

THE NATURE AND CAUSES OF THE FARM INCOME PROBLEM

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1. INTRODUCTION - THE INCOME SITUATION

In the current debate on national economic issues, the very grave situation that exists in the agricultural sector has tended to be regarded as of concern only to the farming community. While the impact of the current agricultural difficulties obviously impinges most directly on farmers, it, nevertheless, has most serious consequences for the growth of the economy as a whole, for the level of our balance of payments deficit and for the exchequer position.

The decline in agricultural output in recent years is one of the causes of the current low growth performance of the economy. The stagnation, and for some products the decline, in farm output has led to a fall in employment in the agricultural processing industries and in industries supplying farm inputs. It has also led to a stagnation in the level of farm exports which, in the face of rising imports, have contributed substantially to the balance of payments deficit in 1981. At the same time, there has been a considerable rise in the level of State expenditure in relation to agriculture. Even with this additional State expenditure, farmers' net incomes in recent years have fallen significantly below those in non-agricultural occupations.

Many farmers in Ireland are now experiencing very serious financial difficulties. These have arisen from the sharp decline in farm incomes since 1978, both in nominal and, even more so, in real terms. In nominal terms, incomes in agriculture from self-employment and other trading income have fallen from £835m in 1978 to £673m in 1980, with an improvement to £770m estimated for 1981 (see Table 1). In real terms (as measured by comparison with changes in the CPI)* this represents a fall of 34 per cent between 1978 and 1980, with no improvement in 1981. When allowance is made for the growth in interest payments, the fall in incomes is still greater - of the order of 50 per cent. Even with the decline in the agricultural labour force, this fall in real incomes per head must be regarded as of crisis proportions to the agricultural sector.

Dramatic income declines of this nature must inevitably generate a consideration of their causes and of what should be done to remedy the problem. It is now conventional wisdom to ascribe the cause of the decline in real farm incomes to inflation, i.e., to the increases in farm input prices and in the cost of living that has occurred since 1978 at a time when the changes in the level of prices for farm products have been very small. If the situation over the past decade is analysed in detail, this is only a partial explanation.

Farm incomes are a consequence, not only of the relationships between the prices of farm products, farm inputs and consumer expenditures, but also of production efficiency, i.e., the volume of inputs and output. In addition, some income changes can be accounted for by changes in taxes and subsidies. Price and volumes are, of course, not entirely independent factors; the volume of inputs and output can be expected to respond to changes in their prices. Nevertheless, each of these - the price and volume of inputs and the price and volume of output - will be considered separately in this paper. The interaction

*It has become conventional in Ireland to deflate incomes by the Consumer Price Index, while the SOEC, Luxembourg, has consistently deflated by the GDP deflator (see Annex 1).

between them will then be considered subsequently.

While the maintenance of any given relationship between prices of farm inputs and output could, *ceteris paribus*, maintain farm incomes in nominal terms, the real value of these incomes depends upon movements in the CPI. For example, compared with the situation in 1975 (when the CSO began a new series of price indices of farm inputs and products), the CPI, by February 1982, had increased by 149.5 per cent, with prices of farm products increasing by 137.7 per cent, and prices of farm inputs increasing by 130.2 per cent. The drop in real farm incomes can, therefore, be explained in part by the effect of more rapid increases in the CPI than in the prices of farm outputs or inputs; there still remains, however, a substantial element of the problem not explained in this way.

These factors need to be considered over a number of years but this is, of course, dependent on the data that is available. It is proposed to focus on the period 1970-81, but with special emphasis on the more recent years, i.e., from the mid-seventies onwards. After the 50 per cent increase in real incomes between 1970 and 1973, the reversal, due to the cattle crisis, was even more serious than the income declines in 1979 or 1980. In terms of the farm income developments in the seventies, 1975 was a reasonable year. It was a year which saw a recovery from the short-lived decline of 1974, and preceded the rapid income growth which reached its peak in 1978. As this paper is concerned particularly with the last seven years or so, its primary purpose is to explain why the difference between price and income changes has occurred since then and to discuss the consequences of these changes.

2. TRENDS IN PRICES OF INPUTS AND OUTPUT

The changes in prices over the years from 1970 to 1981 are set out in Table 2. The index of input prices covers goods and services purchased by farmers for use in current consumption, e.g., seeds, feed, fertilisers, energy, veterinary services, etc. In the periods 1970-73, 1975-78 and again in 1981, the prices paid for farm products rose more rapidly than input prices; over the other years since 1970, prices for inputs went up somewhat faster than those for output. The most striking feature of the second half of the seventies is that, by 1981, the relationship between input and output prices is virtually the same as that in 1975, the difference in the two indices being just over 3 per cent by January 1982 with the prices paid to farmers having increased slightly more rapidly. In other words, for the period 1975 to 1981 taken as a whole, there has been virtually no cost/price squeeze in agriculture.

This period since 1975 splits into three distinct parts; 1975-78, 1979-1980, and 1981. In the first three years there was a sharp divergence in prices, with output prices increasing much more rapidly than input prices; by 1978 the increase in output prices was 74 per cent while the input price rise was much lower at 46.6 per cent. Since 1978 the reverse has been largely true. In 1979 and 1980 output prices rose very little (they actually fell in 1979). Input prices, however, continued to rise relentlessly. It is for these years that the price squeeze on farmers has been evident, with its consequential effects on incomes. For the most recent year, 1981, prices of output have risen much faster than those of inputs, i.e., 18.9 per cent as opposed to 14.8 per cent.

In effect, therefore, prices in the years of adversity (1979 and 1980), have just negated the benefits that arose in the period 1975-78. Had the adverse trends continued into 1981, then the current parity with the 1975 ratio of input to output would no longer hold and the future problem of the agricultural sector would have been seriously exacerbated. At this stage, it is not possible to project, with any degree of confidence, what the trends in prices will be over the next few years: there is little ground for expecting that

the very beneficial situation in the years from 1975 to 1978 will be readily repeated. The objective of bringing inflation down to European levels within the next two years is widely acknowledged; as there is some reason to anticipate that farm price increases at EEC level may be set at around current EEC inflation rates, then agricultural growth and prosperity will depend on the level of improvement in efficiency which is realised. This is the issue which is the focus of the latter part of this paper.

3. CHANGES IN THE VOLUME OF OUTPUT AND INPUTS

As price relativities of farm inputs and products today are the same as in the mid-seventies, why is there a farm income problem? Why are incomes in real terms more than 30 per cent below their 1975 level (and 40 per cent after allowance for estimated interest charges)? If price trends do not explain the cause of the decline in income, what then is the explanation? Is it to be found in the changes of volume of output and input? This section of the paper considers this question.

The trend in Gross Agricultural Output since 1970 has been one of increase, rising to a peak in 1978 but showing a small decline since then (see Table 3). For the 3 years 1978-80, inclusive, gross output has been around 10 per cent higher than the previous peak of 1975, but some fall occurred in 1981. In face of the financial problems of farmers over the past three years, their level of gross output has been remarkably steady.

Over the years since 1970, growth in the output of livestock and livestock products has been more rapid than in crops (although since 1973-75 crop output has increased more than livestock output). This growth in crop output is due almost entirely to the expansion in output of feeding barley, which increased by more than 100 per cent. The contribution of crops as a whole to total output is, however, relatively small so that changes in total farm output largely reflect trends in the output of livestock and livestock products.

The trend in livestock and crops can be seen from the changes in breeding herds of cattle, sheep and pigs and the acreage of the main crops (see Table 4). The total number of cows and the total cattle herd in 1981, while still substantially above the 1970 level, was 8 per cent below the 1974 peak, though the decline since 1974 has not been a uniform one. In the case of sheep, while there has been a small increase shown in the 1981 Enumeration, the drop since 1973 has been over 18 per cent. Only pig numbers have regained their numbers of the early seventies, with the breeding herd now slightly above that in 1973. Within the livestock sector there has been a sharp difference between the increase in the output of livestock products (mainly milk) which was 29 per cent higher in 1981 than in 1975, and in livestock, which declined by 4 per cent over these years.

