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The Political Economy of our Arable and Grassland Production [and Discussion]

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Phil. Trans. R. Soc. Lond. B 1977 **281**, 83-92
doi: 10.1098/rstb.1977.0125

Phil. Trans. R. Soc. Lond. B. **281**, 83–92 (1977)
Printed in Great Britain

The political economy of our arable and grassland production

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The level of production from arable land and grassland is determined by the volume of labour and capital invested in the available agricultural land to exploit current technology. The levels of investment are influenced in turn by the levels of market prices and other institutional arrangements determined, *inter alia*, by the political economy of the common agricultural policy of the European Economic Community (E.E.C.) and of the individual policies of the Member States.

The level of production in the United Kingdom will be influenced increasingly by the competitive strength of British agriculture within the E.E.C. as commodity price levels are gradually harmonized. The balance of arable and grassland production will, similarly, be determined by the relative advantages enjoyed by British farmers due to climatic, technological and institutional differences compared with E.E.C. competitors.

The speed of development and application of new science and technology will thus be a major determinant of the level and efficiency of British agriculture during the next decade. This is the responsibility and the challenge which has to be accepted by those responsible for national research, development and advisory activities.

The management of inputs to increase the level of agricultural production and productivity is undertaken directly by the occupiers of the 272000 agricultural holdings in the United Kingdom, including 170000 farm businesses large enough to provide a full-time occupation (Cmnd 1976). The decisions made by these farmers individually on what to produce and how to produce it are influenced by their judgement of the technical requirements of production and the expected levels of production and profitability. The profitability is affected, in part, by the decisions made by Government in the discharge of its responsibility to encourage the development of agriculture in the national interest. Following our accession to the E.E.C., some of these decisions are made in the Council of Ministers in the context of the common agricultural policy and the application of E.E.C. rules.

That is why a discussion of the management of inputs for yet greater agricultural yield and efficiency needs to include some consideration of the political economy of arable and grassland production. The political economy of agriculture embraces political decisions which are taken in response to economic and social pressures which, in turn, reflect scientific and technological developments in agriculture.

Some indication of the management of agricultural inputs is given by the trends of production and investment; the level of production being determined by the volume of labour and capital invested in the available agricultural land to exploit current technology. In the two decades from the mid-fifties to the mid-seventies, the net product of agriculture increased by more than 75%, although adverse weather conditions during the last 2 years have reduced the recent level of production. This has been achieved by a smaller labour force and a substantial increase in capital investment. The number of people employed in agriculture declined from 788000 in 1955 to 380000 in 1975 (Cmnd 1966, 1976), a decline of 52%. The number of farmers,

partners and directors in agriculture has only been recorded since 1971, but between then and 1975 the number fell by 24000 from 298000 (Cmnd 1976).

This decline in the labour force was offset by an increased capital investment in farm machinery and buildings. The annual gross capital formation in these items increased from an average annual figure of £151 M in 1960/62 to £654 M in 1975 (Cmnd 1971; Cmnd 1976), an increase in money terms of 330 %, representing an increase of 73 % in the annual volume of investment.

The increased volume of production has not been achieved simply by adjusting the volume of labour and capital inputs, but there have been accompanying changes in the technology of production which have increased the efficiency of production. During the last two decades wheat, barley and oat yields have increased by approximately 40 %, 30 % and 50 % respectively (see table 1). During the same period potato yields have increased by more than 50 %. The national demand for potatoes (except for the importation of some early potatoes) has been met from an area reduced by more than 40 % in the last 20 years (Cmnd 1966, 1976).

TABLE 1. ESTIMATED AVERAGE YIELDS 1955–1975 (TONNES PER HECTARE)

	1955–7	1958–60	1961–3	1964–6	1967–9	1970–2	1973–5
wheat	3.2	3.4	4.1	4.0	3.9	4.3	4.5
barley	3.0	3.2	3.5	3.6	3.6	3.7	3.9
oats	2.4	2.6	2.8	3.0	3.3	3.7	3.7
potatoes	18.3	19.6	22.1	23.8	24.8	27.8	28.4

(Estimates by the Ministry of Agriculture, Fisheries and Food.)

