

Some Economic Aspects of Land Use Policy in Ireland

By E. A. ATTWOOD

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It might seem unnecessary to preface a paper on land use in Ireland with an account of the importance of land in the economic and historical life of Ireland, yet the fact remains that there have been very few studies published of the factors determining land use in Ireland, or assessments of the extent to which actual land use is correlated to the economic optimum. There is, of course, a very considerable literature on the land question, but the general assumption underlying the long debate on this issue was that, once the political difficulties of ownership were overcome, the pattern of utilisation would automatically follow the optimum one. This paper sets out to examine the current trends in the pattern of land use, to discuss the factors which must be considered in any delineation of the optimum utilisation of the land in the country, and finally to examine the problems and opportunities for improving the existing uses of land.

There is at present a growing interest in the theoretical problems involved in the regional planning of land use, and of the computational problems in particular case studies. For example, in the inter-regional programming model in India a projected gain of around 12.5 per cent in total food production would have arisen from a re-allocation of production from given resources among regions, even when limits were placed on the magnitude of shift which can take place.¹ In a study of the broad impact of the removal of all institutional barriers to the production and movement of milk in the northern states of the U.S.A., it was concluded that "great transitional difficulties would be involved for producers and some processors and distributors in the region in adjusting to an equilibrium situation"²

This work has not been confined to hypothetical situations, it is now of growing importance in decisions affecting land use. In a paper on "Some Operations Research Applications in the Conservation of Wild-Land

¹ Narindar S. Randhawa and Earl O. Heady, "An Interregional Programming Model for Agricultural Planning in India", *Journal of Farm Economics*, Vol. 46, No. 1, Feb. 1964.

² D. A. West and G. E. Brandow, "Space Product Equilibrium in the Dairy Industry of the North-eastern and North-central Regions", *Journal of Farm Economics*, Vol. 46, No. 4, Nov. 1964.

Resources" (broadly the use of "other land" areas, including afforestation, rough grazing and watersheds) it is argued that this technique offers considerable promise as a means of dealing with the problems of "the long-term periods involved, the multiple uses of land, and by definition, man's limited control over the total environment"³ There is a growing need for a comprehensive analysis of these problems under Irish conditions. This paper is concerned with the present knowledge of land use in Ireland, and with the development of suitable criteria which will be needed under the new planning legislation that has recently come into operation.

CURRENT TRENDS IN LAND USE

It is not my intention to dwell at any length on the history of land use in Ireland, but in Table A of the Appendix the figures are given of the major crops and livestock since 1847. The only conclusion that is relevant for this present paper is the very obvious consequences of the contemporary economic forces on the use of land at any time. It is necessary to remind ourselves of this in view of the widely-held belief that there is some uniquely correct use for land without any reference to the interaction of the economic issues involved. The fall of the potato acreage from 860,000 acres in 1861 to less than one quarter of this a century later, the extraordinary similarity in the wheat acreage at these two dates, the decline in the acreage of oats at a rate even faster than that of potatoes, and the ups and downs in the acreage of hay can only be explained with reference to the economic environment over these years. In some instances, the broad trend in social and economic change is a sufficient guide (as in the case of potatoes) but with other crops a detailed analysis of the economic factors at particular times is necessary to explain these trends (for example, the case of wheat).

Of the 17 million acres of land (including woods and plantations, grazed and barren mountain, turf bog, marsh, roads, etc.) grassland and meadowland currently account for around 55 per cent, of this about one-fifth is cut for hay. The 3 million acres of rough grazing is essentially an extension of this grassland acreage (and indeed part of it has, in the past, been recorded as pasture), but its present output is at such a low level that alternative uses, of which forestry is the most important, are economically feasible.

The tillage acreage in 1959-61 was divided between crops grown for sale or used in the farm-house (720,000 acres) and those grown and fed to livestock on the farm (900,000 acres). The acreage of sale crops consists of almost 16,000 acres of fruit and vegetables (or only one per cent of the tillage acreage, and 0.1 per cent of the total area of the State), approximately 500,000 acres grown for home consumption and 200,000 acres grown for sale but used for livestock feeding.

The data of the volume of agricultural output given in the Second Programme, together with the current trends in yields of the main crops,

³ A. Broido, R. J. McConnen and W. G. O'Regan, based on a paper presented to the Tenth Annual Meeting, Western Section Operations Research Society of America, 1964.

make it possible to project with reasonable confidence the pattern of land use that is likely in 1970. This is given in Table A (Appendix) and shows only small changes in the main totals compared with the present pattern. The really important question is the degree of intensity of land use, rather than the particular category to which the land has been allocated. The continuance of around 10 m acres of grassland must be associated with a far more intensive production policy if this grassland is to be justified in terms of the national economic goals.

The area under urban settlement⁴ was just under 150,000 acres in 1961, and seems likely to rise to around 175,000 by 1970. The problem of the encroachment of urban settlement on agricultural land has not been as serious in Ireland as in other European countries, but is giving rise to concern in particular areas.

Another sector in which the problems of competing uses is beginning to give rise to some local difficulties is that of forestry, which by 1970 is likely to account for 550,000 acres. As the forestry programme proceeds, it is bound to give rise to increasing difficulties in the acquisition of land. The decisions on the choice of forestry or agriculture for particular sections of land are of great importance because of the very long-term commitment involved in afforestation. The social and economic factors in extending or restraining developments in urban settlement or forestry in particular areas must be examined sympathetically but impartially, and I would like to come back to the issues involved in this choice later.

The changing patterns of land use during the current decade can be summarised in terms of the national cropping and stocking rates per 1,000 acres of crops and pasture. Wheat and oats are likely to drop to less than 20 acres each per 1,000 acres crop and pasture, compared with over 30 acres in 1961. The 1970 agricultural targets will involve over 150 cows, nearly 350 other cattle, together with almost 600 sheep per 1,000 acres. This level of stocking will only be reached if a very large improvement in grassland husbandry is achieved. At the same time, unless the total number of persons in rural areas begins to rise in relation to the agricultural labour force, then the density of the rural population is likely to fall to less than 100 per 1,000 acres crop and pasture, or only about one-third of the level a century ago. The rate at which these changes are currently taking place must give rise to very large problems of adjustment in the agricultural sector, which should not be underestimated in terms of their social and demographic consequences. This is one of the most important of the consequences of a high rate of economic development, and the need for assistance towards solving these problems is becoming more generally accepted as a factor in social and economic development over the coming years.

