ratio between the two countries is not 2 : 1 but only 1.57 : 1 in favour of Germany (1972/73 - 1977/78 average). So the above comparison using monetary units and exchange rates may have been distorted in favour of Germany.

... Germany's gross self-sufficiency in food rose from 87 per cent in 1972/73 to 94 per cent in 1977/78; the corresponding figures for UK were 66 per cent and 72 per cent.

(Basis: domestic agricultural production as per cent of total human consumption of food, all measured in grain-equivalents).

... Net self-sufficiency in food, after allowing for imported feedingstuffs, has fluctuated around a level of about 70 per cent in Germany (1972/73 to 1977/78); in UK it rose from 50 per cent to 60 per cent in the same period, because domestic agricultural production increased without any corresponding increase in imported feedingstuffs.

If Germany had the same farm-size distribution as England and Wales, and the existing output/input ratios at each point in the size-scale continued to apply, then it could be expected that the average level of efficiency in total resource use in Germany might be expected to be increased by about 11 per cent above the present level. In other words, the size-structure in England and Wales could be said to represent an "advantage" to British agriculture of about 11 per cent in terms of the better use of resources which it facilitates.

COMPARISONS OF AGGREGATES : THE TOTAL ECONOMY AND THE AGRICULTURAL SECTOR

Table 1 gives some general economic and demographic indicators for both countries in 1979. It can be seen that there is close similarity between them in terms of population, land area, density of population and number of persons in active employment. The similarity does not, however, extend to the gross domestic product, which was almost twice as high in Germany, with the result that GDP per person in active employment in Germany was almost double that of UK.

In recent years the proportion of gross domestic product represented by gross fixed capital formation has been greater in Germany than in UK, so that in 1978 the total amount invested in this way in Germany was nearly two-and-a-half times the UK amount.

On the other hand, the difference between the two countries in consumption of primary energy was not as great as the figures of gross domestic product might suggest.

Comparisons of industrial wage levels are of special interest in the context of the present study. Broadly speaking, industrial earnings appear to have been about 60-80 per cent higher in Germany in recent years.

Inflation has risen at a much faster rate in Britain than in Germany. Between 1970 and 1979 the cost of living index rose by 205 per cent in Britain compared with only 56 per cent in Germany.

Between 1970 and 1978 exchange rates moved significantly in favour of the German economy, widening the apparent difference in income levels, but between 1978 and 1981 the pound recovered strongly so that in terms of ECU the gap between the two countries has narrowed appreciably compared with what it would be at 1978 exchange rates.

Calculations of the relative purchasing power of national currencies in the respective countries show that the exchange rate does not correspond closely to the real (domestic) purchasing power comparison. Throughout the 1970s the pound sterling was generally worth considerably more within the United Kingdom than the exchange rates would indicate.

The problem of "unreal" exchange rates has been tackled by many economists and statisticians, and frequent attempts have been made to calculate "real" relative purchasing power of currencies. Kravis *et al* 1/ have made the general observation that "the real per capita GDP of low-income countries relative to high-income countries is greater than is indicated by comparisons based on exchange rate conversions of GDP to a common currency." They calculated that in 1970 the real relative purchasing power of the pound sterling against the German mark was about 18 per cent higher than the nominal

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1/ Kravis, I. B., Heston, A. W. and Summers, R. *"Real GDP per capita for more than one hundred countries"*. Economic Journal, Vol. 88 No. 350, pp. 215-242.

purchasing power as indicated by exchange rates. By 1974 this discrepancy had widened to almost 50 per cent (ratio, 1.49). Other estimates quoted by Schrader *(op. cit.)* put the discrepancy in 1976 at between 26 and 48 per cent, depending on whether a German or a British pattern of spending is used. However, for the purposes of this study monetary comparisons have been made on the basis of official exchange rates, in the absence of a generally accepted series of real purchasing power conversion rates of D Marks to pounds. The discrepancy must be kept in mind in all the following comparisons which are expressed in monetary terms.

Table 1 General economic comparisons : 1979

		Germany	*UK*
I.	Population *(millions)*	61.4	55.9
	Land surface *(mn. ha.)*	24.9	24.4
	of which arable land *(1978)*	7.5	6.9
	permanent pasture *(1978)*	5.2	11.4
	forest and woodland *(1978)*	7.2	2.1
	Density of population *(persons/km^2)*	247	229
	Active civilian population *(millions)*	25.9	26.0
	Unemployed *(%)*	3.4	5.3
	Gross domestic product *(000 mn. ECU)*	554.1	286.9
	GDP per active civilian *(ECU)*	21394	11035
	Percentage growth in volume of GDP, *1971-79*	25	17
	Gross fixed capital formation *(000 mn. ECU, 1978)*	108.2	44.0
	Consumption of primary energy *mn. tons oil equivalent)*	282	218
	Hourly earnings in industry (males, DM.)	13.25	8.21 (@ 3.88 DM = £1)

Table 1 (contd.) General economic comparisons : 1979

(continued)

Rate of exchange *(DM/£)*		Rate of inflation *(consumer price index)*		
			Germany	*UK*
1970	8.78	*1970*	100	100
1975	5.45	*1975*	135	184
1976	4.53	*1976*	140	215
1977	4.05	*1977*	146	248
1978	3.85	*1978*	150	269
1979	3.88	*1979*	156	305
1980	4.22	*1980*	165	360
March 1981	4.70	*Feb. 1981*	171	382

Relative importance of agriculture in the economy

Measured by its share in the national gross domestic product, agriculture, forestry and fishing is now of about the same importance in Germany and the United Kingdom. This is in contrast to the situation thirty years ago, when the relative proportions were 11 per cent in Germany and 5 per cent in UK *(Table 1A)*. In recent decades agricultural production has expanded in both countries but in Germany the economy as a whole has expanded much more rapidly than in UK *(Table 1B)* so that agriculture's share has fallen more perceptibly in Germany, from 5 per cent. in the mid-sixties to 3 per cent. in 1977, while in the same period agriculture's share in the UK has fallen only from 3.2 to 2.8 per cent. Thus the two countries appear to have been converging towards a common figure of about 2.8 per cent.

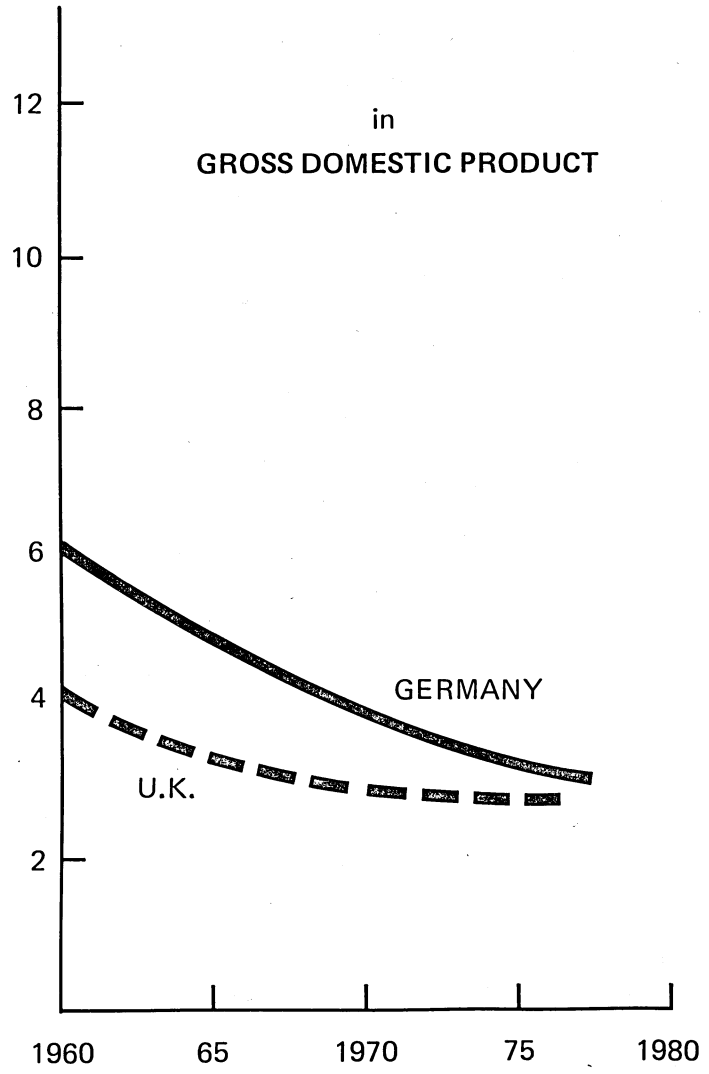
Table 1A Agriculture, forestry and fishing as per cent. of GDP at factor cost