These increases in crop yields have been achieved by the application of technology which, although it may be complex in development, is relatively simple to introduce into farming practice. For instance, the chemical control of weeds, pests and diseases, the increased application of fertilizers and the adoption of improved crop varieties can be introduced piecemeal by farmers, often without any great increase in capital investment. The results achieved from adopting the new technology are often disappointing in practice because of the complex factors affecting yields. But many new technologies, e.g. new cereal varieties or improved weedkillers are, in themselves, easy to incorporate into farming practice. In contrast, the adoption of new technology in grassland and ruminant livestock production is more complex because improved grassland management is only rewarded through consequential improvements in livestock management and increased capital investment. This is probably a major reason why the general level of grassland management is widely considered to lag further behind the technically feasible levels than does arable farming. Nevertheless, milk yields per cow have increased by almost a third in the last two decades. Of the national increase in milk production of about 4500 Ml (England and Wales) since 1953 (Cmnd 1966; Cmnd 1976) some 75 % is due to increased yields, and only 25 % is due to an increase in the size of the national dairy herd. The yield increases were due to a variety of reasons, such as breed changes and improvements in feeding and management.

The adoption of new technology and the levels of investment of capital and labour in agriculture are influenced by the levels of market prices and by other factors including Government policies which affect the profitability of production and the incentive to invest. The market prices and the support arrangements for British agriculture have changed substantially during

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the transitional period of accession to the E.E.C. The impact of these changes may be seen in the levels of production of individual commodities.

During 1972, the feed:pig price ratio (the number of kilograms of feed acquired to equal in value 1 kg deadweight of pigmeat) in the Cambridge Pig Management Scheme in 1976 was steady at about 8.5, having increased from about 7.6 early in 1971. The resulting improvement in profitability led to an increase in the total pig population (England and Wales) to an all-time high of 7.3 M in June 1973 (M.A.F.F. 1974). The number of gilts-in-pig (one of the early indicators of changes in the size of the pig population) rose to 126000 in England and Wales (M.A.F.F. 1974). Then the fortunes of pig producers changed. Feed prices reported in the Cambridge Pig Management Scheme in 1976 more than doubled between 1972 and 1974 – from £36 per tonne to £73 per tonne. The feed:pig price ratio fell at times to almost 5.6 and averaged no more than 6.5 for the second half of 1973 and the first 6 months of 1974. (The average feed input was about 5.2 kg per kg deadweight pigmeat). This was due principally to the sudden and substantial increase in the world price of cereals in the autumn of 1973, following the failure of the Russian grain harvest. Also, one of the mechanisms of the previous pig guarantee scheme in the United Kingdom had been terminated following accession to the E.E.C. This was the 'feed formula' by which the guaranteed returns to producers were adjusted to reflect changes in feed costs. The resulting reduction in profitability led to a reduction in the national pig herd to 7.1 M (down by 3%) by June 1974 and a further fall to 6.3 M (down by 12%) by June 1975. The number of gilts-in-pig fell to 95000 (down by 25%) in June 1974 and to 87000 (down by 9%) by June 1975 (M.A.F.F. 1975, 1976).

But by early 1975, the feed:pig price ratio had increased to nearly 10.0. In consequence, the numbers of gilts-in-pig on farms in England and Wales in June 1976 had increased by 33000 (40%) (M.A.F.F. 1976).

Similarly, changes in market prices in the beef sector, influenced by changes in domestic and overseas supplies and in the institutional arrangements, had a marked impact on farmers' investment decisions. Throughout 1972 and 1973, the price of cattle increased steadily. For instance, average clean cattle prices in January 1972 were 25p per kg liveweight. By June 1972 they were 30p per kg; and 38p in June 1973 (Meat and Livestock Commission 1972, 1973). In the spring of 1974 the bullish market for beef turned as the world increases in supply began to depress market prices. Cattle prices began to fall. The average market price of clean cattle fell in June 1974 to just under 35p per kg. The low point came in October 1974 when the average price was under 25p per kg (Meat and Livestock Commission 1974). Since then market prices have increased due to both a general reduction in supplies and the introduction of various types of intervention support. By June 1975 clean cattle prices were nearly 40p per kg. By June 1976 prices reached nearly 55p per kg liveweight (Meat and Livestock Commission 1975, 1976).