⁴ I.e. the total area of all county and other boroughs, urban areas and towns under the Towns Improvement (Ireland) Act 1854.

TABLE 1

CROPS, STOCK AND PERSONS PER 1,000 ACRES CROPS AND PASTURE

	1851	1901	1961	1970
Wheat	35.7	2.5	30.6	19.3
Oates	132.0	57.7	32.6	18.9
Total Corn	198.0	73.8	95.9	86.2
Potatoes	55.5	36.6	18.9	14.4
Total Roots	89.3	65.1	44.9	38.8
Hay	88.3	140.4	167.7	178.6
Pasture	619.3	719.8	690.5	696.4
Horses	33.3	34.8	18.4	
Cows	—	94.1	114.5	156.3
Total Cattle (including cows)	193.8	308.9	418.3	494.3
Total Sheep	164.2	318.0	401.8	599.9
Persons in rural areas	321.3	186.5	134.8	93.2

SOURCE Agricultural Enumerations and, for 1970, author's estimate

The pattern of land use today still represents a relatively unintensified one. The output per acre from the total acreage of crops and grass has increased over the past decade from £15.3 in 1953 to £18.9 in 1963 (in current prices, which have been almost constant over this decade). This includes the output from pigs and poultry which, only to the extent that they are produced from feeding stuffs grown and fed on the national farm, really represent a part of this output from the total acreage of crops and pasture in this country.

OUTPUT PER ACRE FROM THE MAIN FARM ENTERPRISES

From the primary data that were used in the 1960 County Income Study, it has been possible to prepare two additional sets of estimates which are of particular importance in a discussion of land use in Ireland. The first is the average output per acre from each of the main farm enterprises, and the second the average output per acre and per holding from each of the main farm size groups. Of course, in neither analysis is it suggested that output by itself is a sufficient criterion of the optimum use of the land in question, but it does give us a much more useful guide than has been available hitherto.

The estimate of the output per acre from the main agricultural enterprises involves the allocation of the total home-grown feeding stuffs against each of the livestock enterprises. The main problem—that of allocating grassland—has been met by the use of livestock unit equivalents based on the physiological body weights of the different livestock categories.⁵

⁵ E. A. Attwood and J. F. Heavey, "Determination of Grazing Livestock Units", *Irish Journal of Agricultural Research*, 3, 2, Dublin 1964. The actual allocation of the acreage fed to grazing livestock is set out in Appendix Table B.

Details of the allocation of food to the main categories of livestock are given in the Tables in the Appendix

The main results are set out in Table 2 and give a range of average outputs from £5,000 per acre from intensive glasshouse production to under £10 an acre from cattle and sheep.

TABLE 2
OUTPUT PER ACRE OF MAIN ENTERPRISES, IRELAND 1960¹

	Acreage sold off farms (000's)	% of total acreage	Value of total output (£000's)	Value of output per acre £
LIVESTOCK				
Cows	3,168.7	28.2	53,299	16.8 ²
Cattle	4,817.0	42.9	43,731	9.1 ²
Sheep	1,391.9	12.4	12,926	9.3 ²
Horses	795.2	7.1	3,511	— ³
Pigs and Poultry	294.3	2.6	34,757	(118.1) ⁴
CROPS				
Wheat	340.8	3.0	11,077	33
Oats	64.5	0.6	1,370	21
Barley (Malting)	69.2	0.6	2,434	35
Barley (Feeding)	131.8	1.2	3,381	26
Sugar Beet	68.3	0.6	6,046	89
Potatoes	73.1	0.7	6,063	83
Vegetables	12.6	0.1	1,020	81
Tree Fruit	2.8	—	465	160
Soft Fruit}	2.7	—	655	240
Glasshouses	0.3	—	1,250	5,000
Other	—	—	3,394	—
TOTAL	11,233.2	100.0%	185,379	16.5⁵

¹ Excludes turf and timber output

² Including the value of production from imported feed

³ As the value of output from horses does not include the value of farmhouse work no figure of output per acre has been included

⁴ Including allowance for imported feed. The figure for pigs and poultry does not, of course, represent the real value of output per acre of crops devoted to their feed as production includes that from imported feeding-stuffs which is of particular importance in these enterprises

⁵ Including pigs and poultry

The average estimated output from field horticulture, at £120 per acre, represents the most intensive use of land but involves a very high input of both capital and labour per unit of land involved. The extent and location of the production of fruit and vegetables are, at least at present, much more dependent on the immediate requirements and opportunities of the market than in the case of other land-using enterprises. The very small proportion

of the total area involved—or even of the area which is potentially usable for horticulture—means that land as a factor of production is relatively less important than in the case of the other farm enterprises. This, of course, is why vegetable production has been advocated as a route to economic viability for small farmers—but at the same time horticultural production is still mainly concerned with the market for fresh produce, and rapid access to this market is still of particular importance in the location and scale of horticultural production.

The influence of proximity to markets is gradually becoming of smaller significance with improvements in transport and—of more importance—the growth of processing. This so far has affected only relatively small areas of the country, such as the production of early potatoes in the southern districts, onions in the Castlegregory peninsula and vegetable in west Donegal. These land-use developments are giving rise to additional needs for technical and economic research in order that the full potential can be exploited.

The 800,000 acres of cash crops (other than horticultural crops and timber) produced, on average, slightly over £40 per acre. The location of the cash crop enterprises is not, in general, so dependent on the local opportunities or the position of the market, and the comparative advantages in costs of production of one region compared with another become of greater importance. The amount of land involved is primarily dependent upon the size of the home market for the crops involved. Only a small proportion of cash crops is exported in either raw or processed form. The more important determinant is that of the policy towards imported temperate crops. The official policy of encouraging home production of the major crops has led to a very considerable expansion of cash cropping in recent decades but when we gain access to full membership of the EEC, further expansion is likely to depend upon the relative efficiency of production compared with other European countries.⁶

The principal use of land in Ireland—for livestock production predominantly off grass—involved 10.2 million acres of grass and cropland plus the estimated 3 million acres of rough grazing. Leaving aside the contribution from the rough grazing acreage, the average output per acre was just over £11.2 (excluding the output from pigs and poultry). This very extensive utilisation of the larger part of the total land resources necessarily is due to a whole range of problems—agricultural prices, marketing, education, capital—but of course the pattern of land use is one facet of the economic situation as a whole. The average output of under £10 per acre from cattle and sheep, and of £17 an acre from cows, in relation to the very large proportion of the total agricultural area occupied by these three enterprises, has been one of the major economic problems of the agricultural industry. Whatever the causes it remains true that the output of £10 an acre (this was at 1960 prices, but it would be little over £12 at 1964 prices) is most inadequate.