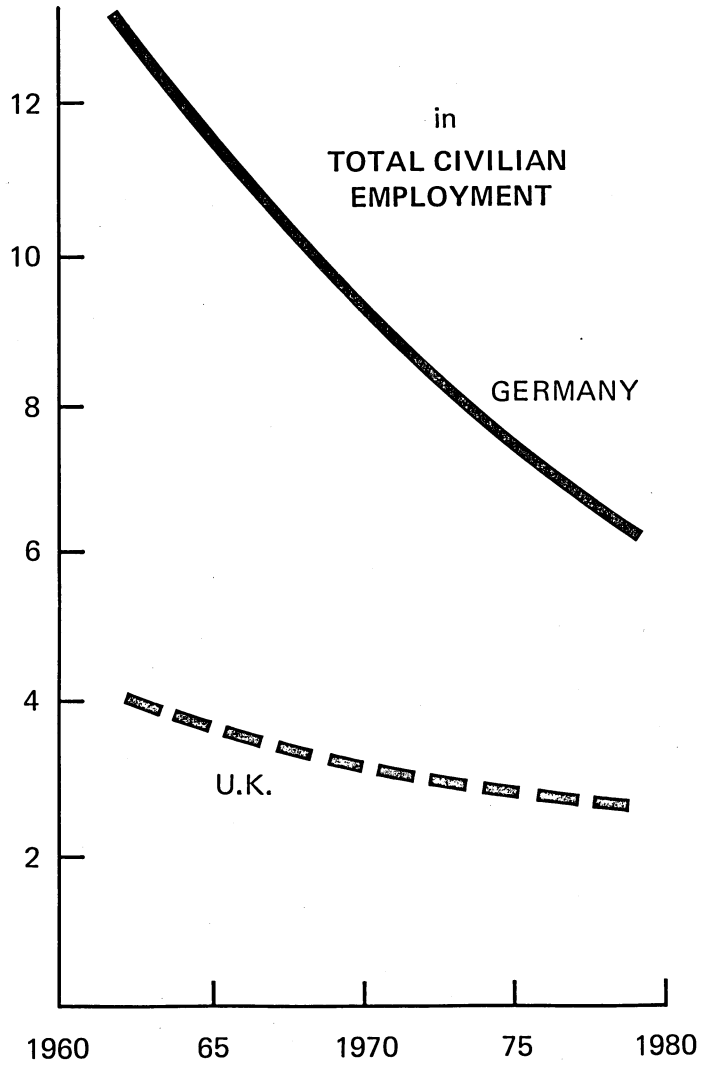
	Germany	*U.K.*
1950-51	10.6	5.1
1965	5.0	3.2
1970	3.8	2.9
1975	3.2	2.7
1977	3.0	2.8

Table 1B

Annual growth rate in GDP, 1968-78	3.5	2.2

Figure 1 Percentage share of agriculture, forestry & fisheries





Share of agriculture in total employed population

Statistics on employment in agriculture are notoriously difficult to interpret, but the general indications are that in Germany the proportion of the total civilian employed population which is engaged in agriculture, forestry and fisheries is considerably higher than in the U.K.

Table 2 Percentage share of agriculture, forestry and fisheries in total civilian employed population

	Germany	*U.K.*
1962	12.6	4.0
1965	11.1	3.4
1968	9.9	3.5
1972	7.7	3.0
1973	7.5	2.9
1974	7.3	2.8
1975	7.3	2.7
1976	7.1	2.7
1977	6.8	2.7
1978	6.5	2.7
1979	6.2	2.6

Sources: OECD: Agricultural Statistics 1965-68

OECD (1965) Agriculture and Economic Growth

European Commission: Annual Reports on The Agricultural Situation in the Community

Eurostat: Basic Statistics of the Community (1980)

Labour productivity: first impressions

When these figures are compared with those of agriculture's share in gross domestic product *(Figure 1)*, it would seem that labour productivity in German agriculture is relatively low. For instance, in 1977 6.8 per cent of the employed population contributed only 3.0 per cent of GDP, while in the U.K. the corresponding figures were 2.7 per cent contributing 2.8 per cent. These figures in themselves give no indication of the relative productivity of labour in German and British agriculture respectively, but they do suggest that by this criterion agriculture is a backward sector within the context of the German economy. Indeed, the impression is given that there is a large reserve of under-employed labour in the agricultural sector,

and this aspect is examined more closely in later sections of this report. In the U.K., on the other hand, there seems to be little difference in average labour productivity between the agricultural sector and the rest of the economy. Here again, however, the figures call for closer scrutiny.

Size of the agricultural labour force

Turning from agriculture's proportionate share in total employment to the absolute numbers working in agriculture, the first impression given by the national employment statistics is that there are about 2½ persons working in German agriculture for every 1 person working in British agriculture. (1979: Germany, 1544 000 persons, U.K., 632 000 persons. Ratio: $2.44/_1$. *Source:* Eurostat, Basic Statistics of the Community, 1980, Table 8). It is uncertain, however, to what extent people who work only part of their time in agriculture (for example, farmers' wives or other family members) are included in these figures. There are good reasons to suppose that many such people are excluded. When the Community's Farm Structures Survey was carried out in 1975 it recorded 2215 000 persons in Germany and 757 000 persons in UK (ratio, $2.93/_1$) who "had carried out agricultural work for the holding during the 12 months up to the survey day", including persons of retiring age who continued to work. For that same year the general manpower statistics indicate only 1823 000 in Germany and 668 000 in UK (ratio, $2.73/_1$) and these include workers in forestry and fisheries, whereas the Structures Survey was concerned only with agriculture.

It is evident that there are large numbers of farm family workers engaging in agricultural activities who fall outside the scope of the annual national employment statistics. This is confirmed by the following comparison *(see overleaf)*.

Table 3 Size of the agricultural labour force

	Germany 1975	*UK 1975*
Non-salaried workers in agriculture, forestry and fisheries *(Employment statistics)*	1579 000	266 000
Family workers on agricultural holdings *(Farm Structures Survey)*	2125 000	524 000
Difference	546 000	258 000
Salaried workers in agriculture, forestry and fisheries *(Employment statistics)*	243 000	401 000
Regular non-family workers on agricultural holdings *(Farm Structures Survey)*	90 000	233 000

The fact that the Farm Structures Survey figures relate specifically to agriculture, with the exclusion of forestry and fisheries, and that within agriculture they are more comprehensive in their coverage than the other source mentioned, might lead to the conclusion that they will suffice for the purposes of the international comparison now being undertaken. However, there remain two difficulties. First, the Structures Surveys have been intermittent, not annual, and therefore provide no regular annual series from which trends can be accurately perceived. Secondly, the figures given above take no account of the total annual duration of the work done by the persons recorded by the Structures Survey as working on agricultural holdings. Ideally we need a series of annual statistics for each country, with each series being adjusted to allow for the duration factor. In practice we have to be satisfied with duration-adjusted figures for 1975 only (the year of the first Structures Survey in which both countries took part) and unadjusted, or only partially adjusted, series of annual statistics.

The indications given above that in 1975 employment in German agriculture may have been nearly three times as great as in British agriculture must certainly be discounted when adjustment is made for the duration of work by individuals. In the course of the Structures

Survey, enquiries were made about the proportion of annual time which was worked on the agricultural holding, and in the published tables persons were grouped according to whether this proportion was less than 25 per cent, 25 to 50 per cent, 50 and less than 100 per cent or 100 per cent. The results were as follows:

Table 4 Persons working in agriculture by proportion of annual time worked. 1975
thousands.

Time worked	Holders		Other family workers		All persons 1/		Ratio
	Germany	*UK*	*Germany*	*UK*	*Germany*	*UK*	*Germany/UK*
< 25%	162	18	315	76	482	107	4.50
25 < 50%	238	8	471	47	716	71	10.08
50 < 100%	92	52	246	47	369	132	2.80
100%	412	188	189	88	648	447	1.45
Total	904	266	1221	258	2215	757	2.93

1/ Including non-family workers.

Source: European Commission: Structures Survey 1975

It will be seen that large numbers of persons working in German agriculture - both holders and other family workers - were devoting less than 50 per cent of their time to that work, whereas in the U.K. those numbers were relatively small. 69 per cent of the persons recorded on British farms were engaged in agriculture for 100 per cent of their working time, compared with only 29 per cent of those on German farms.

A further step in the 1975 Structures Survey analysis was to calculate for each holding the total number of Annual Labour Units (ALU), one such unit being equal to the work of one person for 2200 hours a year. Persons who worked in agriculture for less than that number of hours were converted to ALUs on the basis of the hours which they worked during the year. In this way the adjustment for duration, mentioned above, was made: the total size of the agricultural labour

force could be measured in reasonably comparable units instead of by a simple counting of heads.

Using this method, the number of persons recorded in Germany (2215 000, excluding non-regular non-family workers) was converted to 1234 000 ALUs, a reduction of 44 per cent. For the U.K., 757 000 persons were converted to 626 000 ALUs, a reduction of only 17 per cent. Again this reflects the fact that in Germany a far larger proportion were working part-time in the U.K.