These fluctuations in the prices of fat cattle were reflected in the prices of store cattle and calves. More important for the current supplies of beef, they were reflected in farmers' investment decisions to retain calves for fattening. Throughout 1972 and 1973, quarterly slaughterings of calves (in the United Kingdom) were some 25 to 50 thousand (Meat and Livestock Commission 1972, 1973). By the last quarter of 1974 they had risen to 174000. During 1975 they fluctuated from 161 to 115 thousand per quarter; and by the summer and autumn of 1976 they had returned to some 60 to 65 thousand per quarter (Meat and Livestock Commission 1975, 1976).

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These two examples have been quoted at length to illustrate the impact of market prices and institutional arrangements on the investment decisions of farmers. Although the institutional arrangements are determined increasingly by decisions of the Council of Ministers of the E.E.C., the individual policies of Member States are still important in determining the level of investment in agriculture. A current example is the very heavy weight given to the wishes of the Member State concerned in any Community decision to change the value of a green currency: that is, the rate at which common Community prices are converted into national prices. The monetary compensatory amounts paid by the Community are intended to maintain returns to producers on intra-Community trade at the levels agreed in the Council of Ministers wherever the products are sold within the Community. The actual level of returns to producers within a Member State is also heavily influenced by the general state of the national economy, the national institutional policies on such matters as taxation and social transfer payments, and the national policy on the green currency.

One of the tenets of the common agricultural policy of the E.E.C. is Community preference – that is, a preference to produce rather than to import these products which can be produced efficiently within the Community. A second objective is to promote the free movement of agricultural products and this has been attempted by harmonizing market prices and support arrangements and eliminating national aids which distort competition between Member States. As price levels and institutional arrangements between the United Kingdom and the rest of the E.E.C. are gradually harmonized then the level of agricultural production in the United Kingdom will be influenced increasingly by the competitive strength of British agriculture in the E.E.C. Similarly, the balance of arable and grassland production will be determined increasingly by the relative advantages enjoyed by British farmers due to climatic, technological and institutional differences compared with E.E.C. competition.

There is no particular degree of self-sufficiency for British agriculture, either in aggregate or for individual commodities, which can be determined in advance. The country will become increasingly self-sufficient in the production of those commodities for which the U.K. has a competitive advantage in the Community. The balance between production from arable and grassland has been, and will continue to be, determined by the competitive efficiency of the various commodities in relation to the prices received. The old saw, 'Up horn; down corn', is a traditional expression of this phenomenon. The relative advantages of producing alternative commodities is determined, at any time, by the current political economy of agriculture generally and by the political economy of the individual arable and grassland products. But the political economy in turn is determined by the technology of production, and as this changes so the economics and political forces affecting production also change. Advances in the technology of broiler production have altered its price relatively to beef. Advances in the technology of milk production have led to higher yields and a structural surplus of production within the Community, with major repercussions on the political economy of the c.a.p. and the E.E.C. generally.

Some of the institutional differences such as the structure and scale of operation within the industry are clearly in favour of the United Kingdom. Take the average size of holdings, for instance. In the United Kingdom it is 64 ha compared with 24 in France, 18 in the Irish Republic and 14 in Germany and in the Netherlands (M.A.F.F. 1976). Also, farms in the United Kingdom do not suffer from the extreme fragmentation found in some Member States. The average size of dairy herds in the United Kingdom is 38 cows, compared with 23 in the

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Netherlands, 11 in France, 10 in the Irish Republic and 9 in Germany (M.A.F.F. 1976). These, and other advantages of scale, enable U.K. farmers to adopt mechanical aids which are more expensive to adopt on small, fragmented units. The scale of operation also enables producers to earn rewards sufficient to finance further investment as well as maintaining an acceptable standard of living.

The balance of advantage of other institutional arrangements needs further study before a clear judgement could be made. Taxation is but one example, albeit an important one, of variations in institutional arrangements which could have a significant influence on agricultural production. Indeed, the impact on British agriculture of recent and proposed domestic taxation changes is far from clear, so comparison with other Member States is particularly difficult.