⁶ This is discussed in a paper read to the Society on 14th December, 1962—E. A. Attwood, "Trends in Agricultural Development in Europe and Ireland", *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XXI, Part 1, 1962-63.

The fourth major use of land is forestry. Unfortunately the output from land under tress is less well documented than that in crop and livestock production. Timber sales in recent years have been around £500,000, i.e. between £1 and £2 per acre, but sales are only a fraction of the "output" of timber (i.e. increments in net value). Estimates of the true level of productivity of land under timber have not been published and it is, therefore, not possible to compare the output from land in this use with that in alternative enterprises.

In examining the appropriateness of particular uses of land, this factor of output per acre is only one-half of the data needed for a comprehensive evaluation. The compilation of data on the inputs associated with different uses of land in agricultural production is only partly completed. Part of the research programme of An Foras Taluntais is directed towards this end, and it is hoped to have this reasonably complete within the near future. There are very considerable problems involved in estimating inputs to particular uses of land, and the procedure is one which is laborious and time consuming.

This will then give us the average products and inputs per acre under different farm enterprises, but there will remain the complications arising from the wide variation of efficiency of production in each of these activities. In a paper read to the Society ten years ago, it was shown that "we are entitled to conclude that even if the attributes of ability, energy and capital were fixed, we would also find considerable variability which can only be due to individual idiosyncrasy . . . There seems to be very little recognition in such discussions (on Irish agricultural problems) of the vast range in farming skills throughout the country"⁷ As we know that in fact the attributes of ability, energy and capital themselves vary very widely within the farming population⁸ (as they do in every major sector of the community) it is clear that the use of average productivities and inputs per acre of each enterprise must be modified by the inherent variability within each of them. This problem of variation within any type of land use has been the source of widespread disputes about the optimum use of land, but it must remain as an essential part of any examination of the use of particular areas of land. The rise in farm output over the current decade and the changes in the farm labour force might lead to some reduction in this variability but it is unlikely to be on a sufficient scale to bring about a much more uniform level of farm efficiency.

OUTPUT PER ACRE BY SIZE OF HOLDING

One widely-discussed influence on the level of output per acre is the distribution of holdings by size. Data on the output and costs per adjusted acre of different sized farms were published in the Final Report of the

⁷ R. C. Geary, "Variability in Agricultural Statistics on Small and Medium Farms", *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XIX, Part 1, 1956.

⁸ Rasmussen and Sandilands, *Production Function Analysis of British and Irish Farm Accounts*, University of Nottingham, School of Agriculture, Loughborough 1962.

National Farm Survey 1955/56-1957/58, but these figures were not precisely representative of the average farm in each size group⁹

In order to get the results for the "average" holding in each size group, the data for 1960 were analysed on a farm size basis. The results are set out in Table 3

TABLE 3A

AGRICULTURAL OUTPUT PER SIZE OF FARM, 1960

Farm Size (acres)	Livestock & Livestock Products*		Crops		Total Agricultural Output	
	£'000	% of Total	£'000	% of Total	£'000	% of Total
¼-5	3,287 3	2 2	1,735 2	4 0	5,022 5	2 6
5-15	6,314 1	4 2	2,148 6	5 0	8,462 6	4 4
15-30	18,805 9	12 5	5,281 4	12 3	24,087 3	12 5
30-50	26,544 4	17 7	6,948 8	16 1	33,493 2	17 3
50-100	40,700 1	27 1	10,778 2	25 0	51,478 3	26 7
100-150	20,755 3	13 8	6,157 7	14 3	26,913 0	13 9
150-200	11,275 8	7 5	3,595 7	8 3	14,871 5	7 7
200-300	10,195 9	6 8	3,121 6	7 2	13,317 5	6 9
Over 300	11,219 0	7 5	3,231 3	7 5	14,450 3	7 5
Not on Farms	927 2	0 6	28 5	0 2	1,055 7	0 5
TOTAL	150,025 0	100 0	43,077 0	100 0	193,102 0	100 0

*Including the value of changes in livestock numbers

TABLE 3B

DISTRIBUTION OF HOLDINGS, CROPS AND PASTURE, LABOUR AND OUTPUT, BY SIZE OF HOLDING 1960

Size Group (acres)	% of total holdings	% of total crops and pasture acreage	% of total output	% of total male labour force
¼-5	25.9	1 1	2 6	3 1
5-15	13 2	3 8	4 4	8 7
15-30	20 4	12 9	12 5	20 3
30-50	17 2	18 3	17 3	21 8
50-100	15 0	27 6	26 7	24 4
100-150	4 5	14 2	13 9	9 8
150-200	1 8	7 8	7 7	4 6
200-300	1 2	6 9	6 9	3 6
Over 300	0 8	7 0	7 5	3 7

⁹ This problem is discussed in detail in the *Final Report of the National Farm Survey 1955/56-1957/58* (Pr 6180), Stationery Office, Dublin 1961

The farms of under 50 acres contributed 36.8 per cent to the total agricultural output, those of 50-100 acres 26.7 per cent and those over 100 acres 36.0 per cent (there was also a very small amount of output recorded as "not on the farm") These figures include a considerable degree of variation according to the product in question. In general, the smaller and medium-sized farms of between 15 and 100 acres produced a higher proportion of the livestock and livestock products, and a small output of crops, compared with their contribution to the total agricultural output. The position was, of course, reversed in the larger farms, although the contribution of these of over 300 acres to the crop, livestock and, therefore, total output was identical. The holdings of under 15 acres produced a relatively higher proportion of crops—this being due to the production of potatoes on these holdings, primarily for home consumption. On the larger farms, potatoes were less important and grain crops occupied a relatively much larger part of the total cropping pattern, although sugar beet was of greater relative importance on the medium and larger sized farms than it was on the small ones.