On the basis of the ALU calculations the ratio of total agricultural force in Germany to U.K. was $1.97/_1$. This estimate - that the volume of farm employment in Germany in 1975 was twice that of U.K. - is one which should be kept in mind in much of the subsequent discussion of the relative situations of their two agricultures.

AGRICULTURAL LABOUR PRODUCTIVITY : A COMPARISON IN GROSS AND NET TERMS

In order to examine more closely the impression obtained from the previous section that Germany's agricultural labour force has been relatively high in comparison with its contribution to gross domestic product, and that Germany compares unfavourably with the U.K. in this respect, it is necessary to relate the agricultural labour statistics (converted to labour units) to estimates of agricultural production, and hence to derive production per labour unit in the two countries in common terms.

For this purpose, reference may be made to the figures of final agricultural production in European currency units at 1970 prices and exchange rates, as published by SOEC, and these figures can then be related to the corresponding labour force as in Table 5 *(overleaf)*.

Table 5 Gross agricultural labour productivity

	(1) Final agricultural production *(thousand million EUR at 1970 prices)*			*(2)* Agricultural labour units *(000)*			*(3)* Gross labour productivity *(000 EUR at 1970 prices)* (1) ÷ (2)		
	Germany	*UK*	*Ratio*	*Germany*	*UK*	*Ratio*	*Germany*	*UK*	*Ratio*
1963	8.6	4.7	1.8	2763	875	3.2	3.1	5.4	0.57
1970	9.8	5.4	1.8	1731	690	2.5	5.7	7.8	0.73
1971	10.1	5.5	1.8	1557	681	2.3	6.5	8.1	0.80
1972	10.0	5.6	1.8	1416	672	2.1	7.1	8.3	0.86
1973	10.6	5.6	1.9	1323	663	2.0	8.0	8.4	0.95
1974	10.5	5.5	1.9	1254	644	2.0	8.4	8.5	0.99
1975	10.4	5.3	2.0	1234	626	2.0	8.4	8.5	0.99
1976	10.4	5.1	2.0	1198	621	1.9	8.7	8.2	1.06
1977(p)	11.1	5.8	1.9	1162	616	1.9	9.6	9.4	1.02

Sources:
Eurostat, Economic Accounts 1978 and Yearbook of Agric. Statistics
European Commission, Projections for the Agricultural Sector (Information on agriculture No. 66)
Ministry of Agriculture, Fisheries & Food (U.K.) Agricultural Labour (annual report)
Behrens, R. and H. de Haen (unpublished paper, Institut für Agrarökonomie, Göttingen).

Notes:
In (1), U.K. figures for 1973 to 1977 have been adjusted from a basis of 1975 prices to 1970 prices, by using a volume index published in the Annual Abstract of Statistics.

In (2), figures have been interpolated between those given for Germany for certain years by Behrens and de Haen, using a table in Projections for the Agricultural Sector for reference. The U.K. series is a combination of the European Commission's Structures Survey figure for 1975 and the series of man-equivalents given in Agricultural Labour.

These figures of gross labour productivity indicate that although Germany was a considerable distance behind the U.K. at the beginning of the 1970s, this gap had been closed by about the middle of the decade and both countries are now continuing to achieve about the same gross output per person employed. Germany obtains twice as much output as the

U.K., with about twice as many labour units engaged in agriculture. Thus, if Germany could be said to have had an under-employed labour 'surplus' in the 1960s and earlier, this seems to have been dispersed. The decline in the German agriculture labour force from 1731 000 units in 1970 to 1162 000 units in 1977 - a reduction of 33 per cent in seven years - is particularly impressive, and may well be the most important single factor affecting any Anglo-German agricultural comparison in this period.

Gross labour productivity is only a partial, not a comprehensive, measure of efficiency in resource use, as it is confined to one major resource. A somewhat more refined approach is to calculate net labour productivity by deducting from final production the value of goods and services purchased for current production purposes, together with an allowance for depreciation of machinery and buildings - in other words, to estimate "net value added" per labour unit in agriculture. Behrens and de Haen made such calculations which, after adjusting the U.K. labour figures to those given in Table 5, give the following results.

Table 6 Net labour productivity :
000 EUR per labour unit (at 1970 prices).

	Germany	*U.K.*	*Ratio*
1963	1.6	1.9	0.84
1970	2.4	2.9	0.83
1976	3.6	3.7	0.97

It appears that in 1963 and 1970 the net basis showed Germany to be lagging behind U.K. to a lesser degree than on the gross basis. In those years the U.K. was a relatively heavy user of purchased resources, especially feedingstuffs, but to-day the two countries are much more like one another in that respect.

AGRICULTURAL PRODUCTION IN TERMS OF GRAIN-EQUIVALENTS

One source of data on the relative total size of German and British agricultural production became available from Eurostat towards the end of 1980, in the publication Overall accounts on the Community supply situation based on grain-equivalents (Agricultural Statistical Studies No. 22). In this publication Dr. G. Thiede describes a method of aggregating individual agricultural products by using standard grain-equivalent conversion factors. These are based on net energy values, expressed in starch units. For livestock products the conversion factors are derived from the estimated grain-equivalent of the feed input per unit of weight. For example, 1 kg. of pork is expressed as 4.8 kg. of grain-equivalent, butter as 15.5 kg., liquid milk as 0.8 kg., etc. For those products for which grain-equivalents based on net energy value would appear to be inappropriate (such as wine and fruit), the conversion factors are stated to be "derived from yields and land-labour inputs".

At the same time, quantities of imported feed are also converted to grain-equivalents, to facilitate comparison of the relative importance of these imports in the various countries.

It will be evident that this basis for aggregation is an alternative weighting system to that of weighting by price which is used in national accounts aggregates. To the extent that inter-product price relationships do not correspond to grain-equivalent relationships, the two systems must be expected to give divergent results. Their relative merits cannot be examined here, but it seems that those who have made use of the grain-equivalents method have some reservations about it. The preface to the publication quotes a previous study which remarked rather cryptically that the grain-equivalent measure of aggregate quantity should not be used for the calculation of an index of agricultural production. In that case one wonders what it does indicate. The results of the grain-equivalent calculations for Germany and U.K. are as follows:

Table 7 Final agricultural production
(mn. tonnes GE)

	Germany	*U.K.*	*Ratio*
1972/73	58.3	38.0	1.54
1973/74	61.4	39.2	1.57
1974/75	62.1	40.0	1.55
1975/76	62.2	39.1	1.59
1976/77	61.6	38.9	1.58
1977/78	66.8	42.5	1.57

Notes: "Final" production excludes production used within the agricultural sector of the country in question.

The aggregates are based on those products for which Eurostat compiles "supply balance sheets". Some 7 per cent of the Community's final production is not covered by these products, which include flowers, ornamental plants and other non-food commodities. The relative importance of this omission in Germany and U.K. is not indicated.

The average ratio for the six years 1972/73 - 1977/78 was 1.57. There was no discernible trend in this ratio, and surprisingly little year-to-year variation. In both countries, aggregate production is shown to have been appreciably greater in 1977/78 than in 1972/73 - by 14.6 per cent.

Looking at final crop production and final animal production separately, as the two components of final agricultural production shown above, the following ratios can be derived.

Table 8 Production Ratio, Germany/UK

	Final crop production	*Final animal production*
1972/73	1.50	1.54
1973/74	1.71	1.53
1974/75	1.65	1.53
1975/76	1.73	1.56
1976/77	1.67	1.57
1977/78	1.45	1.60

The figures for final crop production are much more variable from year to year than those for final animal production. The six-year average ratios were 1.62 and 1.56 respectively, so there was evidently little difference in Germany's lead over the U.K. in these two sub-sectors of agriculture.

Another set of estimates in the same publication relates to total food consumption in each member-country of the Community. Again the measurement is in terms of grain-equivalents. The figures are as follows.

Table 9 Total food consumption (mn. tonnes GE)

	Germany	*U.K.*	*Ratio*
1972/73	67.3	57.7	1.17
1973/74	68.2	59.6	1.15
1974/75	67.7	59.7	1.13
1975/76	68.3	57.6	1.19
1976/77	68.5	57.9	1.18
1977/78	70.8	58.2	1.22

The average ratio for the six years 1972/73 - 1977/78 was 1.17.

Thus it would appear that although German agriculture produced some 57 per cent more (final production) than U.K., Germany consumed only 17 per cent more food than U.K. - a strong indication of Germany's greater degree of self-sufficiency in food supplies during this period. However, this makes no allowance for their respective dependence on imported feed to sustain agricultural production. This point will be taken up later.

If we calculate final agricultural production as a percentage of total food consumption, the following results are obtained.

Table 10 Final agricultural production as per cent of total human consumption of food

	Germany	*U.K.*
1972/73	86.7	65.8
1973/74	90.0	65.9
1974/75	91.6	67.0
1975/76	91.1	67.9
1976/77	90.0	67.3
1977/78	94.3	72.3

Both countries evidently increased their degree of self-sufficiency in total food supplies during this period. The difference of 21 - 25 percentage points in favour of Germany is maintained throughout the six years.