Others are better qualified to judge the relative strength of U.K. agriculture resulting from its climate and geography. It is generally accepted that the ratio of energy output to support energy input is much greater for cereals and potatoes than for livestock products (J.C.O. 1974; Leach 1975; Cooper 1976). But the appropriate comparison is between the energy output in relation to support energy input for particular commodities in the United Kingdom and in other Member States. For cereals and potato production in the more favoured growing areas of the U.K. it may be that the ratio is as favourable as in competitive areas within the Community; while for crops with a longer growing season such as sugarbeet other areas with sunnier, warmer autumns and consequently a greater supply of solar energy, may have a competitive advantage. For some crops – grain maize and soya for example – the United Kingdom is not competitive, while for other crops the United Kingdom may well have a competitive advantage in terms of energy output in relation to support energy input. Outdoor lettuce and some winter brassicas may be examples. A detailed comparison, region by region, of the energy output/support energy input ratios for each commercial crop would be a firm indicator of the future pattern of crop production in the Community. This could be a fertile field of study by those concerned with the strategy of agriculture. But not all farmland is suitable for arable cropping. Some 35% of the land surface of Great Britain consists of marginal land or rough grazing, and a further 25% may be used more effectively for forage than for arable crops (Holmes 1971; Spedding 1975; Cooper 1976). This indicates ruminant production – dairying, beef or sheep – except under some extreme conditions where non-conventional ruminant production such as red deer may be competitive. Again, detailed comparisons of net metabolizable energy production per hectare – in total and seasonally – between competing regions of the Community, considering both grass and winter forage crops and competing crops such as forage maize, would indicate the areas with competitive advantages for ruminant production. The comparisons are more complex than for arable crops. The forage production is processed through ruminants which have a continuing feed requirement that can be supplemented to a greater or lesser extent by purchased feedingstuffs. The total volume and the seasonality of forage production can be influenced by cultural and conservation practices. Some ruminants (e.g. sheep) are more adaptable to adverse climatic and geographic conditions than others (dairy cattle).

The extent to which the United Kingdom will increase its level of milk production in the next decade or so, when faced with the competition of a structural surplus of milk in the Community, will be greatly influenced by the degree to which U.K. producers have a competitive advantage in feed production to support their advantages of scale of production.

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Beef production from grass and the production of beef stores for finishing elsewhere may well be sectors in which certain areas of the U.K. have climatic advantages. Sheep in the hill and upland areas of the U.K., with their predominant dependence on grass and other non-concentrate feed and their ability to thrive under relatively adverse conditions, are also probably strongly competitive with other areas of the E.E.C. The profound impact of the development and application of technology is shown in broiler production in which breeding and feeding alone have reduced broiler prices by 55% in real terms during the last two decades. There has been a reduction of 18 days (26%) in the time required to reach sale weight, and feed conversion has improved from 3.0:1 to 2.2:1 or less. During this period broiler production has increased by 1200% from 25 M birds to 300 M birds (Richardson 1976). During the same period, average egg yields have increased by 62 eggs per bird, and the real price of eggs has also reduced by 55%. But, for this product, the average consumption has nonetheless fallen from 275 eggs in 1970 to 246 eggs in 1975 (M.A.F.F. 1976). This illustrates that making a product more competitive does not necessarily increase the demand for it; in some instances the effect is merely to temper the extent of the reduction in demand.

Similar, but less dramatic, improvements in the technology of pig production could be demonstrated. For both these cereal-based products – pigs and poultry – there is evidence of a move in production not only towards larger units to take advantage of scale of enterprise in adopting advanced technology but also a move towards the cereal growing areas and the centres of population. This, again, has implications for the future development of these commodities within the E.E.C. Provided no region or Member State has any significant technological advantage over other regions, the production of these commodities may be expected to move towards those regions producing ample cereals and which are adjacent to major conurbations.