In the case of livestock, the pattern followed the expected one, with relatively small differences from product to product. There are obvious reasons why the importance of different enterprises will vary according to the size of farm, but this has clearly not led to the pattern of resource use on different sized holdings that would give the best return for the different combinations of inputs as farm size varies.¹⁰

This data on the total output of the different sized groups of farms can be compared with the acreage and the number of holdings in each group. The results of this, given in Table 4 below, show a remarkably similar output per acre for farms of 15 acres and over, and although there appears to be a lower level of output on farms of 30-50 acres than in any other size group, it is doubtful whether the differences are sufficiently large to justify any differentiation between the output per acre for this size group, and those in the next largest or smallest category. If instead of taking crops and pasture, the total acreage in each size group (i.e. including rough grazing and other land) had been taken as the denominator there would have been a steady—but still only small—fall in the output per acre as the size of farm increases. It is, however, of more importance to focus attention on the surprisingly narrow range of output per acre—as measured either by acres of crops and grass, or by the total acreage—than to be concerned with whether or not the very slight trend that exists slopes in one direction or the other.

¹⁰ This is very clearly brought out in the analysis of least cost combinations of Irish farm accounts. See Ramussen and Sandilands, *op cit*.

TABLE 4

OUTPUT PER ACRE (£) CROPS AND PASTURE BY SIZE OF HOLDING
1960

Size of holding	Ireland	Leinster	Munster	Connacht	Ulster
$\frac{1}{4}$ —1	54.2	56.6	52.3	48.2	59.6
1—5	33.0	32.6	34.6	30.9	32.8
5—10	21.8	21.5	23.3	21.0	21.9
10—15	18.6	18.9	22.2	16.8	18.4
15—30	16.6	16.8	20.6	14.7	16.1
30—50	16.3	16.4	19.2	13.8	15.0
50—100	16.6	16.7	18.3	13.3	14.6
100—150	16.9	17.2	17.5	13.8	14.8
150—200	16.9	17.6	17.0	13.2	15.0
200—300	17.0	17.5	17.0	13.6	16.6
Above 300	18.3	19.2	18.4	11.7	15.8
TOTAL	17.2	17.8	18.7	14.3	15.9
Output per acre (£) Total Area 1960					
$\frac{1}{4}$ —1	51.3	53.1	50.7	44.1	51.2
1—5	29.2	30.2	32.4	27.3	24.3
5—10	18.8	20.0	21.2	17.2	17.6
10—15	15.9	17.4	19.5	13.9	15.1
15—30	14.2	15.5	17.7	12.3	13.0
30—50	13.6	15.0	16.1	11.2	11.7
50—100	13.5	14.9	14.7	10.2	10.4
100—150	13.4	15.1	13.6	9.8	9.3
150—200	13.2	15.3	12.8	9.1	7.9
200—300	12.7	15.4	11.9	7.6	7.5
Above 300	9.5	14.5	8.6	3.2	2.6
TOTAL	11.3	13.9	12.7	7.9	8.5

The average output per acre at any given farm size varies between the four provinces, although the pattern is not an entirely regular one. On the smaller holdings (except those of under one acre), the highest average outputs per acre are found in Munster—due primarily to the higher incidence of dairying. As farm size increases the difference between Munster and Leinster diminishes until—at over 150 acres—the output per acre crops and pasture in Leinster becomes the highest of the four provinces. This is due to the importance of cash cropping on the larger farms in the eastern part of the country. At all size levels the output per acre in Connacht is lower than that in the other three provinces, and in the 15-50 size groups the difference is quite substantial. For example, the output per acre in farms of this size is 40 per cent higher in Munster, and under these conditions it is not surprising that dairying has been so widely advocated as a solution to the problems of many small western farmers.

The patterns of agricultural output—and therefore of land use—in any region is directly affected by the structure of farm size and the degree of

congestion amongst the population. In the western counties of Ireland, the multiplicity of small holdings at a long distance from the main markets has led to a pattern of land use which involves a very considerable degree of self-sufficiency of the individual farm households. This means that the production of crops such as potatoes, and the cutting of turf for heating and cooking, still plays an important part in the economy of the region.

The degree of self-sufficiency in the agricultural sector of individual counties can be derived from the data given in the County Incomes paper. The results of this showed a very wide range from county to county about the national average of 25 per cent of net family farm income from farm produce consumed in the home. In Mayo and Donegal, for example, the consumption of farm produce in the farmhouse accounted for 45 per cent of family income¹¹—and it must be remembered that these two counties account for more than one-seventh of the total land area of the State. Any proposals for changing the pattern of land use in the western counties must take account of the existing dependency on the farm for the immediate day-to-day requirements of the home.

The national policy of relieving congestion through the resettlement of families on holdings created by the subdivision of the larger farms in the more prosperous eastern counties has tended to alter—though only very slowly—the pattern of land use in the areas concerned. The smaller farms tend to produce milk in place of dry-stock, and to attain a greater measure of self-sufficiency through potatoes and vegetable crops in place of grain for sale.

At the same time, the inevitably slow rate at which this land settlement policy proceeds has meant that its effects on land utilisation are not discernible in the national statistics—at least over the short period. The policy of voluntary migration and rearrangement of holdings involves a necessarily lengthy process and consequently only a relatively small number of farms have been involved. Over recent years the number of migrations have been, on average, about 100 per annum and the number of rearrangements around 500.

If the relative productivity of land on farms of different sizes remains unchanged, the changes in the pattern of holdings which are currently taking place will have very little effect on the level of total farm output. Thus there is little evidence for contention that the current reduction in the number of small farms will adversely affect the level of agricultural output, and on this score such a trend will not have serious repercussions. These changes in the number of holdings in each size group have been particularly marked over recent years—the 20 per cent fall in the number of holdings in the 5-15 acre group during 1955-60 was much larger than during the previous intercensal period 1949-55. In the 15-30 acre group the rate of fall was only half that of the smaller size holdings, and in the next size group (30-50 acres) the fall was only marginal. Of the farms over 50 acres only the number of these over 200 acres fell after 1955—due primarily to the official policy of dividing large estates.

¹¹ This includes the farm income of part-time farmers, but not their incomes from non-farm sources.

Changes in the distribution of land between different size groups can be seen very clearly if the figures of the changes during 1931-49¹² are brought up to 1960. In the eighteen years from 1931 to 1949 the change in the area under crops and pasture on holdings under 15 acres fell by 6.4 per cent, and by 23 per cent on holdings of over 200 acres—and increased in all the size groups in between. In the subsequent eleven years from 1949 to 1960 the crops and pasture acreage fell in all the farm size groups of under 50 acres except in Connacht, and increased in all size groups over 100 acres (again with the exception of Connacht). It is rather surprising to find that in Munster and Leinster there was actually a fall in area of crops and pasture in the 50-100 acre group, compared with a very considerable increase in Connacht, and a somewhat smaller one in Ulster.