It should be noted that a small part of final agricultural production (4 or 5 per cent in the Community as a whole) is used for non-food industrial purposes. To that extent the above figures somewhat overstate the food self-sufficiency of the two countries. Correction for this would reduce the figures by about 4 percentage points in each country.

Livestock producers in both Germany and the U.K. rely heavily on imported feedingstuffs. For instance, in 1977/78 it is estimated that in Germany "final animal production" represented some 53.3 million tonnes of grain-equivalent, of which 12.1 million tonnes (23 per cent) was imported. For the U.K. the corresponding figure was 17 per cent.

The estimates of aggregate utilisation of imported feedingstuffs are as follows.

Table 11 Imported feedingstuffs (mn. tonnes GE)

	Germany	*U.K.*	*Ratio*
1972/73	9.1	6.9	1.31
1973/74	9.3	5.8	1.61
1974/75	9.2	5.2	1.76
1975/76	10.4	6.3	1.66
1976/77	12.3	7.3	1.68
1977/78	12.1	5.6	2.16

The most notable feature of this table is that it indicates a sharp rise in Germany's imports with no corresponding rise in the U.K. This means that any comparison between the two countries in terms of agricultural production which did not take account of imported feedingstuffs would tend to overstate the strength of Germany's development compared with the U.K. We may therefore move on to a comparison of net self-sufficiency, insofar as this can be measured by the grain-equivalents method.

The procedure is to deduct imported feedingstuffs and relate the result to domestic consumption for food and industry. The outcome of these calculations is as follows.

Table 12 Production, consumption and self-sufficiency

	Final agric. production less imported feedingstuffs (mn. tonnes GE)		Domestic consumption for food and industry (mn. tonnes GE)		Net self-sufficiency %	
	Germany	*U.K.*	*Germany*	*U.K.*	*Germany*	*U.K.*
1972/73	49.2	31.1	71.0	62.3	69.4	49.9
1973/74	52.2	33.5	71.8	63.8	72.6	52.5
1974/75	52.8	34.7	71.4	63.5	74.0	54.7
1975/76	51.8	32.8	71.9	61.3	72.1	53.4
1976/77	49.4	31.6	72.1	61.1	68.4	51.8
1977/78	54.7	36.9	74.1	61.6	73.8	59.9

These figures suggest that in five successive years (1973/74 to 1977/78) the gap between Germany and the U.K. in terms of net self-sufficiency was progressively closed, from about 20 percentage points to about 14 percentage points. This situation appears to have developed because the U.K.'s domestic consumption remained virtually constant while agricultural production increased without any corresponding increase in imported feedingstuffs.

The Eurostat publication further suggests that the quantity of feedingstuffs produced within each country can be estimated by deducting imported feedingstuffs (in grain-equivalent) from final animal production (also in grain-equivalent). The results are as follows.

Table 13 Estimated domestic production of feedingstuffs (by residual method)

(mn. tonnes GE)

	Germany	*U.K.*	*Ratio*
1972/73	38.1	23.7	1.61
1973/74	39.6	26.2	1.51
1974/75	40.0	26.9	1.49
1975/76	39.9	25.9	1.54
1976/77	38.4	25.1	1.53
1977/78	41.2	27.6	1.49

The average ratio for the six-year period was 1.53. No regular trends are discernible in either country, but the ratio was noticeably less favourable to Germany in the latest year than in the earliest year of the series.

PRICES RECEIVED AND PAID BY FARMERS

In both countries there was a decline in the real prices of goods bought and sold by farmers between 1973 and 1979. The "cost-price squeeze", i.e. the ratio between product prices and input prices within the respective countries, moved adversely to farmers in 1973 and 1974, recovered in 1975 and 1976, but thereafter has been of increasing severity to a similar extent in both countries. (1980 figures, when available, will no doubt show a further deterioration).

Table 14 Real prices of agricultural products and inputs

	(1) Real prices of agricultural products		*(2)* Real prices of inputs *("intermediate consumption")*		*(3)* 'Terms of trade' of agriculture *(1) ÷ (2)*	
	Index 1973 = 100					
	Germany	*U.K.*	*Germany*	*U.K.*	*Germany*	*U.K.*
1970	..	..	..	..	104.6	103.1
1971	..	..	..	..	105.4	104.4
1972	..	..	..	..	110.5	111.6
1973	100	100	100	100	100	100
1974	91.8	100.1	99.2	110.2	92.6	90.9
1975	94.9	96.0	96.1	97.5	98.8	98.7
1976	100.6	107.2	100.8	103.0	99.7	104.5
1977	95.0	98.4	99.1	104.7	96.0	94.1
1978	88.8	91.7	92.1	97.4	96.4	94.2
1979	86.4	88.4	92.1	95.6	93.8	92.4
1963-73 average	..	..	..	..	105.3	105.9
1973-79 average	..	..	..	..	96.8	96.4
Difference, %	..	..	..	..	- 8.1	- 9.0

Source: *The Agricultural Situation in the Community: 1980 Report*

Note: the 'real' price indices were calculated using the implicit price index of GDP of each country as deflator. The 'terms of trade' were calculated from nominal, not real, indices.

THE NATURE AND CONSEQUENCES OF SIZE-STRUCTURE DISADVANTAGE

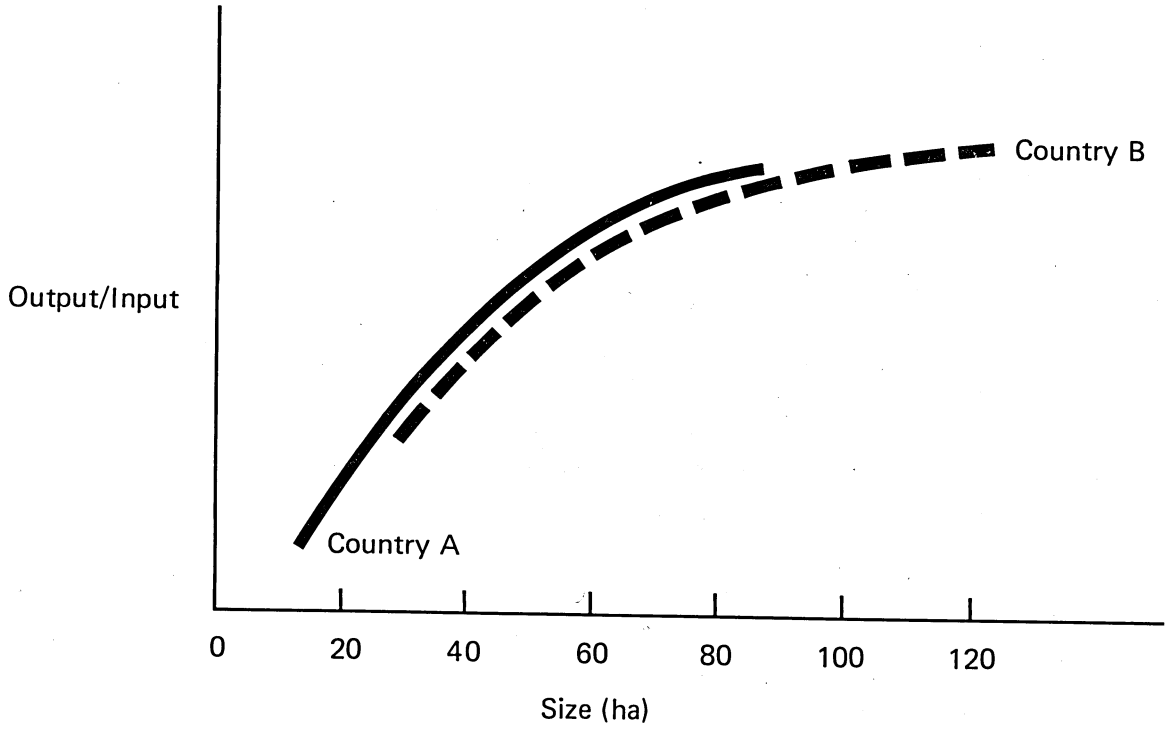
The purpose of this section is to examine the evidence for Germany and the U.K., in order to consider the extent to which their very different farm-size structure may constitute an important element in any comparison of their relative economy in the use of agricultural resources.

It has often been observed that in agriculture, as in many other sectors of the economy, costs of production per unit of output tend to fall as the size of the productive unit (in this case the farm) increases, up to a certain point, after which costs level off or even increase. This relationship is sometimes described as approximating to an L-shaped curve, where cost per unit is the vertical scale and size of farm the horizontal. It is especially evident in agriculture if family labour is included in costs at its supposed "economic value". When making comparisons between the agricultural sectors of two or more countries it is therefore important to try to disentangle the effects of (i) the efficiency of resource use in the respective countries at a particular size of productive operation; and (ii) the relative numbers of farms of different sizes.