Although weather obviously plays a part in determining both the level of output and the use of inputs, the deterioration in the weather over recent years, while of significance, does not seem to have been such as to explain the very substantial changes in the input-output ratio that have taken place in Irish agriculture. The trends in crop output, for example, would seem to indicate that the relatively slow growth in gross agricultural output in relation to the large increase in inputs is unlikely to have been due purely to weather factors. It is difficult to derive a satisfactory explanatory variable to measure the effects of weather and this is one of the issues on which further research work would be extremely useful. If there were good reasons to suggest that the weather was of itself the major factor in the changes in input-output relationships in recent years, then the current measures to stimulate agricultural growth would not appear to have been necessary; we could have waited for the weather conditions to revert to normal and, if this had been the major cause of the current problem of production efficiency, farm output would then

expand again while inputs would decline sharply. Clearly, such an approach is not a realistic solution to our current farm problems. There seems to be broad agreement that 'normal' weather would result in a considerable increase in farm output, perhaps of the order of 3 to 5 per cent for any given level of inputs or indeed for some decline in the use of inputs, but changes of this magnitude would not restore previous input-output levels nor resolve the income problem.

On the input side, the CSO volume index covers only the non-factor inputs (i.e., does not include labour, land or the longer-term capital items). The effect of changes in the volume of the factor inputs is considered later in this paper. The increase in inputs since the early seventies has been just over 50 per cent: growth in the first half of the decade was relatively slow but in the second half, it has been very rapid indeed (see Table 3). It is this very sharp increase in inputs, compared to the increase in output since the mid-seventies which is a major element of the current farm income problem. Compared with the mid-seventies, farmers are now using nearly 45 per cent more inputs to produce some 10 per cent more output. While the effects of diminishing returns would indicate an explanation as to why output could not reasonably be expected to rise in parallel with increased inputs, this does not give a satisfactory explanation of the trend in the input-output ratio in recent years, particularly when regard is taken of the vast potential for higher farm output which is widely recognised as a feature of Irish agriculture.

It would appear that this problem of the high use of inputs is now being recognised by the farmers themselves. A report in the Irish farming press on the Munster Farm Income Crisis Group¹ contains proposals to reduce input levels over a very wide range; the Chairman of this Group was quoted as saying that such an approach "was simply good business management practice" and "what it did mean was that the return on every input level of production was critically examined". This appears to indicate that a critical examination had not been made in the past but that a policy along these lines is urgently needed. It is clearly of the utmost importance that farmers ensure that their expenditure on inputs generate a worthwhile return. Such an approach would reverse the serious problems in production efficiency that have occurred since the mid-seventies. The data at aggregate level, however, conceals a very substantial variation in efficiency levels between farms. The achievements of the more efficient farmers are a testimony, both to the potential that is there and the ability of some of our farmers to realise that potential.

A recent edition of "Farm and Food Research" highlighted the very substantial incomes which can be achieved on farms of 50-60 acres, in dairying, sheep, tillage, etc., given efficient management and high levels of production². The question as to why these levels of income or incomes approaching such levels are not far more common on Irish farms is of major importance and requires a far more complete answer than has been given so far.

4. CHANGES IN THE GROSS AGRICULTURAL PRODUCT

The contribution of agriculture to the economy is best measured by the level of gross agricultural product (i.e., its contribution to the gross national product). This is the difference between the volume of gross output and the volume of non-factor inputs. In the early years of the seventies, gross agricultural product in Ireland was increasing broadly in line with the increase in agricultural output. Since the mid-seventies, however, it has declined in absolute terms; by 1980 it was 6 per cent lower, and for 1981 it is estimated to be over 13 per cent lower than its 1975 level (see Table 5). The absolute level of Gross Agricultural Product in volume terms in recent years has thus tended to fall, and by 1981 it was back to the level of 1973-74. This happened in spite of the increases in the level of gross output that had been achieved by 1978. In other words, there has, over the medium

term, been an overall decline in the volume of agricultural product - a decline that has occurred in spite of the years of good prices and incomes as well as in the years of bad prices and declining incomes. This decline in the Gross Agricultural Product clearly shows that the problem we must resolve is not simply that the rate of increase in output has not kept pace with the rate of increase in inputs but that the difference in absolute terms between the volume of output and the volume of inputs needed to generate that output has diminished, i.e., that the extra inputs have been considerably greater in absolute terms than the extra output.

The contribution of agriculture to GNP in current terms was sustained over the good years by the price effect, so that the underlying deterioration had been masked. However, in years of poor prices, this medium or longer term decline has been evident and the overall trend now stands out more clearly.

5. CHANGES IN THE VOLUME OF FACTOR INPUTS

The foregoing analysis has considered changes in the level of output and non-factor inputs. Could the serious picture that has emerged have been explained by the effects of the changes in the level of factor inputs, land capital and labour? In so far as land is concerned, the change in the area devoted to agriculture in Ireland has been small in relation to the total area involved. When account is taken of the amount of land improvement that has been undertaken during the past decade, the changes in the area of land in agricultural production are not of any real significance.

The changes on the investment side have been substantial. The amount of annual capital investment at current prices rose from £50m in 1970 to £342m in 1979, with some fall to £268m in 1980. Over the period 1970-80, the total amounted to £1750m, with depreciation accounting for just over £900m (see Table 6). At constant (1980) prices, this represents an increase in capital investment from £166m in 1970 to £268m in 1980, and a total of over £2,700m over these years, or £1300m after allowing for depreciation. Using an average interest rate of, say, 10 per cent for the period as a whole, the total investment since 1975 would incur an annual interest charge of some £270m in 1981 (not allowing for investment in 1981 itself) and of £130m a year after allowing for depreciation.

Not all of this investment involved the farmer in outlay from his own resources. Part of the total was provided by Exchequer grants. There was also a very substantial increase in the level of borrowing from the lending institutions (see Table 7). Total loans outstanding from the main lending institutions rose from £77m in 1970 to £214m in 1975 and to £1,059m in 1981. While this cannot be compared directly with the level of farm investment over these years, it gives a clear indication that a considerable proportion of farm investment was undertaken with loan capital. The consequential problem of debt service has now become a major issue in farm development.³

So far as the agricultural labour force is concerned, these years have seen a fall in the total numbers engaged in agriculture, from 262,000 in 1970 to 231,000 in 1975 and to 214,000 in 1980 (see Table 6)*. The average decline of 4,000 a year has itself been falling, in spite of the income problems in agriculture. The fall in the numbers working on farms is primarily of a longer term demographic character rather than immediately responsive to external push or pull factors.

In aggregate efficiency terms, the issue is whether the increase in capital investment has been fully worthwhile, given the changes in the ratio of output to non-factor inputs

*Due to a discontinuity in the Labour Force data in 1975, the data at the beginning and end of the decade are not strictly comparable.

and the fall in the labour force. As we have already seen, the ratio of output to non-factor inputs has itself declined over recent years, so that the level of capital investment has not been justified in terms of the replacement of non-factor inputs by capital. So far as the decline in the farm labour force is concerned, the fall of 48,000 since 1970 would, at current agricultural wage levels, result in a notional saving of around £124m at 1980 prices. Re-calculating the interest charges on the total investments since 1970 at 1980 prices gives a figure of £400m, or £190m after allowing for depreciation, even with an interest charge of only 15 per cent (and currently the average interest charge on farm borrowings would be higher). Thus, capital investment on the grounds of the financial savings on labour costs - both direct wage costs and implicit family wage costs - has not yielded a realistic return. Certainly, new investment in buildings, yards, machinery, etc., has eased the burden of farm work - but this investment has been at a high cost in terms of its effects on farm incomes. These improvements have, however, been beneficial to the farmer and his family and have eased the burden of drudgery on many family farms.

6. EFFECTS OF TECHNOLOGY

In order to get a full picture of the changes in the efficiency of production at farm level, it is necessary to take account, not only of the changes in factor and non-factor inputs in relation to total output, but also the effects of long-term trends in the potential of Irish agriculture. This upward trend arises from the opportunities for improved resource combination due to structural changes, and the improved productivity of inputs arising from research and development work.

As has already been shown, total output changes over recent years have not been responsive either to the increased levels of non-factor inputs or to the very much greater level of capital investment than the release of labour would have justified. At the same time, agricultural policy in Ireland has been based on the view that a substantial investment by the State in research, education and advisory work is justified by the potential for improvement in efficiency in agriculture. This view has arisen mainly from the belief that efficiency in agricultural production in Ireland lags behind that in other Western countries and that there is a vast potential for improvement in the level of farm output per acre here which could be mobilised by additional advisory, research and educational work. The belief that this would lead to increased farm output and incomes and that it is, therefore, the key to the development of the agricultural sector in Ireland, has not been borne out by the experience of recent years.

It is not possible to determine in any absolute sense without substantial further analysis, the return which expenditure by the Exchequer in research, education and advisory work has generated. It is, of course, arguable that without it, the level of efficiency in Irish Agriculture would have been lower. However, we are currently spending on research, education and advisory work a sum equivalent to 5 per cent of the Gross Agricultural Product, and it is essential that we generate a worthwhile return on this investment in order to justify the considerable volume of Exchequer resources that are involved.