TABLE 5

PERCENTAGE CHANGE IN AREA UNDER CROPS AND PASTURE

	1 and under 15 acres	15 and under 30 acres	30 and under 50 acres	50 and under 100 acres	100 and under 200 acres	Over 200 acres	All holdings above 1 acre
1931-1949							
Leinster	- 6.3	+10.2	+ 5.3	+ 5.1	+ 3.6	-18.2	- 1.0
Munster	+ 1.9	+ 5.8	+ 2.8	+ 3.4	- 0.5	-24.4	- 1.1
Connacht	- 8.4	+ 7.1	+10.2	+ 5.3	-10.6	-41.7	- 0.1
Ulster (3 Counties)	-10.7	- 8.9	- 1.3	+ 3.4	- 1.6	-24.8	- 5.1
26 Counties	- 6.4	+ 4.7	+ 4.9	+ 4.2	+ 0.2	-23.1	- 1.3
1949-1960 ¹							
Leinster	-32.1	-25.8	- 9.2	- 3.3	+ 7.1	+ 6.8	- 2.6
Munster	-27.5	-21.1	- 9.1	- 0.8	+ 5.5	+ 5.1	- 2.1
Connacht	-36.0	-15.6	+ 7.9	+27.9	+11.4	- 8.1	- 1.0
Ulster (3 Counties)	-26.5	-20.0	- 2.8	+11.3	+19.5	+18.6	- 0.6
26 Counties	-31.5	-19.6	- 3.1	+ 4.0	+ 7.6	+ 4.9	- 1.9

¹ The relative changes are overstated here because of the revised method of dealing with "divided holdings" (i.e. those in more than one D E D) introduced in 1960.

INPUT REQUIREMENTS IN DIFFERENT LAND USE SITUATIONS

Knowledge of the levels of associated inputs with land in various enterprises is still incomplete. The data included in the Final Report of the

¹² Published in Table 29 in the *Report of the Commission on Emigration and Other Population Problems*, Pr 2541, Dublin Stationery Office, 1954.

National Farm Survey, however, throw a valuable light on the consequences of different resource combinations on the gross and net product per acre under different farming systems. The pattern of resource combination in the farms on the survey was a fairly uniform one, as farm size increases the amount of labour and inventory capital increases but at a diminishing rate (i.e. inventory capital per acre tends to fall and acres per labour unit tend to increase as farm size increases, but the rate of change gets smaller between each successive size group). There was considerable uniformity in these resource combinations for any given farming system, although the subsistence group had lower capital inputs and, to a lesser extent, the cattle farms had lower labour inputs per acre than the other three major systems.

The more interesting variations were, however, those within each size/system group. In each size group of the four systems for which data were available, the upper income group had the largest amount of labour per farm, and the lowest income group the least labour. This was by no means simply due to the contribution of the additional labour, for there were substantial differences in the output per labour unit between the income groups in each of the size/system groups. The more intensive farming policies of the upper income groups were a clear route to a larger and more prosperous farming community, the upper income group in the 15-30 acre farms had 1 man per every 12 to 14 acres,¹³ on the lower income farms of the same size the ratio was 1 man to 18-27 acres. In general, as acreage increases the divergences in the land/labour ratio between the lower and higher income groups tended to narrow, but even in the largest group the average amount of labour per unit of land was from 25-50 per cent higher in the upper income group than in the lower income farms.

All of this points very strongly to the need to promote a more intensive use of land, through both the educational and advisory services for farmers and through a greater measure of flexibility in the distribution of land. If the available land is to be used for the maximum benefit of the national economy, then more steps are needed to see that those who will develop its potential are put in a position to do so. There are considerable hurdles to be overcome, but the direction of official policy needs to be more closely orientated towards bringing together those with the talent and energy to use land to its full potential, and those lands which need developing from the state of low output (which can be seen in any journey across the country). The time is coming in a highly competitive agricultural world where the potential productivity of land is being very rapidly expanded by modern technology, when we must question more closely the right to misuse or leave land underdeveloped. This does not mean that there should be any arbitrary confiscation (as was, for example, attempted in Britain in the 1947 Agricultural Act, but subsequently found unworkable), but that ordinary economic pressures towards expanding land use should be encouraged in order that the abilities and opportunities of the younger, more able farmers should be harnessed to create a more intensive

¹³ Adjusted to allow for common and rough grazing, etc

use of the land available. Where such a policy would involve social difficulties, then measures to relieve this will have to be undertaken. This is however a far more valuable policy than that of reducing the opportunities for greater movement within agriculture.

This does not mean, however, that the very large amount of under-employment on the smaller farms, particularly those in Connacht and Ulster, could be readily overcome simply by a policy of intensification. The extent of this underemployment has been given in the Report of the Interdepartmental Committee on the Problems of the Small Western Farms,¹⁴ and this is such as to make a policy of developing alternative employment opportunities together with more intensive farming system, the only one that will stabilise the population of the western counties.

THE DEVELOPMENT OF LAND USE CRITERIA

The problems involved in any comprehensive appraisal of existing or of optimum land use patterns involve extremely complex issues concerning the methodology to be followed, the precise data which are required, how these data are to be assembled, and the means by which non-economic factors should be integrated into the analysis. The methodology involved has recently been the subject of a debate on the national criteria to be used when there are relatively long time periods involved in the decisions. In decisions on land use there are long-term implications in many of the alternatives. This is most obvious in the case of forestry, but it is also inherent in many improvement schemes such as arterial and other drainage programmes, and in farm plans involving other fixed capital investments.

Difficulties arise from four different sources. The first is that prices received for the different farm products are affected in different degrees by State assistance. If land is to be used for the maximum benefit of the national economy, the effects of this assistance must be taken into account.