Some of the technological advances in the production of other commodities have already been described. These give relative advantages to U.K. farmers only to the extent that they are adopted in this country more rapidly than in competing regions. The high yielding variety of wheat, Maris Huntsman, introduced commercially in the U.K. in 1972 and in France in 1973, provides an example. It is estimated that in 1975 34% (385000 ha) of the winter wheat acreage in the U.K. was planted with this variety (National Seed Development Organisation 1976). But in the same year some 250000 ha of Maris Huntsman were sown in France (6% of their crop area). Within a relatively short period new technology which can be adopted relatively easily by farmers is rapidly disseminated throughout the area in which it is applicable. Technological advances in the production of such commodities as cereals, pigs and poultry, give short term advantages to those producers and regions where they are first adopted. But these advantages disappear rapidly as the new technology is disseminated throughout the sector where it is applicable. The practical adoption of scientific advances is of general application; quite apart from any ethical issues arising from attempts to limit the adoption of new technology to any particular group or region, mankind is naturally inquisitive. 'If a man write a better book, preach a better sermon, or make a better mousetrap, though he build his house in the woods, the world will make a beaten path to his door' (Emerson).

The more sophisticated a new development or scientific advance then the longer and the greater may be the advantages enjoyed by those adopting it early. The concept of metabolizable energy as a guide to the feeding of farm livestock has taken a decade to become established since it was advocated by Blaxter (1962) and the A.R.C. (1965). But it is now becoming

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widely adopted within the United Kingdom, and the resulting improvements in feeding efficiency may give a relative advantage to U.K. producers for a considerable period while their competitors adjust their educational, technical and advisory activities in order to adopt the concept.

The ultimate beneficiaries of technological advance are the consumers who benefit from reductions in the real price of farm products – *vide* the reduction in the real price of eggs and broilers noted above. Thus, it may be appropriate that the ultimate beneficiaries pay, usually via taxation, for the research, development and advisory efforts which contribute to the reduction in the real price of the food they consume. The transient beneficiaries are the progressive producers who adopt new technology to improve their incomes, but as the new technology is adopted by more and more producers, output is affected and the price of the product declines. The less adventurous farmers are then forced to adopt the new technology simply to maintain their incomes. It has been well expressed that 'the average farmer is on a treadmill with respect to technological advance' (Cochrane 1958).

In this way, the speed of development and application of new technology becomes a major determinant of the competitive strength of U.K. agriculture. Thus the scale and effectiveness of a State aided development and advisory service has an important influence on the competitive efficiency of agriculture. The competitive advantages derived from the adoption of new technology are short-lived. The more rapidly they are adopted nationally, the greater is the benefit to national agriculture. The more rapidly they are adopted in competing regions the shorter is the period of advantage to U.K. agriculture.

Developments in technology can offset climatic advantage previously enjoyed by particular regions. A simple illustration is the development of indoor curing of onions which has enabled U.K. producers to compete successfully with Spanish production of onions cured outside; the additional curing costs in the U.K. being competitive with the transport cost for Spanish onions.

Resources devoted to research, development and advisory activities – both State and privately financed – related to the development of agriculture are of significant volume. For instance, the combined annual cost of the A.R.C. and A.D.A.S. is some £68 M. Some of this expenditure is admittedly related to the administration of statutory functions, but many of these are in turn designed to foster the development of agriculture. In addition there are substantial but unquantified private sector investments in agricultural research, development and advice, as well as further State and private investments in agricultural education. The management of these scientific and technological inputs can have, and demonstrably does have, a material effect on the future size and efficiency of British agriculture. Research development and advisory activities are thus strategically important imputs for the ensurance of a continuing greater efficiency in the agricultural industry as a whole.

Agriculture in the United Kingdom can thereby move ahead, and keep ahead, of competition from within the Community by the rapid and widespread adoption of a continuing flow of new technology both to benefit from climatic, institutional and demographic advantages where they exist, and to counteract climatic and geographical disadvantages in other instances. A parallel may be drawn in recent industrial development. The success of some economies in penetrating, and maintaining a dominance in, successive industrial fields is not due to any climatic or natural advantage of production. It is due to the more rapid adoption of continuing technological developments. The momentum of new developments maintains these competitive

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advantages as other competitors strive to remain in business by belatedly adopting earlier technology.