/1. If

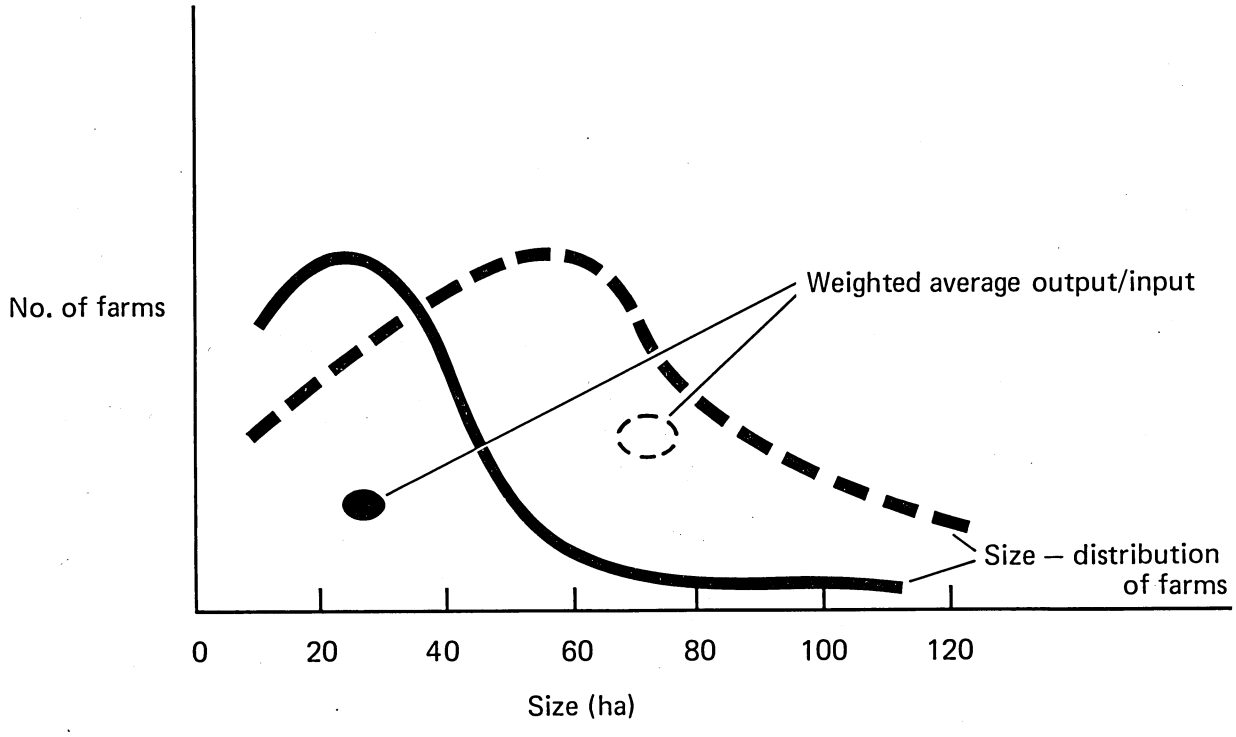
1. If agricultural conditions in a country are such that over a given range of farm sizes, the value of output per unit of total inputs increases consistently as size increases, we may say that 'economies of size' exist over that range.

Fig. 2.1 **Existence of similar economies of size**



2. If in any two countries A and B there is evidence that similar economies of size prevail, i.e. that in both countries the change in the output/input ratio over a given size-range is similar in direction and in degree, the two countries may nevertheless have very different aggregate output/input ratios over that range, if the size-distribution of farms is different.

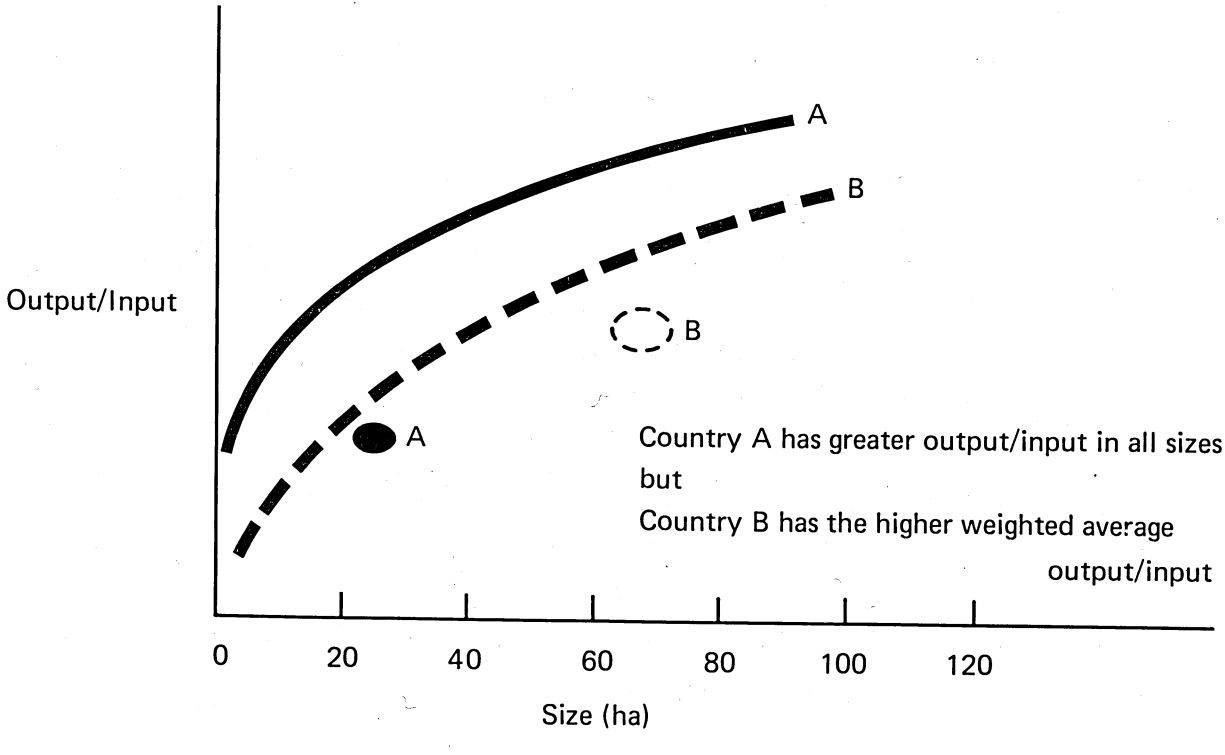
Fig. 2.2 Effect of difference in size-structure



Specifically, if country A has a size-structure which is heavily skewed towards small farms while country B's structure is less skewed in that direction, not skewed at all or even skewed towards large farms, then country A will have a lower weighted-average output/input ratio than country B, even if the economies of size as between different points on the size-scale are the same in both countries.

3. If country A has a more favourable output/input ratio than country B at all corresponding points on the size-scale, but both countries are subject to similar economies of size, then it is possible that if the size-structure in country B is less skewed towards small farms than in country A; country B may have a higher weighted-average output/input ratio.

Fig. 2.3 **Better size-structure outweighs lower performance**



A method of calculating output/input value ratios for individual farms has been described in Britton and Hill, Size and Efficiency in Farming (1975). By grouping farms according to size and calculating the average output/input value ratio in each size-group it can be shown that there is a positive correlation between size (in hectares) and the value ratio. For farms in England and Wales in the six years 1968-73 inclusive the following average results were obtained. (Further details of the calculations are given in Appendix 15).

Table 15 Output/input ratio by size of farm, England and Wales, 1968-73

Size of farm (ha.)	Output/input ratio as percent of average for all sizes of farm (England and Wales)
< 20	87.2
20 - 40	94.9
40 - 61	98.5
61 - 121	101.9
121 - 162	103.8
162 - 202	103.0
202 - 243	104.8
all farms	100

It is evident that (i) output per unit of combined inputs is lowest on the smallest farms; (ii) this value ratio rises steadily up to a farm size of about 150 - 160 ha; and (iii) beyond that size there is no consistent pattern of relationship.

For the purpose of the present study the same method of analysis was applied to farm accounting data from the Federal Republic of Germany provided by the German Ministry of Agriculture. Details are given in Appendix 15. The average results for the three years 1974/75 to 1976/77 may be summarised as follows *(see overleaf)*.

Table 16 Output/input ratio by size of farm, Germany, 1974/75 - 1976/77

Size of farm (ha.)	Output/input ratio as percent of average for all sizes of farm (Germany)
5 - 10	73.7
10 - 15	89.7
15 - 20	96.9
20 - 30	102.3
30 - 40	106.2
40 - 50	108.9
50 - 100	114.7
100+	117.0
All farms (exceeding 5 ha.)	100

Because of difficulties in harmonising the definitions and measurements in the two countries, it would be inappropriate to use this approach to try to make absolute comparisons of the value ratios prevailing in each. However, certain points of interest emerge from the figures given above, bearing in mind that in each case the average value ratio for each farm size-group has been expressed in relation to the national average.