In the second place the pattern of economic growth which is appropriate to the requirements of the community at any one point in time—or at any one level of prosperity—is not likely to meet the needs of society as the level of prosperity improves. The changes in the social utility consumption function over time (i.e. the way in which society values—in economic terms—the various ways in which it can consume its income) are very difficult to evaluate in quantitative terms, and much more research is required into appropriate ways of evaluating these changes. In all long-term decisions concerning land use (or the use of any other resource) these changes must either explicitly or implicitly be taken into account. This has become of much greater importance with the acceptance, and likely fulfilment, of the objective of a 50 per cent growth in Gross National Product over the current decade. At this rate of growth the country is likely to be well over three times as prosperous in twenty-five years time as it was at the beginning of the Second Economic Programme, and the way in which the community will want to spend that income is likely to be very different from the pattern of expenditure today. This is likely to

¹⁴ Appendix A, page 42

affect, for example, the non-agricultural uses of land in the western counties, which are likely to grow in value at a faster rate than has been the case up to the present. As more and more people have the wealth to maintain recreational facilities in this region, its potential for these purposes will become of increasing value

This brings us to the third aspect which must be considered. The optimum situation in the future may be impossible to achieve if previous decisions do not provide for the possibilities which may arise as the economy progresses. For example a policy of extensive land use today in a particular region may make it virtually impossible to develop profitable intensive systems at a later date because of the irreversibility of population movements. This may often mean achieving a balance between policies which promote rapid economic progress in the short term, and those which achieve the optimum pattern of social and geographic developments in the longer period. Given the fact that we are now able to postulate with reasonable assuredness the future growth of the economy, there is a major need to examine its implications for the use of the basic national resources—of which land is among the most important. There are many difficulties in projecting the optimum pattern of resource use in, say, ten years time, but this does not mean that it should not be undertaken, for this sort of objection has been the source of much unhelpful criticism of economic growth in Ireland. The fact that there can be no uniquely correct projection should not be regarded as a deterrent, a constructive policy that has regard to the future pattern of development is likely to be far more successful than one that relies on the pull of short-term economic forces to achieve the optimum pattern of land use.

This will involve the fourth problem, which is that of evaluating the non-economic gains—in terms of recreational and amenity use—of devoting land to alternative uses. A scientific land use policy which takes account of all the criteria of the physical and social sciences will have to be amenable to mathematical treatment and to processing by modern computer techniques. This will require considerable research into the appropriate methods of processing the data, and of determining precise values for the criteria involved.

One of the major requirements in formulating national or regional land use plans is a full evaluation of the physical resources in terms of soils and their behaviour under different cultural, manorial and management practices. This need is being met by the research work within An Foras Taluntais. The size of this task should not be underestimated, for it is essentially long-term research which will play a basic role in land use planning.

A solution—if only a partial one—to the problems of methodology, and a reasonably comprehensive body of data on the relative productivity of the soils of the country will make it possible to produce a detailed national land use policy for the country. The most useful measure of the true value of the alternative uses of each of the major areas of land is the present value of the net addition to consumption (in its broadest sense) that would be created by implementing the various alternative uses. This

is a development of cost/benefit analysis, now widely used in deciding national long-term development projects, and this form of analysis can readily be adopted for deciding an optimum land use policy. At the same time, the validity of such an analysis is dependent on the accuracy of the basic data used, modern computer techniques can handle complex data but cannot make up for the gaps in our knowledge of alternative resource uses in different combinations. The development of this analysis over the next few years will make it possible to create a more integrated programme for the agricultural sector than has been possible so far, and to relate the developments in the use of land for farm production to the uses of land for other purposes.

This is now also taking on a much more immediate importance with the coming into operation recently of the Local Government (Planning and Development) Act of 1963. Under Section 19 of this Act, the local planning authorities are required to prepare development plans—and subsequently to effect their implementation. These plans must show in urban areas the land to be used for residential, commercial and agricultural purposes. In non-urban areas they must give plans for preserving, improving and extending amenities, and in addition, may show details of land to be used solely or primarily for agricultural or other purposes.

There is a pressing need for a rational and uniform application of the principles put forward in this Act. The rapid extension of urban settlement on to some of the most valuable agricultural land in recent years is likely to continue, although the work on the Dublin Regional Plan is bringing this problem under direct scrutiny. The problem is by no means limited to Dublin, and although Ireland has the good fortune to have no great overspill problem, there is no justification for not producing a more orderly pattern of development. The improvement of recreational facilities for the growing urban communities, the greater mobility of the city dwellers with the rapid growth of car ownership, and the needs of the tourist industry are all strong reasons for a positive land use policy in the country as a whole. All of these problems can be tackled under the new planning legislation which has very strong powers of enforcement but there are very considerable difficulties of achieving a uniform and positive plan based on adequate criteria of optimum use and given sufficient support to see that it is really effective.

CONCLUSION

The most immediate task in the development of a land use policy is a much more detailed knowledge of the current economic costs and returns from land in its various uses, and the consequences of changing land use. This will necessarily involve very considerable problems of assembling and analysing the data required for a comprehensive assessment of the alternatives. This is already being done, but there remains a great deal to be tackled before any realistic appraisal can be made.

In particular, current decisions on land use need to be examined in greater detail than hitherto. For example the Department of Lands in its

two activities directly affecting the use of land—afforestation and re-arrangement—have targets of 25,000 acres a year. It may be that this is, in fact, just the right level for these programmes, but there has been no comprehensive account published of the factors determining the optimum level for these two important land using activities. It might be argued that, in the face of the many unknowns as to the future, such an examination is not feasible. There are two answers to this. In the first place the use of cost/benefit analysis has been applied to problems at least as difficult as these, and these are just the sort of problems to which this approach is appropriate. In the second place, there have to be some criteria by which the decision on planting trees or shifting people and rearranging holdings is taken. A careful appraisal of these criteria will not only help in the making of more rationally-based decisions, but will give a greater precision to the economic factors which are involved in these policies.

The fact that millions of pounds are spent annually on these changes of land use gives a considerable measure of urgency to the problem. It is not suggested the cost/benefit analysis can be produced without very detailed research. The very fact that a considerable volume of information is required should give a measure of urgency to the task. This is in no way meant as a criticism of the work that has been done, but a plea for an economic assessment of the implications of the present situation in order that the further development can be directed in such a way as to give the maximum returns on the investment being made.

These two facets of official policy affect only a small part of the total pattern of land use, of wider impact are the programmes of arterial drainage and the Land Project. There are considerable advantages to be gained from starting a detailed examination of land use at this point, but there is a very much broader field to follow. Future land use planning can only proceed in a rational and orderly fashion if the implications of the different opportunities are fully examined and a basic set of criteria worked out that can be applied in each of the different regions of the country, and in each of the different situations which emerge. This is a task of some magnitude, but the long-term objectives of the new planning legislation will only be achieved if a start is made now to turn the principles it enshrines into a set of workable criteria. The decisions have to be taken anyway, it will be to the long-term advantage of the community if the pattern of land use which is developed is the one which the next generation will be glad to inherit.