For the EEC as a whole, the EEC Commission, in their annual "objective method" exercise, have used an estimate of the growth of technical efficiency of some 1½ per cent per annum. This represents an estimate of long-term growth in the level of farm output per unit of input; there has been a detailed analysis of the trend in the European Community over more than a decade which would tend to substantiate the validity of this estimate. If this estimate of technological improvement were equally appropriate in Ireland, then, over the past ten years, efficiency should have grown by 16 per cent. Efficiency in Irish agriculture, particularly since the mid-seventies, has not realised any

increase, and the gap which must be made up is not just the negative trend which has occurred, but this negative trend plus improvements in efficiency (i.e., output per unit of total inputs) which should have been realised from our very large expenditures on research, education and advisory work.

7. CHANGES IN EFFICIENCY IN THE DIFFERENT FARM ENTERPRISES

The changes in efficiency in the agricultural sector due to the rapid increase in inputs are not of a uniform nature but rather appear to be concentrated on particular inputs and particular products. So far as the inputs themselves are concerned, while the volume of all current inputs has increased since 1970 by 54 per cent, the increase of the farm materials' element (i.e., feed, fertilisers and seed) has been almost 58 per cent. Given that these farm materials account for some 65 per cent of total current inputs, it would appear that the increase in the volume of current inputs other than the farm material items has been of the order of 45 per cent. While this latter increase is still considerably larger than the increase in output, it is not, of itself, the major element in the total increase in the usage of inputs.

The important individual inputs which account for the major part of the problem are feedingstuffs and fertilisers. Fertilisers currently account for 21 per cent of total inputs, and feedingstuffs for about 41 per cent. The increase in fertiliser consumption since 1970 of almost 70 per cent has been very substantial indeed. Given that the increase in farm output has been limited, the claims that the level of fertiliser used per acre in Ireland is below the optimum level would seem to require further detailed consideration. The available evidence would suggest that even in the mid-seventies the level of fertiliser use on crops was close to the optimum and the generally accepted view has been that the major need was for additional fertiliser on grass. If most of the increased fertiliser usage (particularly since 1975) has, in fact, been on grassland, then the results in terms of extra livestock and livestock products has been disappointing (see Table 8(a)). The relationship is, however, further complicated by the problems of increased feed inputs, discussed below.

In the case of purchased feed, the average increase since 1970 of over one-third in the volume used varies widely as between the different livestock enterprises. Table 8(b) sets out a comparison of the increase in purchased feed used and the changes in output for the major enterprises. The most noticeable feature of this table is the extremely large increase in purchased feedingstuffs used for the production of cattle, milk and sheep, with little extra output. In the case of cattle and sheep, the 1981 output is virtually the same as the 1970-72 average, yet purchased feed has increased four-fold in the case of cattle and even more so in the case of sheep. In milk production, where purchased feed use has also gone up seven-fold, there has been an increase of around 46 per cent in output during the period 1971-81. Even allowing for the low level of feed usage in 1970-72, these ratios of extra feed to extra output are very serious. Farmers have substituted bought-in feed for home-produced feed on a substantial scale, to the detriment of the financial returns from their farm business. The reasons for this development are complex; weather factors have obviously been important but more analysis needs to be undertaken to assess the extent to which this factor has contributed to the changes that have taken place.

It is clear that a major problem in farm efficiency is that the increased level of grassland output, in terms of livestock, has been small while feed use, and to a lesser degree fertiliser use, for grazing enterprises has increased sharply. Farmers have responded to the pressures to use extra feed and fertiliser inputs for grassland livestock enterprises but need to ensure that the level of output from these enterprises keeps pace with the higher level of inputs.

These sharp disimprovements in the feed/output ratios for the grassland livestock enterprises are in sharp contrast to the position in relation to the farmyard enterprise. The 20 per cent fall in purchased feed used for pig production since the early seventies has been achieved without any decline in the level of output. In the case of poultry, the situation is even more satisfactory - the increase of 24 per cent in output since 1970 being achieved with an increase of only 3.6 per cent in purchased feed use. While detailed figures on feedstuffs compounded by pig and poultry producers themselves are not available, there is no evidence that developments of this nature are a major explanation of the improvements in the purchased feed/output ratio for these enterprises.

8. OTHER FACTORS IN THE DETERMINATION OF FARM INCOME

It has been shown that, while the decline in farm incomes over the past three years has been due primarily to the increase in input prices at a time when output prices have increased only very slightly, over the years since the mid-seventies prices of inputs and output have returned to their original relativities. The increase in the volume of inputs has, however, eroded the benefits to the farmer which the restoration of the price relativities in 1981 should have brought.

Prices themselves are not, of course, outside the scope of policy. As already pointed out, the State provides support intended to improve agricultural output and incomes. Since 1973, these measures have flowed, not only from the State itself, but have been very greatly supplemented by the European Community (which, in this context, can be regarded as an extension of the State). The measures include not just those involving direct expenditures from the Community Budget but also those which provide benefits from other aspects of the Common Agricultural Policy, in particular the higher prices for farm products sold inside the Community due to the policy of Community preference. In addition, other factors also affect farm incomes - in particular the level of local taxes, subsidies not related to sales, etc.

So far as the level of State and EEC aid is concerned, the total has increased from less than £100m in 1970 to £211m by 1975 and to £623m in 1981 (see Table 9). For the past two years, the support provided by the State and the EEC has been equivalent to over 80 per cent of farm incomes. Of course, not all these support expenditures directly enter into farm product prices or subsidies. Part of these expenditures are contributions to farm investment, or to off-farm investments such as arterial drainage. They also include administrative costs as well as research, education and advisory expenditures. While these clearly do not directly provide part of the farmer's annual income, the basic justification of these expenditures is in their contribution to these incomes over the longer term. If the items represented by these expenditures do not contribute to improving farm incomes, then they should be discontinued.

In addition to the direct State and FEOGA expenditures, there are substantial benefits from the policies of Community preference. The precise consequences are difficult to evaluate. It is not difficult to measure the benefits in terms of the outcome of the higher prices over those which prevail on the "world market" but the "world market" prices themselves are in many ways an inadequate basis for evaluating the benefits of the Community preference policies because of the absence of any truly competitive situation on international markets. Even so, given the very large proportion of farm incomes which are accounted for by the current level of FEOGA and Exchequer expenditure in relation to agriculture, even a small net benefit from the EEC system of Community preference would more than account for the remaining part of farm incomes. Given this situation, the question of a new approach to sustaining farm incomes is now of considerable concern.

9. CONCLUSION

The major conclusion of the above analysis is inescapable. The major problem of Irish Agriculture since the mid-seventies has been the decline in its competitiveness. Over the past three years, the cost/price squeeze has brought very serious consequences for agricultural incomes. The effects of this decline can be seen more graphically in the following illustration. Had the percentage increase in the volume of inputs since the mid-seventies generated a similar percentage increase in output, then farm incomes in 1981 would have been £1,330m, i.e., incomes would have been 70 per cent above the levels actually realised. While an assumption of a linear relationship between inputs and output takes no account of the effects of diminishing returns (or of any changes due to technical improvements arising from research, education, etc.), the size of the gap is such that it cannot be explained by any reasonable hypothesis about the rate of diminishing returns to additional factor use. Indeed, the pressure from many sources on farmers to increase their level of inputs, and the benefits that are portrayed, might suggest that the problem of sharply diminishing returns to additional inputs is still a long way distant. The argument about the large potential in Irish agriculture for expansion implies a relatively small diminishing returns effect at the present level of output. The benefits that such higher farm incomes would bring to the farming sector itself are obvious, but equally important are the benefits to the economy as a whole. The failure to realise these benefits is of major significance, given the present state of the national economy.

While the fact of the decline in agricultural competitiveness can be readily deduced from the available statistical data, the causes of this change are far less evident. The strong emphasis on the need to use additional inputs has not been matched by anything like sufficient emphasis on the vital need to achieve output increases commensurate with these additional inputs. It would appear to have been accepted far too readily that using more fertilisers, feed, sprays, etc., will automatically generate consequential higher output; this clearly has not been the case. In a recent paper on "Cost trends in agriculture", based on the Farm Management Survey of An Foras Taluntais, Mr J. Heavey argued that much of the increase in farm expenditure was income-led rather than income-generating.⁴ The author's view, based on his observations of trends over the years, was that "a sizeable proportion of expenditure, through lack of any adequate cost control measures on the majority of farms, followed quickly an increase in incomes", and that "if this were the case, production efficiency was not getting the attention it deserved". This is not to say that the levels of management on the more efficiently run farms are inadequate, but points to the very large variations in the levels of efficiency that still exist - and indeed would seem to be widening.