First, for Germany as for UK, output per unit of combined inputs is lowest on the smaller farms. (For farms of less than 20 ha., more detailed information is given for Germany than for U.K.). Secondly, in Germany the value ratios rise steadily with size throughout the range of size for which data is available, but more steeply than in U.K. Thirdly, it is not possible, owing to lack of data, to say whether this increase ceases at about 150 - 160 ha. as in the case of U.K. Fourthly, in Germany the national average value ratio corresponds to the ratio attained at a size of about 20 ha., whereas in U.K. (England and Wales) it corresponds to a size of about 65 ha.

This last point directly reflects the difference between the two countries in farm size-structure, and the effects of this merit closer analysis. The figure of 100 given above for "all farms" in Germany is a weighted average obtained by weighting the size-group ratios by the estimated amounts of national farm output occurring in the respective size-groups. (See Appendix 16). The relatively heavy concentration of German output in farms of 10 - 30 ha. (over 60 per cent) means that the much higher value ratios found on farms of over 50 ha. have little effect on the national average level of efficiency in resource use. In England and Wales, on the other hand, only about 14 per cent of output is estimated to occur on farms of 10 - 30 ha., and the lower value ratios found on these farms are greatly outweighed by the higher performance on farms of over 50 ha.

It is interesting to consider what might be the effect on the efficiency of resource use in Germany if that country had the same size-distribution of farm land as prevails in England and Wales. This effect can be estimated by re-calculating the German national average (shown above as 100), using the England and Wales weights instead of the German weights, as shown below.

Table 17 Effect of applying British farm-size weights to German data

Size of farm (ha.)	Relative output/input ratios	Weights (percentage distribution of output)	
	Germany	*Germany*	*England and Wales*
5 - 10	73.7	10.2	3.5
10 - 15	89.7	14.4	3.2
15 - 20	96.9	14.4	3.5
20 - 30	102.3	23.1	7.2
30 - 40	106.2	12.7	7.1
40 - 50	108.9	9.1	6.9
50 - 100	114.7	11.7	22.9
100+	117.0	4.4	45.6
Weighted average	-	100	110.9

On this basis, if Germany had the same farm-size distribution as England and Wales, and the existing output/input ratios at each point in the size-scale continued to apply, then

the average level of efficiency in total resource use in Germany might be expected to be increased by about 11 per cent above the present level. In other words, the size-structure in England and Wales could be said to represent an "advantage" to British agriculture of about 11 per cent in terms of the better use of resources which it facilitates.

Appendix 1

Comparison of Agricultural Sector Accounts at current prices and current rates of exchange, Germany and UK, 1967-79

	Final production of agriculture		Ratio	Intermediate consumption		Ratio
	Germany	*UK*	*(Germany/UK)*	*Germany*	*UK*	*(Germany/UK)*
	million EUA			*million EUA*		
1967	7813	4954	1.58	3716	2798	1.33
68	8379	4674	1.79	3615	2651	1.36
69	9081	5024	1.81	4097	2826	1.45
70	9825	5481	1.79	4691	3189	1.47
71	10622	5860	1.81	4972	3281	1.52
72	11771	6777	1.74	5301	3531	1.50
73	14269	7128	2.00	6763	3833	1.76
74	14695	7948	1.85	7370	4666	1.58
75	16400	8251	1.99	7846	4741	1.65
76	19640	9410	2.09	9822	5285	1.86
77	21537	10274	2.10	11063	5874	1.88
78	20919	10753	1.95	10460	5972	1.75
79	21506	12302	1.75	11766	6735	1.75
	Average, 1967-79:		1.87			1.60

	Gross value added at market prices		Ratio	Net value added at factor cost		Ratio
	Germany	*UK*	*(Germany/UK)*	*Germany*	*UK*	*(Germany/UK)*
	million EUA			*million EUA*		
1967	4097	2156	1.90	3380	2408	1.40
68	4765	2024	2.35	4148	2102	1.97
69	4984	2198	2.27	4045	2264	1.79
70	5134	2291	2.24	4274	2321	1.84
71	5651	2578	2.19	4729	2625	1.80
72	6471	3246	1.99	5310	2882	1.84
73	7506	3295	2.28	6109	3036	2.01
74	7324	3282	2.23	5564	3031	1.84
75	8554	3510	2.44	6533	3230	2.02
76	9818	4124	2.38	7482	3556	2.10
77	10474	4400	2.38	7730	3678	2.10
78	10459	4781	2.19	8015	3699	2.17
79	9740	5567	1.75	7011	4200	1.67
	Average, 1967-79:		2.20			1.89

Source: *Eurostat: Economic Accounts (Agriculture)*

Appendix 2

Comparison of rates of inflation of prices, Germany and UK, 1973-79

	Average annual percentage increase in prices	
	Germany	*UK*
General consumer prices	4.6	15.6
Consumer prices of foodstuffs and beverages	3.6	16.0
Agricultural producer prices		
- crop products	4.8	13.5
- livestock products	1.9	12.9
- total	2.5	13.0
Feedingstuffs	0.4	12.8
Fertilisers and soil improvements	5.6	16.5
Energy and lubricants	9.9	22.0
General 'intermediate consumption'	4.2	15.0
Farm wages (hired labour)	8.7	17.5
Investments in farm machinery	5.5	20.0

Source: *The Agricultural Situation in the Community: 1980 Report*

Appendix 3

Trends in volume of agricultural production, intermediate consumption and gross value added (at market prices), Germany and UK, 1973 = 100

	Agric. production		Intermediate consumption		Gross value added (at market prices)	
	Germany	*UK*	*Germany*	*UK*	*Germany*	*UK*
1967	88.9	88.8	93.0	93.8	85.6	83.0
1968	90.2	88.6	87.2	95.8	92.5	80.5
1969	90.1	91.3	96.1	98.1	85.2	83.6
1970	92.7	94.2	98.9	100.0	87.7	87.6
1971	95.7	96.5	100.0	99.7	92.2	92.9
1972	94.5	97.8	99.7	100.4	90.4	94.8
1973	100	100	100	100	100	100
1974	98.6	97.7	97.7	95.8	99.5	99.9
1975	97.8	91.5	99.4	95.7	96.4	87.0
1976	99.0	90.9	106.6	97.7	92.4	83.3
1977	104.3	98.7	111.2	99.1	98.2	98.4
1978	109.2	..	114.9	..	104.1	..
1979	109.1	..	121.0	..	98.5	..

Source: *The Agricultural Situation in the Community: 1980 Report*

Appendix 4

Indices of real per capita gross and net value added of agriculture at factor cost, Germany and UK, 1969-1980
(1967-69 average = 100)

	Real gross value added per person employed		Real net value added per person employed	
	Germany	*UK*	*Germany*	*UK*
1969	105.2	102.3	105.2	101.4
1970	106.1	103.5	103.6	101.2
1971	113.7	109.5	111.0	107.0
1972	123.5	112.8	121.4	108.9
1973	129.4	138.5	126.7	136.2
1974	113.0	128.8	104.1	119.7
1975	124.1	127.1	116.3	117.0
1976	129.1	137.1	121.1	127.3
1977	125.4	129.8	114.2	117.0
1978	127.2	127.4	114.5	112.6
1979	117.8	123.0	100.5	106.9

Source: *SOEC, Sectoral Income Index 1980 (Feb. 1981)*

Note: Data in 'real' terms were obtained by deflating the corresponding nominal figures by the implicit price index of gross domestic product at market prices, in the respective countries.

Appendix 5

Indices of 'input' of agricultural labour, Germany and UK, 1969-1980.
(1967-69 average = 100)

	Germany	*UK*
1969	94.3	96.5
1970	88.4	92.2
1971	83.4	89.9
1972	79.7	87.7
1973	76.5	85.9
1974	73.7	84.1
1975	72.0	82.9
1976	70.5	81.9
1977	68.6	81.3
1978	66.3	81.0
1979	64.6	80.0
1980 (forecast)	63.6	78.8

Source: *SOEC, Sectoral Income Index 1980 (Feb. 1981)*

Appendix 6

Some agricultural comparisons, 1979

	Germany	*UK*	*Ratio*
		(000 ha.)	
Utilised agric. area	12314	18775	0.66
Arable	7284	6824	1.07
Perm. meadow and pasture	4797	11863	0.40
Woods and forests	7318	2080	3.52
Cereals	5233	3873	1.35
Potatoes	276	203	1.36
Sugar beet	393	214	1.84
Green fodder	970	1967	0.49
	(000 head)		
Dairy cows	5442	3342	1.63
Total cattle	15049	13318	1.13
Pigs	22374	7815	2.86
Sheep	1145	21658	0.05
Market value of agric. land (ECU/ha)		*(England)*	
1978	10248	4025	2.55
1979	12137	4791	2.53
Land in different farm sizes			
(ha.)		*(000 ha.)*	
1 - < 5	666	110	6.05
5 - < 10	1114	238	4.68
10 - < 20	2708	589	4.60
20 - < 50	5339	2246	2.38
>50	2364	13948	0.17
Total *(in holdings of at least 1 ha.)*	12190	17130	0.71

Source: *The Agricultural Situation in the Community: 1980 Report*

Appendix 7

Some agricultural comparisons, 1975

	Germany	*UK*	*Ratio*
Number of farms (000)	907.9	280.6	3.24
Averages per farm			
Utilised agric. area (ha.)	13.7	58.7	0.23
Value of final prodn. (EUA)	17 100	30 900	0.55
Gross value added (EUA)	8 700	14 100	0.62
European size units 1/	8.2	15.3	0.54
Averages per ha.			
Value of final prodn. (EUA)	1248	526	2.37
European size units 1/	0.60	0.26	2.31

Source: *The Agricultural Situation in the Community: 1980 Report*

1/ One European size unit (ESU) represents 1000 ECU of standard gross margin at 1972-74 prices. Standard gross margins, defined as the difference between value of output and certain variable costs, were estimated for each kind of crop and animal in each region and applied to each farm in the Farm Structures Survey, 1975.