APPENDIX

TABLE A

ACREAGE UNDER CROPS AND PASTURE

Year	Wheat	Oats	Barley	Total corn	Potatoes	Turnips and Mangels	Sugar beet	Total root and green	Total corn, root and green	Hay	Pasture	Total crops and pasture	Other land	Total area
1847	671,448	1,544,148	297,676	2,534,989	219,555	304,305	—	569,634	3,128,555	959,312	—	—	—	—
1851	428,705	1,584,943	312,280	2,376,546	666,373	330,606	—	1,072,321	3,509,229	1,060,210	7,434,511	12,003,950	4,973,187	16,977,137
1861	327,910	1,419,582	193,473	1,956,437	862,103	295,234	—	1,224,794	3,227,032	1,281,099	8,220,085	12,728,216	4,248,891	16,977,107
1871	184,017	1,132,602	219,049	1,551,062	795,551	294,019	—	1,167,877	2,772,430	1,499,057	8,673,997	12,945,484	4,007,824	16,953,308
1881	115,342	946,683	206,040	1,261,834	635,410	270,848	—	966,307	2,287,752	1,646,084	8,652,098	12,585,934	4,396,584	16,982,518
1891	59,519	811,520	175,701	1,060,751	548,900	278,375	—	898,684	1,975,145	1,661,858	8,814,787	12,451,790	4,535,319	16,987,109
1901	31,762	722,812	158,418	923,897	458,500	290,045	—	814,620	1,750,803	1,757,884	9,011,168	12,519,855	4,467,254	16,987,109
1911	36,232	701,518	156,029	902,707	424,502	286,569	—	775,424	1,697,338	2,045,579	8,447,391	12,190,308	4,813,983	17,004,291
1921	39,510	820,319	168,664	1,034,705	409,303	294,603	—	756,070	1,807,843	1,983,241				17,019,155
1931	20,848	622,779	115,735	763,284	346,073	265,791	5,012	653,729	1,425,021	2,313,109	7,988,824	11,727,034	5,297,447	17,024,491
1941	463,206	782,201	163,342	1,413,196	428,146	252,960	76,390	798,571	2,236,413	2,004,214	7,336,107	11,576,734	5,447,751	17,024,485
1951	281,637	619,940	167,174	1,073,614	321,448	205,212	59,885	619,786	1,717,283	1,936,263	7,934,698	11,588,244	5,435,848	17,024,092
1961	344,800	367,800	361,700	1,081,000	213,100	158,700	78,800	505,700	1,598,700	1,889,200	7,779,900	11,267,800	5,755,900	17,023,700
1964	215,700	290,900	454,300	969,500	183,300	140,100	80,800	464,800	1,434,300	1,925,700				
1970	216,000	212,000	531,000	965,000	161,000	122,000	96,000	435,000	1,400,000	2,000,000	7,800,000	11,200,000	5,800,000	17,023,000

SOURCE Agricultural Enumerations and for 1970 Author's estimate

TABLE B

ALLOCATION OF ACREAGE FED TO GRAZING STOCK

Acreage Fed to Grazing Stock		Number of Grazing Livestock Units			
CEREALS	(000's)	CATTLE	(000's)		
	Wheat	14 0	Bulls	18 3	
	Oats	198 3	Milch Cows	1,347 9	
	Barley	70 1	Heifers in Calf	121 6	
	Rye	1 3	Total Dairy	1,487 7	
	Peas and Beans	2 5	3 y o and over	272 9	
	Total Cereals	286 2	2-3 y o	843 2	
	ROOT CROPS		1-2 y o	731 8	
			Under 1 y o	413 7	
			Total Cattle	2,261 6	
SHEEP				Cheviot Ewes	43 2
				Black Face Ewes	76 4
	Short Wooled Ewes	85 5			
	Other Ewes	155 5			
	Over 2 y o	22 8			
Total Roots	318 2	1-2 y o	68 2		
		Under 1 y o	190 5		
		Rams	11 4		
		Total Sheep	653 5		
		GRASSLAND		HORSES	
Other	9 9				
Hay	1,980 7				
Pasture	7,577 9				
Total Grassland	9,568 5				
TOTAL ACRES	10,172 9	Working Horses	264 2		
		Thorough-bred Horses	13 3		
		Other Horses	34 4		
		Mules and Asses	61 5		
		Total Horses	373 4		
		TOTAL LIVESTOCK UNITS	4,776 2		

TABLE C
PRODUCTION AND ALLOCATION OF MAIN CROPS 1960

	Acreage	Production	Imports	Exports	Total Available	Household Consumption	Fed to Livestock	Grazing Stock	Pigs	Poultry
	(000's)	(Tons 000's)								
Wheat	366.3	462	133 ¹	2	593	388	167	61	90	16
Oats	425.8	419	—	—	419	11	382	210	145	36
Barley (M)	118.4	149	—	55	95	49 ²	298	141	129	28
Barley (F)	210.0	286	12 ¹	26 ¹	271					
Potatoes	233.8	1,800	—	65	1,755	458	1,067	899	139	29
Turnips	102.9	2,158	—	—	2,158	35	2,123	1,790	276	57
Mangels (Fodder Beet included)	66.8	1,254	—	—	1,254	—	1,254	1,254	—	—
Sugar Beet	67.8	120†	26	27	119	119	{ 117* 72	{ 117* 72	—	—
Cabbage	33.9	581	—	—	581	103	478	478	—	—

162

All figures, except for last 3 columns, (which are author's estimates) are obtained from Statistical Abstract except for ¹ Trade Statistics,
² Derived from Census of Industrial Production
 †As sugar *Pressed and Dried Pulp

TABLE D

PERCENTAGE¹ OF PURCHASED AND HOME-GROWN FEEDINGSTUFFS
FED TO THE MAIN CATEGORIES OF LIVESTOCK

Feedingstuffs	Pigs %	Poultry %	Grazing Stock %
Purchased Concentrates	59.0	9.2	31.8
Purchased Bulky Foods	6.0	—	94.0
Home-Grown Cereals	35.6	9.5	54.9
Home-Grown Roots (incl. Potatoes)	13.0	2.7	84.3
Hay, Silage and Pasture	—	—	100.0
Total Purchased Feedingstuffs	52.7	8.2	39.1
Total Home-Grown Feedingstuffs (excl. Hay, Silage and Pasture)	27.0	6.9	66.1