This problem of production efficiency has been considerably accentuated by the fact that the increase in the volume of inputs used in farm production has grown in spite of the rapid rise in the prices of inputs and the substantial cost/price squeeze in 1979 and 1980. Given the economic circumstances of Irish agriculture during the past few years, it would have been reasonable to expect the opposite, i.e., that there could have been a considerable reduction in the use of inputs. The fact that the volume of inputs has, in fact, increased, is a measure of the underlying problem in Irish agriculture today. This reinforces the conclusion quoted above. Production efficiency has not, and is not, getting the attention that it so desperately needs.

There is, *prima facie*, a need for a reassessment of the underlying approach to the development of agriculture in Ireland. The use of more inputs should not be the centre of attention in policy at the individual farm level. Instead, it should be accepted that while some increase in inputs is unavoidable, they should be confined to the minimum extent necessary to generate worthwhile additional output. This quite evidently has not been the

case during recent years. The future viability of Irish agriculture depends on reversing the disturbing trends in competitiveness of recent years. This is a major task and one in which the traditional ways of generating agricultural development may have to be reconsidered. It is the primary purpose of this paper to stimulate a detailed consideration of a new approach to the development of our agricultural sector.

There are two thoughts which should be recorded to complete this paper. Firstly, while it has, of necessity, been concerned with the agricultural sector, an analysis of the other major sectors of the economy could well show an equally serious problem. There is, no doubt, plenty of scope in the public sector and in the private non-agricultural sector for improvements in efficiency. This does not take from the need for those of us concerned with agriculture to appraise the opportunities in farming, but at the same time we should not allow the criticism that the efficiency problem is primarily an issue for the agricultural sector.

Secondly, although detailed statistical evidence of changes in efficiency in EEC agriculture for the period since 1968 shows an increase of around 1.5 per cent per annum, there is recent evidence in the EEC Commission study of "Differential Rates of Inflation and the CAP" of a decline in the most recent years (see Table 10)⁵. The problem is, clearly, not just an Irish one but one which affects some other EEC countries. A search for a solution to our own problem could usefully be extended to those other EEC states which have been experiencing similar difficulties in recent years.

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Table 1: Family Farm Income 1970-'81

Year	Family* Farm Income (£m)	Percentage Change			Family Farm Income per head (£)	Percentage Change		Average** Industrial Income (£)	Agricultural Income as % of Industrial Earnings %	Family *** Farm Workers (000's)
		In Current Terms 1970 = 100	Consumer Price Index 1970 = 100	In Real Terms 1970 = 100		In Current Terms 1970 = 100	In Real Terms 1970 = 100			
1970	182.3	100.0	100.0	100.0	810.2	100.0	100.0	923	87.8	225
1971	200.3	109.9	108.9	100.9	914.6	112.9	103.7	1,074	85.2	219
1972	283.9	155.7	118.4	131.5	1,320.5	163.0	137.7	1,235	106.9	215
1973	363.1	199.2	131.8	151.1	1,729.0	213.4	161.9	1,485	116.4	210
1974	330.4	181.2	154.2	117.5	1,603.9	198.0	128.4	1,774	90.4	206
1975	476.3	261.3	186.4	140.2	2,346.3	289.6	155.4	2,306	101.7	203
1976	534.9	293.4	219.9	133.4	2,701.5	333.4	151.6	2,758	97.9	198
1977	743.0	407.6	249.9	163.1	3,810.2	470.3	188.2	3,238	117.7	195
1978	835.1	458.1	269.0	170.3	4,326.9	534.1	198.6	3,710	116.6	193
1979	734.7	403.0	304.6	132.3	3,887.3	479.8	157.5	4,278	90.9	189
1980	673.0	369.2	360.1	102.5	3,598.9	444.2	123.4	5,055	71.2	187
1981	770.1	422.4	433.6	97.4	4,162.7	513.8	118.5	5,886	70.7	185

* Family farm income is equivalent to "income from self-employment and other trading income", as published by the Central Statistics Office. This represents the amount available to remunerate farmers and members of their families for their labour and management and to cover interest on capital.

** Earnings of all industrial workers (men, women, youths, and girls combined) in the transportable goods industries.

*** Estimated number of persons engaged in Agriculture minus the estimated number of employees engaged in agriculture. Compiled using data published in the Labour Force Surveys by the Central Statistics Office.

Table 2: Prices in Agriculture 1970-1981

Year	Prices Paid To Farmers	Prices Paid By Farmers	Consumer Price Index	
		All Inputs	Food	Total
1970	89.0	92.4	91.6	91.7
1971	95.2	100.3	98.4	99.8
1972	115.7	107.4	110.0	108.4
1973	151.1	131.9	128.2	120.8
1974	153.3	184.9	146.9	141.3
1975	196.4	217.4	178.5	170.8
1976	246.8	251.6	208.0	201.6
1977	302.2	305.9	242.0	229.1
1978	341.7	318.8	266.2	246.5
1979	361.7	358.8	305.2	279.2
1980	352.1	410.0	338.2	330.0
1981	418.3	470.7	388.9	397.5

Indices to the base "1971" = 100 (average 1970, 1971, 1972)

Source The data in this table were compiled from the Input Price Indices, Output Price Indices and Consumer Price Indices published in various issues of the Irish Statistical Bulletin by the Central Statistics Office, Dublin.

Table 3: Index Numbers of the Volume of Agricultural Output and Inputs 1970 - 1981 (Base Year 1971* = 100)

Year	Crops	Livestock and Livestock Products	Gross Output	Net Output	Farm Materials	All Current Farm Inputs
1970	96.9	93.7	94.2	94.2	94.5	94.7
1971	104.9	99.4	100.3	79.7	102.1	101.9
1972	98.0	107.1	105.5	106.0	103.4	103.5
1973	90.2	109.6	106.3	104.1	114.5	114.6
1974	89.8	111.9	108.1	110.3	103.3	106.8
1975	95.9	118.4	114.5	122.1	96.1	101.8
1976	92.1	113.3	109.6	109.6	110.6	112.5
1977	115.9	120.6	119.9	120.5	119.8	122.7
1978	118.8	129.6	127.7	122.8	141.9	141.5
1979	114.0	129.4	126.7	111.1	168.4	163.3
1980	117.3	127.9	126.7	119.5	146.9	147.2
1981 (est)	109.7	125.8	123.6	110.9	157.8	153.7

* Indices for livestock gross and net output include changes in livestock numbers average, 1970, 1971, 1972.

Source: The above figures were compiled from data published in the Irish Statistical Bulletin by the Central Statistics Office, Dublin.

Table 4: Crops Acreages and Livestock Numbers 1970-81
(^{'000} head/acres)

Year	Cattle		Sheep		Pigs		Total Crops
	Cows	Total	Breeding	Total	Breeding	Total	Acreage
1970	1,713.1	5,956.5	1,843.7	4,082.3	141.5	1,192.5	1,071.5
1971	1,781.9	6,133.7	1,888.1	4,188.7	150.5	1,322.5	1,081.6
1972	1,894.8	6,438.1	1,873.8	4,260.4	131.7	1,199.1	1,027.6
1973	2,096.3	6,969.8	1,872.4	4,219.9	132.6	1,107.6	985.2
1974	2,151.3	7,214.5	1,804.1	4,059.7	95.3	922.6	970.3
1975	2,102.1	7,168.1	1,687.7	3,682.7	99.1	795.5	937.1
1976	2,047.1	6,954.0	1,602.6	3,474.7	113.0	924.8	980.5
1977	2,094.5	7,124.3	1,614.3	3,533.8	107.6	933.8	1,051.6
1978	2,096.3	7,124.8	1,578.2	3,385.4	122.1	1,055.9	1,059.3
1979	2,108.2	7,177.9	1,576.5	3,375.6	127.6*	1,154.3*	1,090.2
1980	2,034.9	6,934.7	1,548.6	3,291.3	124.1*	1,056.7*	1,101.3
1981	1,981.7	6,695.8	1,603.1	3,362.9	125.5*	1,082.1*	1,068.1

*August enumeration.

Total Crops include wheat, oats, malting and other Barley and potatoes only.

Figures for total crops are provisional

Source: Dublin: Central Statistics Office

Table 5: Gross Value Added at Constant Prices (1975) (Volume Index)

Base Year 1975 = 100

(According to EEC concept of G.V.A.)