Developments in agricultural technology are increasingly mobile. They can be adopted rapidly in many countries with the resources and the will to innovate: see, for instance, the speed with which new cereal varieties or improved strains of broilers are introduced on a world-wide basis. It is therefore necessary to provide a continuing supply of new technology for rapid and widespread adoption on farms in the United Kingdom if its agriculture is to establish and maintain a lead over its competitors. That is the responsibility and the challenge which has to be accepted by those responsible for national research, development and advisory activities.

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Discussion

G. D. H. Bell, F.R.S. (6 *Worts Causeway, Cambridge*). The point has been made more than once that the improved performance of this country's crops and stock has been achieved by the application of research results and improved technology. Agriculture has had a successful record over several decades in this respect, more particularly so over the last 30 years, and much credit is due to the great contribution of the Advisory Services in the part they have played. These are vitally important inputs under constant scrutiny and careful appraisal. The research in particular has grown and diversified as the demands of agriculture have increased, and the successful applications on the farm of new knowledge, new materials and improved technology

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have become apparent. It is equally apparent that the intensification of the research input has required an adequate input response on the part of the farmer which is ultimately reflected in improved farming practices and rising standards of productivity.

However, this chain of events is only practicable when agriculture is prosperous and the national economy reasonably buoyant. Innovation and intensification of inputs cost money and the price of the product to the consumer must be adjusted accordingly. The present world recession and the state of the economy in this country have fundamentally changed the situation with Britain described as industrially impoverished and out of date. The immediate and long term future are unclear, but the prices of individual articles of food are quoted as significant components of inflation and are the subject of rationing by a large section of the population simply on the basis of cost. These are all of the utmost consequence in any consideration of input management insofar as this affects costs and levels of productivity.

Mrs J. Bower (*Farm and Food Society Secretariat, 4 Willifield Way, London NW11 7XT*). We have been reminded about the tremendous increase in agricultural production accompanied by reduction in manpower. I suggest that the figure given for agricultural workers, which is now something less than 2 %, is spurious, as every farmworker is now supported by an army of industrial workers. We know that energy is running out; agricultural pharmaceuticals which are based on oil are also threatened. There seems to be no paper before this conference dealing with input of manpower to the land, but surely this is a vital issue. A recent Gallup Poll showed that 79 % of people would prefer to live in the country: I am not suggesting that they all want to work on the land, but there is now a world wide movement back to our roots, which could be utilized.

I should also like to say a few words about the broiler industry, which is always put before us as a magnificent example of increased production. The poultry industry causes more environmental pollution than any other form of agriculture. If anyone here has ever smelled one of these intensive poultry houses he will never forget it. There are also problems of flies, rats, noise, extra traffic and roads around these units and there are serious health problems among workers at poultry packing stations. These poultry complexes with all their problems are now proliferating in order to feed, not the hungry millions, but oil rich Arabs, and we are asked to believe this is a good thing. Surely we should consider the minus quantities as well as the plus when talking about extra productivity.

This contribution by Mrs J. Bower was made at the end of a session that had already overrun its time. The chairman said that discussion would be continued later on, but the points were not raised again. A comment by the organizers is therefore included.

The point made by Mrs Bower regarding the spurious nature of the 2 % figure for agricultural workers is, of course, applicable to other classes of skilled workers. No one works in isolation and in complete independence of contributions from other workers in related or supporting fields. The figure given approximates closely to the official returns for those claiming to be agricultural workers. The significance of the supporting industries is fully recognized, their influence usually being international and essential to the economy of world agriculture.

We agree that the minus quantities as well as the plus should be considered when talking about extra productivity. As far as the poultry industry is concerned, however, the claim that

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it causes more environmental pollution than any other form of agriculture does not seem to agree with the facts, and the problems referred to must surely be regarded as exaggerated. On the question of the market being met by the 'poultry complexes' of this country, one can hardly neglect emphasizing the importance of the industry in providing an important and acceptable product for those of moderate income who cannot afford expensive red meat.

The input of manpower is, of course, a vital issue but our concern for this meeting was science and technology. We would only remark that the point here raised by the speaker involves a reversal of all the trends in advanced industrial countries, and in those with mixed economies; it does not seem realistic to consider as feasible the suggestion put forward for increasing the input of manpower.

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