Appendix 8 Distribution of farms, land and labour by economic size of farm (ESU)

1975

Farms

ESU	*Germany*	*UK*	*Ratio*
		(000)	
< 2	246	67	3.67
2 - < 4	156	39	4.00
4 - < 8	184	48	3.83
8 - <16	197	52	3.79
16 - <40	111	52	2.22
>40	14	23	0.61
Total	908	281	3.24

Land

ESU	*Germany*	*UK*	*Ratio*
		(000 ha.)	
< 2	735	739	0.99
2 - < 4	934	788	1.19
4 - < 8	2030	1740	1.17
8 - <16	3947	2873	1.37
16 - <40	3872	4975	0.78
>40	934	5303	0.18
Total	12451	16418	0.76

Labour

ESU	*Germany*	*UK*	*Ratio*
		(000 Annual Work Units)	
< 2	379	68	5.57
2 - <4	137	39	3.51
4 - <8	260	96	2.71
8 - <16	238	105	2.27
16 - <40	148	151	0.98
>40	93	161	0.58
Total	1255	620	2.02

Source: *The Agricultural Situation in the Community: 1980 Report*

Appendix 9

Age-composition of persons employed in agriculture, forestry and fisheries

1979

Age	*Germany* %	*UK* %
14 - 24	10.1	16.3
25 - 34	13.0	19.2
35 - 44	23.6	19.4
45 - 54	28.2	22.8
55 - 64	16.1	17.8
65+	9.2	4.7
Total	100	100

Source: *Eurostat - sample survey on labour force, 1979.*

Sex-composition of persons engaged principally in agriculture

1979? 1/

	Germany	*UK*	*Ratio*
	(000)		
Male	709	581	1.22
Female	682	124	5.50
Total	1390	705	1.97

Source: *The Agricultural Situation in the Community: 1980 Report.*

1/ The year is not indicated in the publication.

Appendix 10

Full-time and part-time farms: their number, land, labour, livestock and tractors

1975

	Germany	*UK*	*Ratio*
Farms *(000)*			
Full-time	497.1	239.8	2.07
Part-time	380.5	20.8	18.29
Total	877.6	260.6	3.37
Land *(000 ha.)*			
Full-time	9691	12779	0.76
Part-time	2138	1080	1.98
Total	11829	13859	0.85
Labour *(000 annual work units)*			
Full-time	904	517	1.75
Part-time	276	14	19.71
Total	1180	531	2.22
Livestock *(000 units)*			
Full-time	12740	13740	0.93
Part-time	2447	548	4.47
Total	15187	14288	1.06
Tractors *(000)*			
Full-time	838	463	1.81
Part-time	374	17	22.00
Total	1212	480	2.52

Source: *The Agricultural Situation in the Community: 1980 Report.*

Notes: "Full-time" farms are those where the farmer devotes at least 50 per cent of his working time to the farm.

The labour figures do not relate to full-time and part-time workers but to work done on full-time and part-time farms as defined above.

Appendix 11

Data compiled by

R. BEHRENS and H. de HAEN. Göttingen, Institut für Agrarökonomie, May 1980

(Note: the figures are generally derived from published statistics, but some were estimated by the authors. The Germany/UK ratios have been added for the purpose of the present publication).

I. Inputs

		Germany	*UK*	*Ratio*
Labour force *(000 man-units)*	*1963*	2763	1025	2.70
	1970	1731	726	2.38
	1975	1234	633	1.95
	1977	1162	616	1.89
Stock of machinery at 1970 prices and exchange rates *(mn. EUR)*	*1963*	7700	2929	2.63
	1970	9998	3321	3.01
	1977	10590	3789	2.79
Stock of buildings at 1970 prices and exchange rates *(mn. EUR)*	*1963*	8092	3606	2.24
	1970	10535	4686	2.25
	1977	11624	6363	1.83
Livestock *(000 units)*	*1963*	6786	6773	1.00
	1970	6813	7076	0.95
	1977	6907	7414	0.93
Agric. area *(000 ha.)*	*1963*	14121	19709	0.72
	1970	13578	18835	0.72
	1977	13218	18390	0.72
Fertilisers and land improvements at 1970 prices and exchange rates *(mn. EUR)*	*1963*	528	321	1.64
	1970	677	418	1.62
	1977	772	486	1.59
Feedingstuffs *(do.)*	*1963*	1080	1276	0.85
	1970	1840	1436	1.28
	1977	2216	1426	1.55
Other costs (payments) *(do.)*	*1963*	1873	1138	1.65
	1970	2278	1258	1.81
	1977	2383	1260	1.89
Tractors per 100 ha.	*1960*	6.0	2.3	2.6
	1970	10.0	2.4	4.2
	1975	10.8	2.6	4.2

/Combines

Appendix 11 (contd.)

I. Inputs *(contd.)*

Combines per 100 ha. cereals	*1960*	1.1	1.8	0.6
	1970	3.2	1.8	1.8
	1975	3.4	1.7	2.0
Milking machines per 100 dairy cows	*1960*	5.3	..	..
	1970	8.9	3.2	2.8
	1975	8.6	3.5	2.5
Stock of machinery per ha. ag. area EUR/ha. *(1970 prices)*	*1960*	443	141	3.14
	1970	736	176	4.18
	1975	779	196	3.97
	1977	801	204	3.93
Stock of buildings per livestock unit EUR/LSU *(1970 prices)*	*1960*	1069	525	2.04
	1970	1546	662	2.34
	1975	1674	790	2.12
Total stock of capital per holding (EUR/holding over 1 ha.)	*1960*	9731	13784	0.71
	1970	18957	25705	0.74
	1975	23936	35433	0.68

II. Annual percentage rates of change

1963-76

	Germany	*UK*
Labour	-6.8	-3.8
Machinery	1.9	1.7
Buildings	2.5	4.2
Livestock	-0.2	0.9
Area	-0.5	-0.5
Fertilisers	2.3	2.9
Feed	3.9	0.4
Other costs	1.4	0.7

Appendix 11 (contd.)

III. Average percentage shares in total value of factor input

	1963-69		1970-76	
	Germany	*UK*	*Germany*	*UK*
Labour	34.7	22.5	29.9	21.9
Machinery	7.3	5.3	9.8	5.5
Buildings	0.9	1.0	1.1	1.0
Livestock	5.5	6.9	4.9	7.4
Land	7.8	9.7	6.9	8.9
Fertiliser	6.6	7.0	6.9	7.0
Feed	16.9	25.7	17.3	26.0
Other	20.3	22.1	23.1	22.2

IV. Rates of growth 1/

		Germany	*UK*
Production	*1963-70*	1.4	1.4
	1970-76	1.5	1.1
	1963-76	1.4	1.3
Factor input	*1963-70*	-0.1	0.0
	1970-76	-1.4	-0.5
	1963-76	-1.0	-0.2
Global gross productivity	*1963-70*	-1.5	1.5
	1970-76	2.8	1.4
	1963-76	2.1	1.5

1/ *Average annual percentage rates of change based on trends of the respective index numbers.*

Appendix 11 (contd.)