Year	G.V.A.
1973	81.9
1974	88.9
1975	100.0
1976	87.9
1977	96.3
1978	96.9
1979	84.5
1980	93.2
1981	86.5
(Estimated)	

Note: EEC concept differs from national concept in its treatment of VAT.

Source: Dublin: Central Statistics Office

Table 6: Annual Capital Investment in Agriculture (£m current prices) and Numbers Engaged (000)

Year	Breeding Stock	Buildings	Land Improvement	Transport Machinery	Agricultural Machinery	Others	Total Capital Investment	Total Numbers Engaged
1970	+ 6.9	9.8	5.9	8.2	17.4	1.9	50.1	262
1971	+ 8.5	15.4	6.5	8.3	15.7	1.4	55.8	252
1972	+33.1	16.9	5.8	10.4	22.1	2.6	90.9	246
1973	+28.7	16.7	6.2	14.7	25.4	9.7	101.4	240
1974	-13.1	13.3	7.5	15.1	28.2	11.7	62.7	235
1975	-23.5	25.8	8.2	16.4	37.4	12.9	77.2	231
1976	+ 5.7	48.3	13.3	26.3	57.2	21.1	171.9	226
1977	- 1.9	59.2	15.7	35.9	99.4	27.1	235.4	222
1978	+ 6.4	63.7	19.5	51.3	116.8	37.9	295.6	220
1979	-13.4	110.9	25.1	53.9	119.5	45.8	341.8	216
1980**	-35.6	125.9		57.6		119.6	267.5*	214

Notes:

*Estimated employment in Agriculture. It should be noted that the estimates for 1975 onwards are based on the results of the bi-annual series of Labour Force Surveys initiated in that year, whereas the estimates for the period prior to 1975 are based on Census of Population results, with estimates for inter-censal years based on trend indicators. As the Labour Force Survey involves a number of differences in methodology and in definitions which affect the measurement of the Labour Force, the survey results are not entirely comparable with the Census-based figures.

**Figures for 1980 are provisional estimates.

Table 7: Estimated Loans Outstanding to Farmers £m* 1975-1981

Year	Associated Banks*	Non-Associated Banks**	ACC***	Total	Annual Change
1970	55	N.A.	22	77	-
1971	67	N.A.	25	92	+15
1972	66	4.0	33	103	+11
1973	100	5.8	49	155	+52
1974	116	10.8	64	191	+36
1975	113	14.7	86	214	+23
1976	152	13.8	103	269	+55
1977	220	17.5	137	375	+106
1978	301	20.0	173	494	+119
1979	464	35.0	224	723	+229
1980	606	65.2	279	950	+227
1981	690	46.4	323	1059	+109

N.A. Not Available

*The published figures on farming indebtedness have been adjusted to exclude certain non-agricultural items (fishing, marts, agribusiness, etc). An element of personal borrowing by farmers may still be included but no estimates are available for this item.

**Year ending February.

***Year ending April.

Source: C. Cahill. Unpublished M.Sc. Thesis

Table 8a: Changes in Fertilizer Use, and in Crop and Livestock Output (1970-72 = 100)

Year	Fertiliser and Lime Usage	Total Feed Usage	Crop Output	Livestock Output	Livestock and Livestock Products Output
1970	92.5	98.9	96.9	92.5	93.7
1971	103.7	100.4	104.9	99.6	99.4
1972	103.8	100.6	98.0	107.9	107.1
1973	129.9	102.7	90.2	107.6	109.6
1974	124.8	93.6	89.8	112.1	111.9
1975	99.2	98.2	95.9	118.8	118.4
1976	119.8	103.4	92.1	105.7	113.3
1977	129.8	105.7	115.9	112.0	120.6
1978	161.2	113.9	118.8	117.1	129.6
1979	180.0	139.5	114.0	115.2	129.4
1980	159.8	120.6	117.3	115.4	127.9
1981	166.9	132.7	109.7	113.3	125.8

Source: This table was compiled from data published in the Irish Statistical Bulletin by the Central Statistics Office, Dublin.

Table 8b: Changes in Compound feed use* and in the Output of Livestock Enterprise** (1970-1972 = 100)

Year	Cattle		Milk		Sheep		Pigs		Poultry	
	Output	Feed	Output	Feed	Output	Feed	Output	Feed	Output	Feed
1970	92.9	86.6	96.6	86.7	89.7	103.6	97.7	95.5	85.8	95.3
1971	99.4	88.2	99.2	84.4	110.2	85.0	101.4	104.8	104.3	101.8
1972	107.6	125.2	104.2	128.9	100.1	111.3	100.9	99.8	109.9	102.9
1973	112.4	169.4	109.1	140.5	102.9	202.5	95.6	96.9	121.9	105.2
1974	111.9	177.9	104.8	140.8	97.2	215.6	73.4	80.3	104.0	99.2
1975	115.9	196.8	112.8	174.6	101.7	180.9	73.5	64.7	98.1	93.4
1976	103.7	229.7	121.3	247.0	89.4	169.9	86.9	79.0	116.8	100.0
1977	113.5	267.4	130.4	353.6	76.5	258.6	92.3	78.3	116.2	105.4
1978	116.3	323.6	147.0	572.8	88.3	261.6	102.4	80.2	119.2	98.1
1979	111.4	452.6	149.9	777.6	86.1	502.4	102.1	88.7	127.7	106.7
1980	105.5	386.5	147.9	605.7	91.6	472.4	97.3	83.4	128.2	105.6
1981 (est.)	99.7	407.2	146.1	699.2	101.4	730.6	101.5	80.7	124.2	103.6

Output including Livestock Change

Base average '70, '71 and '72

Source: *Department of Agriculture

** Irish Statistical Bulletin, Dublin: Central Statistics Office

Table 9: National and EEC (FEOGA) Expenditure and Irish Farm Income (£m)

Year	State Expenditure in relation to Agriculture	FEOGA		Total	Family Farm Income
		Guidance	Guarantee		
1970 (a)	94.2	-	-	94.2	182.3
1971 (b)	107.1	-	-	107.1	200.3
1972 (c)	112.9	-	-	112.9	283.9
1973 (d)	89.0	2.8	37.0	128.8	363.1
1974*	68.3	3.9	63.8	136.0	330.4
1975	108.6	0.5	102.1	211.2	476.3
1976	129.4	2.5	102.0	233.9	534.9
1977	156.1	7.3	245.1	408.5	743.0
1978	170.1	9.3	366.0	545.4	834.5
1979	177.3	16.5	397.9	591.7	734.0
1980	224.4	27.1	381.1	632.6	672.0
1981*	283.1	35.2	305.3	665.6	787.0

* Estimated.

Note: The data for the years 1970 to 1973 are in respect of twelve-month periods between April of the year in question and March of the following year, and for 1974 in respect of the period April to December.

Source: Pre-Budget Tables 1982. Dublin: The Stationery Office.

Table 10: Factors Influencing the Trend in Agricultural Incomes (arithmetic mean per three year period 1979/'81 as % of 1973-1975)

EEC Member States	Internal terms of trade (1)	External terms of trade (2)	Productivity of inputs (3)	Productivity of labour (4)
Germany	90.5	82.7	92.4	129.9
France	88.3	79.2	89.3	126.2
Italy	101.7	90.9	87.8	130.4
Netherlands	90.9	72.8	98.2	140.0
Belgium	91.3	75.9	101.3	127.8
Luxembourg	90.7	73.4	104.8	107.2
United Kingdom	91.0	73.7	107.9	116.5
Ireland	93.8	94.0	80.1	126.6
Denmark	95.3	90.1	86.4	141.5

- (1) Ratio of the index of farmgate prices to the index of input prices.
(2) Ratio of the deflator for gross value added in agriculture to the GDP deflator
(3) Ratio of final production by volume to immediate consumption by volume
(4) Ratio of final production by volume to labour input.

Source: Commission of the European Communities, Differential Rates of Inflation and the CAP, Com (82) 98 Final Brussels.

ANNEX 1: PROBLEMS IN ESTIMATING CHANGES IN REAL FARM INCOMES

The changes in real farm incomes over recent years have become the major issue in the development of Irish Agriculture. While there can be no doubt about the fact that there was a substantial improvement during the years 1975-78 and an even more substantial fall in the subsequent years, there are, nevertheless, some significant problems in measuring precisely the changes that have taken place in real terms.

The main problems are:

- (a) What is the appropriate method of deflating the income data from nominal to real terms;
- (b) the farm income data published by the CSO does not provide a precise account of the net farm incomes in that they do not provide for interest payments made by farmers or for the depreciation on buildings; and
- (c) in order to get a full picture of farm income changes, it is necessary to take account of changes in the number of people who share that income.