¹ Based on acreage equivalent

SOURCE: Attwood, E. A., and O'Carroll, Barbara, *Structure of the Feedingstuffs Industry in Ireland*, An Foras Taluntais Economic Research Series No. 5, Dublin 1962

DISCUSSION

Mr H J Gray, seconding the vote of thanks, said that Mr Attwood had not alone contributed a most interesting paper but had also made a most useful contribution towards progress in this difficult field of comparative evaluation of different land uses. Mr Attwood's conclusions were set within the framework of the problems of implementing the Regional Planning Act, here he felt Mr Attwood was expecting too much since the functions of planning authorities under the Act would be related to the delineation of areas for building and industrial development as against scenic preservation or productive use in agriculture and forestry, it seemed unlikely that such legislation would ever comprehend the determination of different forms of productive use.

Mr Attwood, while recognising broader issues, had made specific suggestions in relation to land rearrangement and afforestation. It was important to remember that the objectives of land rearrangement were not solely economic but indeed largely social and the application of cost-benefit principles would be very difficult. On present knowledge, forest policy could not be based on specific determination of the area of land which could be most economically devoted to forest use. Mr Attwood foresaw increasing difficulty in securing land for forestry purposes but his comparison with Britain was scarcely valid, having regard to population densities, etc. In many European countries the trend was for more intensive agricultural production to be offset by a fall in the area devoted to agriculture, the land thus released being transferred to forestry.

He had much sympathy with Mr Attwood's general theme and felt that any workable means of guiding land use by economic criteria would improve the average quality of the land becoming available for forestry.

He felt there would be great difficulty, however, in development of a system of comparative evaluation which would not merely be sound but would be accepted as such by all the interests concerned and would be reflected in actual changes in the pattern of land use. Mr Attwood rightly stressed the inadequacy of gross output figures. Input-benefit assessment as favoured by Mr Attwood was accepted in forestry but might be difficult to attain in agriculture. In an assessment of the rival claims of forestry and agriculture, it would be necessary to allow for long-term price vagaries on the forestry side and to resolve the problems posed by actual versus optimum uses in agriculture. It might well be that progress in the near future would come rather from the soil survey work of the Agricultural Institute than from economic comparisons.

Forestry's contribution towards stabilising population in areas of reducing farm employment should not be overlooked.

Dr R Johnston suggested that there was a case for considering afforestation and arterial drainage as two elements in an overall "allocation of resources" study of land utilisation. In this study it would be necessary to consider the interaction between these two factors in evaluating the expected return from either. He questioned whether arterial drainage on its own was sound policy, lowering an average level in order to reduce the peak might lead to trouble in a dry period. Reducing variability of level was better, he had heard of evidence that afforestation of high-rainfall areas of the catchment had this effect. He asked were there any co-ordinated investigations into the question going on in this country.

On the question of allocation of resources to backward areas he suggested that an opportunity existed for examining the response of the human resource to changed policies. The recent change in "dole" regulations had had the effect of removing the "dole barrier" through which small farmers who wished to improve had to break. The threshold for the return of the small farmer with savings to invest was now lower than before, he now had a reasonable prospect of earning a tolerable income in his first year of return, whereas under the old regulations his first increment in income would be negated by the application of the "means test". There was scope for study of selected small-farm regions for a couple of years on either side of the "break-point" represented by the change in "dole" policy.

Dr Pierce Ryan The great need for more factual information in establishing working criteria and the necessary methodology for economic land use planning has been highlighted. Knowledge of actual land resources is far from adequate also, land-use appraisal and physical planning may have little value unless based on fundamental physical data and no amount of "computerisation" can compensate for a lack of factual information. Mindful of this, the research programme of An Foras Taluntais, dealing with resource appraisal, considers both physical and economic elements together, through specialist teams working in particular regions, mainly responsible on the physical side is the National Soil Survey.

The Soil Survey programme covers not only the identification, segrega-

tion and mapping of different soils and the characterisation of their environment but also an evaluation of their use possibilities, major limitations and cultural requirements. The relative suitability of the soils for various agricultural and other enterprises are considered and in collaboration with other specialists, the relative productivity of the soils for various crop enterprises, including grass, and the physical inputs necessary to meet this potential are being determined. This is a long-term research programme requiring the best of scientific endeavour using modern methods, older land surveys such as the Griffith's Valuation are no substitute.

Only on the basis of such knowledge can shifts in land use be made with confidence and to the national good. In a rapidly-changing economy the alternative uses to which soils can be devoted must be known, not only the foremost use under which a particular soil is most productive but also the alternative uses in order of merit so as to cater for changes in social and economic demands.

The whole concept of land quality has changed radically in recent years but land use practise has not changed at equal pace. With modern fertiliser technology, considerations of natural nutrient fertility in soils have become subordinate to physical problems such as poor drainage, heavy texture and poor structure which are much more difficult and costly to rectify. Besides, copious farm labour supply has been replaced largely by mechanisation which drastically altered the feasible cultural and management practices on many soils. By means of modern technology it has been possible to obtain higher production per acre and also to bring sizeable areas of marginal land into a higher production category. These radical changes in the relative usefulness of different categories of land are bound to have a considerable influence in land use planning and particularly in the allocation of land to the various enterprises such as agriculture, forestry, urbanisation, industrialisation, transportation, etc.

Dr. R. C. Geary I would like to join the other speakers in complimenting Mr. Attwood on his paper which, apart from his main thesis, contains much interesting statistical material. I was much impressed by the showing of Table 4. The regularity of the output per acre, crops and pasture figures on different sizes of holdings exceeding ten acres is very striking, even if the Connacht and Ulster rates are lower than those for the other provinces. The regularity is the more surprising for the known fact of the great variability of return on individual farms in each size of holding, demonstrated in my 1957 Society paper and subsequently confirmed by the Agricultural Survey. Is this variability and the regularity of Mr. Attwood's figures a fact of life, to be taken into account in the formulation of agricultural policy? In that case I would have to eat the words of my 1957 paper with its proposal that those in the middle productivity group should strive to reach the top group of farmers. On other analogies, on the contrary, the present best may become better and the worst more or less stay where they are with, therefore, a widening spectrum of variability. One hopes not, indeed, but in policy formulation one must start from actuality.