V. Productivity and Factor Ratios

		Germany	*UK*	*Ratio*
Partial gross labour productivity	*1963*	3.1	4.6	0.67
	1970	5.8	7.6	0.76
000 EUR/labour unit 1970	*1976*	8.9	9.3	0.96
Partial net labour productivity*	*1963*	1.6	1.6	1.00
	1970	2.4	2.8	0.86
	1976	3.6	3.7	0.97
Capital per labour unit	*1963*	5.7	6.3	.90
	1970	11.9	11.0	1.08
000 EUR/labour unit 1970	*1976*	18.2	15.5	1.17
Ag. area per labour unit	*1963*	5.1	19.2	0.27
	1970	7.8	25.6	0.30
	1976	11.1	29.4	0.38
Share of final production in EUR-9 total	*1963*	22.5	12.4	1.81
	1970	22.0	12.0	1.83
	1976	21.5	11.8	1.82

* *Final output minus inputs and depreciation of machinery and buildings.*

Appendix 12

Distribution of farms and labour by labour-size of farm

1975

Farms *(000)*

Size of farm in Annual Work Units	*Germany*	*UK*	*Ratio*
>0 - <.5	128	14	9.4
.5 - < 1	180	30	6.0
1 - < 2	397	118	3.4
2 - < 5	197	101	2.0
> 5	5	18	0.3
Total	908	281	3.2

Annual Work Units *(000)*

Size of farm in Annual Work Units	*Germany*	*UK*	*Ratio*
>0 - <.5	31	3	10.0
.5 - < 1	122	21	5.8
1 - < 2	550	153	3.6
2 - < 5	486	281	1.7
> 5	45	168	0.3
	1234	626	1.97

Source: *The Agricultural Situation in the Community: 1980 Report.*

Appendix 13

Farming in the 'less-favoured areas' (as defined by Directive 75/268/EEC) as percentage of farming in all areas

1975

	Germany %	*UK* %
Farms	33.0	21.0
Annual Labour Units	30.4	14.9
Utilised agric. area	28.7	36.0
Arable land	23.4	10.1
Meadows and permanent pastures	37.1	55.6
Cereals	22.9	4.4
Potatoes	36.6	3.0
Livestock Units	26.7	25.1
Dairy cows	32.4	11.5
Pigs	19.7	4.2
Sheep	25.4	58.2
Average size of farm *(ha.)*		
less-favoured areas	11.9	100.4
other areas	14.5	47.5
Total	13.7	58.6

Source: *The Agricultural Situation in the Community: 1989 Report.*

Appendix 14

Some economic characteristics in certain types of farming

1975

Type of farming	Land-man ratio *(ha. per labour unit)*			Livestock density *(Units per 100 ha.) ag.* land			Standard gross margin per labour unit *(in ESU)*		
	Germany	*UK*	*ratio*	*Germany*	*UK*	*ratio*	*Germany*	*UK*	*ratio*
Cereals	16.8	36.2	.46	19.4	31.3	.62	5.4	9.6	.56
Other field crops	14.2	26.9	.53	42.6	41.0	1.04	7.7	10.2	.75
Horticulture	0.6	3.2	.19	18.2	21.7	.84	9.0	6.2	1.45
Fruit	3.1	5.0	.62	32.8	32.2	1.02	9.7	7.8	1.24
Dairying	9.6	19.5	.49	149.0	167.5	.89	5.2	6.7	.78
Cattle rearing/fattening	11.5	26.0	.44	152.7	116.6	1.31	4.2	3.4	1.24
Pigs	7.3	3.9	1.87	630.1	1441.0	.44	9.7	6.0	1.62
Total	10.0	26.3	.38	128.4	100.2	1.28	6.0	6.9	.87

Source: *The Agricultural Situation in the Community : 1980 Report*

Note: 'Standard gross margin per labour unit' does not measure real labour productivity because it is based on normal or 'expected' outputs and costs per unit of crops and livestock, not on actual outputs and costs.

Appendix 15

Output/input value ratios in German and British agriculture

The German data relate to those farms which are described as *"Testbetriebe des Agrarberichts"*.

The output/input value ratio, which has been calculated for each area-size-group within each of the four type-groups, is defined as follows:

A. *Betriebsertrag* (farm output) divided by

B. the sum of the following items of input and multiplied by 100:

1. *Betriebsaufwand* (farm expenses)

2. *Vergleichslohn FAMAK* (family labour valued at the "comparable wage")

3. *Pachtaufwand* (rent expenditure)

   minus *v. Verpächter getragen* (expenses met by the landowner)

4. *Fremdkapitalzinsen* (interest on borrowed capital)

5. *Eigenkapitalverzinsung* (interest on own capital at 3.5%)

The results are summarised in Table 1.

Table 1. Output/input ratios : Federal Republic of Germany

Type of farming		*size-group (ha.)*							
		5 -	10 -	15 -	20 -	30 -	40 -	50 -	100 +
Marktfruchtbau (Cash cropping)	*1974/75*	65.5	77.4	87.1	91.5	95.0	96.4	103.8	107.8
	1975/76	70.9	89.3	95.0	95.3	98.8	99.1	105.0	106.4
	1976/77	72.8	75.3	88.1	90.0	95.1	96.8	102.2	106.0
	3-year average	69.7	80.7	90.1	92.3	96.3	97.4	103.7	106.7
Futterbau (Ruminant livestock)	*1974/75*	59.1	74.3	81.5	86.8	90.5	93.8	96.8	97.4
	1975/76	63.3	80.3	86.6	92.1	95.3	98.2	100.1	98.9
	1976/77	62.6	76.0	81.2	85.5	88.0	90.8	93.0	95.6
	3-year average	61.3	76.9	83.1	88.1	91.3	94.3	96.6	97.3
Veredlungs-betriebe (Non-ruminant livestock)	*1974/75*	88.9	97.3	97.4	99.9	102.0	102.7	106.4	-
	1975/76	97.2	103.7	105.2	109.0	109.2	111.7	111.4	-
	1976/77	87.6	92.0	95.7	95.7	96.7	98.1	98.0	-
	3-year average	91.2	97.7	99.4	101.5	102.6	104.2	105.3	-
Gemischt (Mixed)	*1974/75*	66.9	77.2	81.8	87.8	92.4	94.5	98.9	-
	1975/76	67.7	85.7	92.0	96.2	100.8	100.6	102.2	(98.5)
	1976/77	68.7	80.8	83.8	88.1	90.5	94.4	97.7	(104.4)
	3-year average	67.8	81.2	85.9	90.7	94.6	96.5	99.6	(101.4)
All above-mentioned types (weighted)	3-year average	64.7	78.8	85.1	89.8	93.2	95.6	100.7	102.7

The following was the weighting scheme used for calculating the "all-types" average in Table 1.

ha.	*Marktfrucht - bau*	*Futter - bau*	*Veredlungs - betriebe*	*Gemischt*	Total
5 - 10	17.6	62.6	2.8	17.0	100
10 - 15	14.8	62.3	2.2	20.7	100
15 - 20					
20 - 30	19.6	57.3	2.2	20.9	100
30 - 40					
40 - 50					
50 - 100	49.1	34.1	1.8	15.0	100
100+					

These weights were based on 1974 figures given in Table 11 of *Agrarbericht 1978*.

Table 2. Output/input ratios : England and Wales

Six-year averages (1968-73) with mean of each year transformed to 100

Type of farming	*size-group (ha.)* Under 20	20-40	40-61	61-121	121-162	162-202	202-243
Specialist Dairy	89.9	96.6	103.3	103.7	103.0	-	-
Mainly Dairy	86.9	97.5	99.3	102.4	101.4	99.4	101.7
Livestock	81.3	85.9	94.3	101.5	105.8	106.6	107.7
Cropping, cereals	-	82.1	92.6	99.1	103.9	103.4	105.4
Cropping, general	86.7	93.8	99.9	101.4	102.5	104.2	104.8
Mixed	-	94.1	96.6	102.0	104.4	98.8	102.1
All above-mentioned types (weighted)	87.2	94.9	98.5	101.9	103.8	103.0	104.8

For method of calculation, see Britton, D. K. and Hill, Berkeley (1975)
Size and Efficiency in Farming

The following weighting scheme has been used for calculating an "all-type" average for England and Wales:

ha.	*Specialist Dairy*	*Mainly Dairy*	*Livestock*	*Cropping, Cereals*	*Cropping, General*	*Mixed*
Under 20.2	39	30	3	-	17	11
20.2 - 40.4	34	30	11	1	11	13
40.4 - 60.7	21	27	20	4	11	17
60.7 - 121.5	12	22	25	7	15	19
121.5 - 161.9	4	16	27	13	22	18
161.9 - 202.4						
202.4 - 242.9	2	11	28	15	25	19
242.9 - 283.4						
283.4 - 404.9						
405 and over	1	6	42	13	23	15

Appendix 16

Derivation of size-group weights for national farm output

England and Wales

The areas of agricultural land in each size-group were obtained from the 1977 Agricultural census. The average amount of output per ha. in each size-group was estimated by reference to an analysis of census data showing standard man-days per hectare in the respective size-groups. These standard man-days provide a unit by which the various crops and livestock on a farm may be added together in terms of their estimated labour requirements under average conditions. These labour requirements were then used as a proxy for output data, which are not available for individual farms in the census. The resulting weights are therefore only approximate.

Germany

The areas of agricultural land in each size-group were obtained from the 1977 Agricultural Census. The average amount of output per ha. in each size-group was estimated by reference to data given in *Agrarbericht 1978*.