So far as the problem of deflating nominal farm incomes is concerned, it has been the generally accepted convention in Ireland that the Consumer Price Index is the appropriate deflator. In so far as farm incomes are used for the purchasing of consumer goods, then this approach is fully justified. To the extent that the income data are used for non-consumption purposes (i.e., for servicing existing capital debts, for re-investment purposes, for savings, etc.), then a price index covering a wider spectrum would be appropriate. In practice, however, there is no single uniquely suitable price index; the view of the statisticians at SOEC (and their national counterparts) is that the implicit price index of GDP is the most appropriate one available. Real farm incomes, deflated by the GDP deflator, gives a slightly different result than when deflated by the CPI (see Table AI), but the differences do not affect, to any extent, the orders of magnitude of the changes since 1970.

The concept of farm income also needs further consideration. The CSO agricultural income data relate to "income from self-employment and other trading income". This is a global concept of the income generated in agriculture to reward the basic factors of production land, family labour and capital. At the present time the CSO are not in a position to produce an "income distribution account" for the agricultural sector. As long as this income was all, or virtually all, enjoyed by the farm family, the lack of an income distribution account did not give rise to any difficulty. In recent years, however, the level of interest payments by farmers and the problems of accounting for depreciation of buildings had made this situation increasingly unsatisfactory, and family farm incomes have been considerably different to the conventional CSO agricultural income figures. At the same time, in considering incomes of farmers, no account is taken of interest earned on the very substantial amount of farm profits that have been invested outside the agricultural sector (e.g., with the lending institutions, including building societies, etc.).

This latter point is particularly important to the totality of incomes enjoyed by farm families, which is the kernel of the income situation in agriculture. A substantial proportion (probably around one-third) of farmers counted in the farm family population are in receipt, not only of farm incomes but of social welfare incomes as well. These are primarily old age pensioners (generally non-contributory) and beneficiaries of the "farmers' dole". In so far as these form part of the total incomes of these farmers, the changes in the farm-derived part of their income may be counterbalanced by changes in the social welfare element. This consideration does not cover the part-time farmer who has off-farm

income from other employment and who generally is not considered to be a normal full-time farmer and is, therefore, not included in the farm employment statistics.

This question of the numbers of people reckoned as the family farm labour force (i.e., the denominator in the per capita income calculation) is important in that changes in farm incomes should be related to changes in the numbers enjoying that income. At the present time, no figures are published of the changes in the number of family farm workers, but two series, i.e., the total number in agriculture, forestry and fishing, with the related data from the bi-annual labour force surveys and the number of males engaged in agriculture, are published annually by the CSO. In recent years, these series have shown somewhat different trends, the total numbers engaged declining by around 1.5 per cent per annum, while the males engaged figure declined by nearly double this rate. It would seem that a decline of around 2 per cent per annum would be a reasonable estimate of the recent decline in the family farm labour force, and the decline in total farm incomes adjusted by this figure would give a realistic picture of the trends in farm incomes for comparison with trends in incomes in other sectors.

Table A1: Changes in Real Farm Incomes using CPI and GCP deflators

Year	Total Farm Income*	In Consumer Price Index	In GDP Index	Percentage Change	
				Changes In real terms using CPI 1970 = 100	Changes In real terms using GDP 1970 = 100
1970	182.3	100.0	100.0	100.0	100.0
1971	200.3	108.9	109.8	100.9	100.1
1972	283.9	118.4	124.8	131.5	124.7
1973	363.1	131.8	142.7	151.1	139.6
1974	330.4	154.2	152.5	117.5	118.8
1975	476.3	186.4	189.0	140.2	138.2
1976	534.9	219.9	226.8	133.4	129.4
1977	743.0	249.9	256.1	163.1	159.2
1978	834.5	269.0	282.2	170.2	162.2
1979	734.0	304.6	315.7	132.2	127.5
1980	672.0	360.1	362.0	102.4	101.8
1981(est)	787.0	433.6	427.2	99.6	101.0

Source: Dublin: Central Statistics Office.

* Family Farm Income is equivalent to "income from self-employment and other trading income" as published by the Central Statistics Office, Dublin.

DISCUSSION

S. J. Sheehy: I am pleased to have the opportunity of proposing the Society's thanks to Dr Attwood for his very provocative paper. The central thesis is that resources have been inefficiently utilised in agriculture in recent years and the current income problem is attributable to this waste. The author points out that this diagnosis is at variance with other analyses which attribute the problem primarily to adverse terms of trade for farmers.

Since 1978 marked the end of prosperity in farming, it is logical to decompose this issue into the performance of the industry up to 1978 and the performance since 1978. From the mid-sixties up to 1978, a fitted exponential equation shows that the volume of GAO grew by 3.3 per cent per annum while the volume of NAO (after deducting "farm materials" which are feed, fertiliser and seed) grew by 2.7 per cent. This appeared to be a satisfactory situation well in line with the Government's expectations as outlined in the EEC Accession White Paper of 1972 (Pr. 2064). It was, however, criticised in NESC Report No. 40 (Pr. 7127) as representing an inadequate response to the very great increase in profitability in farming as a consequence of EEC membership. In reply to this criticism, it was emphasised by the Agriculture Minister of the day and by other people that the growth record of Irish agriculture was second only to that of the Netherlands - a claim which was factually correct.

Between 1978 and 1981, profits were halved. The volume of GAO fell by 3.9 per cent but farm materials' use increased by 11.3 per cent, so that NAO fell by 10.2 per cent. On the face of it this is a perverse reaction. Economists reared on profit motivation would have expected a cut-back in input use with perhaps some cut-back in output as well. The author implies that this rational response has been prevented by over-zealous salesmen, careless advisers and complacent farmers.

The author's conclusions are based on a comparison of output/input ratios in 1975 with ratios of more recent years. Since volumes of both outputs and inputs in agriculture are notoriously variable from year to year, one has to be very careful in selecting base and terminal years. The attached graph shows the ratio of the volume of GAO to the volume of farm materials. (A volume index of all inputs is not available prior to 1970.) The 1975 to 1981 data (to which a trend line is fitted) certainly show a rapidly deteriorating position if this is the path that agriculture is set upon. But 1975 was a most unusual year, as is evident in the graph: over the previous two years, the volume of GAO increased by 7.7 per cent while the volume of farm materials fell by 16.1 per cent - a sharp reversal of long established trends. This is highlighted when a trend line (exponential) is fitted to the 1961-1981 data.

Furthermore, among recent years, 1979 and 1981 would appear to have been relatively unfavourable. The author is, of course, correct in treating the weather factor sceptically because it has so often been trotted out as an alibi in the past. However, the evidence of recent years is heavily laden against the author's interpretation and 1982 is developing to confirm that much of the inefficiency problem in the paper is attributable to weather variation. The graph includes my current expectations on the output/input relationship this year which incorporate a weather normalisation in line with that mentioned by the author. It sits precisely on the long-term trend line and well above the 1975-1981 trend.

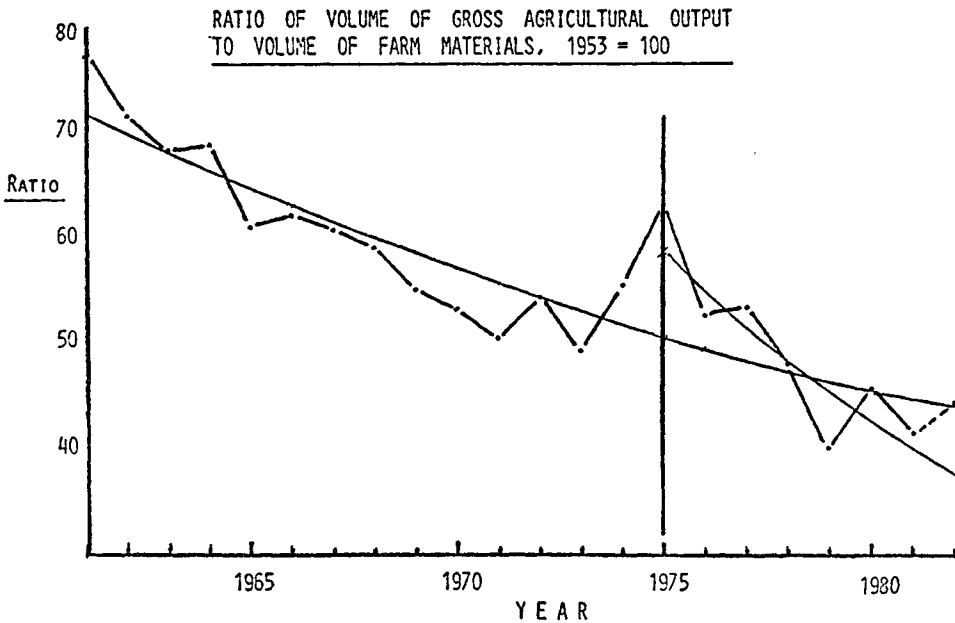
Therefore, as I interpret the trends of the past 20 years, any inefficiency problem which exists - and there may be one - has to be related to the rate of output response to input use over the long-term and not since 1975. The most comprehensive published study of this reports that for the 1963 to 1976 period, total resource productivity (both factor and non-factor) grew by 1.98 per cent annually in Ireland which was third in the EEC league of eight countries (Behrens and de Haen).

Any such study embracing factor inputs as well as non-factor inputs would identify the high level of capital formation up to 1979 which the author discusses. That investment was based on expectations which proved wrong. When charged at its acquisition price, it must now prove to have been inefficient. However, since the salvage value of this investment is very much lower than the acquisition price, it remains in production until it wears out. Thus, the capital stock in the industry is being reduced and will continue to be reduced if profit levels do not recover. In a matter of a few years, this capital bulge will have levelled out to an equilibrium more in keeping with current levels of returns. There may well have been a comfort-creating rather than an output boosting element in that investment, but if the State operates a Farm Modernisation Scheme, it can hardly be surprising if farmers respond by modernising their farms.

The Society is indebted to Dr Attwood for exploring these very important issues. As he himself realises, a great deal more analysis is necessary, however, to discover the real situation. That study should focus on the micro situation at farm level as well as on the macro picture. If there is a waste of inputs, then it is in everybody's interest that these be quickly identified and put right.

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B. Kearney: The theme of Dr Attwood's analysis is, at once, challenging and provocative - *challenging* in that economists have been confronted with an explanation of the apparent divergence between output and inputs in recent years and *provocative* especially concerning the *manner* and extent of his analysis. Perhaps public attention was first drawn to this issue in the address of the Minister for Agriculture to the ASA* Conference in September 1981, when he noted that "prices of inputs and output in the past few years have not been conducive to any rapid expansion in production, but this being the case, it is hard to see the reason why . . . the large increases in inputs has taken place". And again in December 1981, the Minister said, when referring to proposals to improve incomes by reducing inputs, "this approach would seem to confirm the existence of a use of inputs greater than is justified by the output which they generate".

Dr Attwood has outlined the economic milieu in which the sector has been operating over the decade, but his analysis is overly aggregative and perhaps understates the influence of certain factors on farm decision-making. I think, however, that apart from aggregate developments, there is some cause for concern, particularly relating to the consumption of some of the major inputs. For instance, in the 1980 Farm Management Survey there appeared to be too much fertiliser used on some farms in relation to stock numbers and there is some evidence to suggest an over-use of fertiliser also in other instances, such as sugarbeet. Similarly in the livestock sector, there could be some mis-allocation of feed resources due to some injudicious concentrate feeding in some dairy herds but, for the moment at least, we believe that this problem has not been too serious. There are some rather sweeping conclusions in regard to the use of these inputs, however, in the paper. Take milk production, for example, where it is stated that in the aggregate purchased, feed has gone up seven-fold, with only a 46 per cent increase in milk output. Subsequently, it is stated that farmers have substituted purchased for home-produced feed to the detriment of the financial returns from their farms, but, frankly, we cannot find much evidence of this from our surveys. Concentrate feed per animal has increased only by about 120 per cent over the past decade and only in one year out of ten did margins suffer - in consequence, the production strategy has, in general, considerably increased the financial returns to the farmer.

While we are on the issue of productivity, we must not forget that irrespective of the substitution of purchased for home-produced inputs, the process of intensification implies a declining *average* productivity as well, of course, as a declining *marginal* productivity. If, again, we take intensification in dairying, the expected fertiliser costs on highly intensive (0.9)[†] farms would be at least 3 times that on moderately stocked farms (1.5)[†], but revenue per unit area would be *less than twice* as large. I am using this illustration to scotch the widely-held belief that a declining average productivity is synonymous with an irrational use of inputs.

A few points can also be made about the divergence between the pattern of output and investment in recent years. I believe first of all that much of the investment in agriculture was unduly delayed and in many instances was maintained and even increased, as farm incomes were *falling* and interest rates *rising*. Those who set out early on the voyage of expansion had developed enough momentum to come through the storms relatively unscathed. However, many others have now a relatively modern resource base and can accommodate considerable expansion with but little additional capital investment. Gross Fixed Capital Formation in agriculture is now averaging about 9 per cent of agricultural turnover (output) as opposed to 20 per cent or greater in the years 1977-1979. It now seems as if the cash flow difficulties of the sector prevented farmers from building up their stock numbers so as to exploit the additional fixed investment, and it is a safe bet

* Agricultural Science Association

† Stocking rate

that this will now materialise, beginning this year when cow numbers might expand by 4 per cent. Not only that, but I see this trend being maintained and for the next few years we may see the converse of what Dr Attwood has described for the past few years, i.e., a fairly appreciable increase in net product per annum.

This paper, I believe, underlined more than ever the need for a disaggregated analysis of developments in the sector in recent years to obtain a fully satisfactory explanation of what has transpired. The apparently irrational trend in the pattern of output and inputs perhaps reflects the dualism in the agricultural sector - where aggregate growth trends can obscure the increasing concentration of production and the relative decline (and impoverishment) of a large category of farms. It is possible, and this has been accentuated by the cattle crisis of 1974 that much land is now less intensively used than heretofore. I would hypothesise that a more plausible and perhaps rational explanation for the events described in Dr Attwood's paper would be obtained if the analysis were concentrated on full-time commercial farms, as their expansionary performance has been diluted in the aggregate. We have numerous examples of this, and in 1981, for instance, whereas national milk supplies declined by 1 per cent, production on the larger commercial farms increased by 6 per cent.

The dualistic issue is perhaps confusing the link between aggregate productivity and expenditure on R & D also. Dr Attwood points out that spending on research, education and advisory work is equivalent to about 5 per cent of GAP (actually it was 2.5 per cent in 1978), but in this context we must once again employ a differentiated analysis in order to see the direct link between expenditure on R & D and the uptake of the relevant technology and significance of the sector availing of this service. (Actually, the general administration costs in agriculture have grown faster than R & D and now exceed expenditure on education, advice and research).

In conclusion, we must be grateful to Dr Attwood for focussing attention on a fundamental problem in the agricultural sector. He has not abided by the maxim that discretion is the better part of valour, and I am very happy to express the gratitude of the Society by seconding the vote of thanks here tonight.

P. Power. I would like to congratulate Dr Attwood on his stimulating and thought-provoking paper. The paper focuses on a very important aspect of agricultural production. The basic question that Dr Attwood poses is what is happening to technical efficiency in agriculture? Has the output-input ratio declined since the mid-seventies and if it has declined, is this a permanent feature of Irish agriculture?

While the figures put forward by Dr Attwood are not really contestable, the interpretation of what is happening is not altogether a simple matter. There are, in my view, sufficient unusual factors to suggest that there is no long-term decline in the technical efficiency of Irish agriculture and that the apparent inefficiency can be explained by unusual and non-recurring factors. In order to answer the question in a more comprehensive manner, disaggregation would be essential.

The impact of weather as a factor affecting output-input ratios is, in my view, totally underestimated. The three years 1979, 1980 and 1981 were exceptionally poor from the weather aspect, resulting in adverse effects on grass growth and utilisation, with consequential implications for animal performance, particularly milk yields. Crop yields also suffered in those years. Thus, the inclement weather must be regarded as a major contributor to the reduction in the volume of output and the increase in the volume of inputs in that period. While the negative effects of adverse weather on the volume of gross agricultural output are significant, family farm incomes are affected to a far greater degree.

The beef industry is one of the two major components of agricultural production. The extraordinary gyrations in this key output sector also help to explain the decline in output. The slaughter of almost 600,000 cows in 1975 represented an increase of 200,000 cows above normal culling rates. A high proportion of these cows which were culled in 1975 were not replaced. However, the progeny of these cows were sold as adult cattle in 1977 and 1978. Accordingly, their removal from the national breeding herd was not reflected in a permanent loss in the volume of cattle output until 1979 and subsequent years. Similarly, the relatively high levels of calf exports to Continental Europe in 1975 and later years ensured that these animals were not coming on stream as finished cattle from 1978 onwards.

After the boom year of 1978, there was an increase in the volume of inputs used. The main area of input increase was in feedingstuffs, which is a simple technology. Some of the increase in input usage would appear to be income led and this may have accounted for the relatively high usage of feedingstuffs beyond recognised fodder deficit periods, such as the Spring/early Summer period of 1979.

All of these factors, Mr Chairman, are sufficient to explain the apparent decline in the ratio of output to input which took place in recent years. In my opinion, it will not be a permanent feature of Irish agriculture. Under more normal circumstances, especially weather-wise, the former technical ratios should obtain. Again, I would like to congratulate Dr Attwood for his stimulating address.

A. Leavey: There are a number of problems I have with this paper as follows:

1. The base years which have an effect on the conclusions reached with regard to volume of inputs.
2. The movement of prices of the output of farming and materials for farming and again how the base year used affects the conclusions reached.
3. The fact that all farming is dealt with in aggregate. No reference is made to the fact that there is a commercial sector in Irish farming which is reasonably dynamic and a non-commercial sector - mainly older people on smaller farms - which values the ownership of land rather than the use of land.
4. Capital investment - extra capital investment will be needed if Irish Agriculture is to develop. We have 1/4 to 1/6 the capital investment per acre of the more developed agricultures in Europe.
1. Taking the mid-seventies, especially 1975, as a base year could be misleading. In that year the level of volume of all inputs declined to less than 1971, 4 years before, while feed and fertiliser declined to the level of 1970. Given that gross output had increased by 14.5 per cent between 1971 and 1975 and over 20 per cent between 1970 and 1975, there is no way that that input-output ratio could be maintained. In addition, Dr Attwood mentions that the weather could have an effect of up to 5 per cent on gross output, but does not attempt to include it in his detailed analysis. Taking a three-year average around 1971 and allowing 5 per cent increase in gross output for the weather factor in 1979 and 1981, the comment could be re-written to read: "Compared with the early seventies, we are now using 54 per cent more inputs to produce 29 per cent more output". Perhaps we still have a problem but it is of a different dimension.

Explanation of Increase in Inputs

- (i) Change from oats in small acreages in the West which were not traded to barley in the East which was.
- (ii) 300,000 sucklers whose milk was fed to calves to 140,000 milking cows whose

milk was sold. They had to be fed with extra meal and the original milk fed to calves had to be replaced.

- (iii) If the value of the extra output is matched to the extra costs, it makes more sense than is indicated in Table 8.6.

It is my opinion that the emphasis on the increase in the volume of inputs might lead us to a wrong diagnosis of the problem. It may be that it is a lack of growth in the volume of gross output that is our problem rather than too high level of inputs. Given the structure of the Irish agricultural industry, that means that we have not enough cows. The cows we are missing are the 300,000 suckler cows which disappeared, mainly off more traditional-type farms, since the 1974 cattle crisis. True, many of them were replaced by dairy cows. But these replacements were on different farms, most of which were operating further up the production curve which may also explain some of the increase in inputs. The farmers who are liable to be involved in suckling cows are much less likely to be influenced by research and advisory work and are not normally among the regular clientele of those services. They are, however, amenable to public policy in the form of a suckler cow grant of sufficient level to encourage them to hold their cows (i.e., at the level of the real value of the early seventies' grant) and not change to competing, usually store cattle, enterprises. It is easy to be wise now but if some such action had been taken in 1974 and subsequently, we would probably have retained those cows. The rest of the agricultural industry would probably have expanded independently. Our gross output would be approximately 5 per cent higher, our factories would be busier and our balance of payments healthier. The farmers producing the raw material would still be making derisory incomes but that is a different problem.

2. Dr Attwood stated that the relationship between input and output prices is similar now to what it was in 1975. By 1975, however, a significant price squeeze had already occurred compared to the situation prior to EEC entry. If you assume a price ratio as at an average of the years 1970, 1971 and 1972 and allow for the 5 per cent weather factor in 1981, farm income would be 56 per cent higher. So, if you go back to pre-EEC for the base year, you can explain nearly all the present income problem on the basis of the price cost squeeze and the recent bad weather.
3. In the paper, all farming has been dealt with in aggregate. There are, however, at least two types of farm when characterised by inclination or indeed ability to expand and develop. We should look at public policy as to how it relates to those two sections. One section's contraction may counteract the other's expansion. I have already alluded to a suckler cow scheme for the less innovative farmer. The other policy which might move the land in the hands of older people into the hands of those who will utilise it more is an attractive pension scheme allied to leasing rather than to sale. In addition, it should not make more difficult transfer of land within the family.
4. Including transfers from EEC as state expenditure seems to me to be wrong. This transfer is a net gain to the country consequent on farmers' productive efforts. It is a plus rather than a minus. The cost to the Irish taxpayer of transfers, directly or through administration, to agriculture is different. The cost of Agriculture, Forestry and Fishing as a percentage of total public expenditure declined from 14.1 per cent in 1967-69 to 6.8 per cent in 1975-77.

In summary, I feel there is a danger in Dr Attwood's paper that we could talk ourselves into a subsistence agriculture with low output/low input and little or no capital investment. I think that the price cost squeeze and the weather play a bigger role in our problems than Dr Attwood gives them credit for. If you use the early seventies rather than the mid-seventies as your base, this will become clearer. This does not mean that we do

not have to examine inputs and capital investment very carefully in future. But I feel that eventually we will have to decide to take more care of the use of land and design policies to ensure that all land is being worked to near its capacity.

Reply by E. A. Attwood: The discussion on the paper has been most useful, both in raising a number of issues which require further analysis and in expanding some of the ideas underlying the paper. It is useful to consider these comments in the light of the requirements for papers read to this Society - that the basic data are appropriate, that all the available other evidence is presented and that the interpretation of the conclusions are valid in the light of the basic data and other evidence.

Let me first deal with the issues raised in the discussion concerning the data used in the paper. All data given in the tables refer to the years 1970-81, with the exception of Table 5 which relates to the period 1973-81. There has been some discussion as to whether or not 1975 is a typical year in the light of the events of the decade as a whole. In practice, the seventies have seen very sharp year-to-year changes in the levels of output, inputs and incomes, and the choice of a base year is much more difficult than in earlier decades. For that reason, the main base period for the tabular data in the paper is 1969-71; however, for some important series the choice of a 1975 base has been inevitable in the light of the decision by the Central Statistics Office to use this year as the base year for a number of its series on economic data relating to the agricultural sector.

The second question is whether there is other relevant material set out in the paper. For example, the problems of quantifying effects of weather have been raised both in the paper itself and by some of those who have contributed to the discussion but these questions have not been resolved. It would be useful if further work was undertaken with the Meteorological Office to provide an index of the economic effects of the climatic situation in relation to the level of net agricultural output.

The problem of disaggregation of the data has also been raised. This is another area where the available information is inadequate and considerable further work in terms of the trends in outputs and inputs by size and types of farming would be justified. Indeed, further analysis within groups of farms of particular sizes and types would be justified to generate more knowledge of the factors which are associated with growth in economic efficiency, and those associated with a decline in efficiency. The evidence that is available, e.g., the comparative analysis of the Farm Management Survey data would indicate very wide variations of efficiency in resource use. While a general reference to this issue is made in the paper, it is evident that much more work could usefully be done.

The major question in relation to papers read to this Society is whether the interpretation and conclusions from the statistical and other evidence presented are valid. The wide-ranging discussion this evening has shown the very real concern of many members of the Society about the changes in the level of efficiency in the agricultural sector, but there are clearly alternative interpretations and conclusions of the available evidence. The major issue which has arisen in the course of the discussion has been whether the developments since the mid-seventies in the ratio of the volume of inputs to total output have been a continuation of the long-term trend or have significantly diverged from that trend. The effects of changes in the ratio of prices of inputs to those of output in the mid-seventies led to a sharp change in the volume of inputs in relation to the level of output. This was a rational reaction to the situation in which farmers found themselves at that time.

The financial situation in agriculture since 1978 has been even more serious than that in 1974. However, the response by farmers has been significantly different, even after allowing - in a qualitative rather than in quantitative fashion - for the effects of weather. It is clear that even with the anticipated improvement due to better weather in 1982, the

level of *net* output will still be considerably below the 1975 level - while the level of inputs will be substantially higher.

The future progress of the agricultural economy will depend on increased efficiency, rather than the likelihood that the price relationships that existed in 1970 could be restored. There is broad agreement that the possibility exists for improving production and economic efficiency. We need to establish more precisely the probability of achieving significant increases in efficiency in agriculture and the most effective way of achieving this as an input into decisions on the allocation of national resources to the different sectors of the economy.