AGRICULTURAL ADJUSTMENT UNIT · UNIVERSITY OF NEWCASTLE UPON TYNE

Trends in Agriculture

B H Davey

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THE AGRICULTURAL ADJUSTMENT UNIT
THE UNIVERSITY OF NEWCASTLE UPON TYNE

In recent years the forces of change have been reshaping the whole economy and, in the process, the economic framework of our society has been subject to pressures from which the agricultural sector of the economy is not insulated. The rate of technical advance and innovation in agriculture has increased, generating inescapable economic forces. The organisation of production and marketing, as well as the social structure, come inevitably under stress.

In February 1966 the Agricultural Adjustment Unit was established within the Department of Agricultural Economics at the University of Newcastle upon Tyne. This was facilitated by a grant from the W. K. Kellogg Foundation at Battle Creek, Michigan, U.S.A. The purpose of the Unit is to collect and disseminate information concerning the changing role of agriculture in the British and Irish economies, in the belief that a better understanding of the problems and processes of change can lead to a smoother, less painful and more efficient adaptation to new conditions.

Publications

To achieve its major aim of disseminating information the Unit will be publishing a series of pamphlets, bulletins and books covering various aspects of agricultural adjustment. These publications will arise in a number of ways. They may report on special studies carried out by individuals; they may be the result of joint studies; they may be the reproduction of papers prepared in a particular context, but thought to be of more general interest.

The Unit would welcome comments on its publications and suggestions for future work. The Unit would also welcome approaches from other organisations and groups interested in the subject of agricultural adjustment. All such enquiries should be addressed to the Director of the Unit.

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TRENDS IN AGRICULTURE

A Review of Current and Future Developments

B. H. DAVEY

Paper No. 3

AGRICULTURAL ADJUSTMENT UNIT
UNIVERSITY OF NEWCASTLE UPON TYNE

1967

FOREWORD

At an early stage in planning the work of the Agricultural Adjustment Unit it was decided that close attention should be paid to the role of research and development in the agricultural industry. Towards this end a Conference on 'Research, Education and Development' was arranged in Harrogate for October 1967 to examine the extent of the resources used in these areas of activity, and the effectiveness with which those resources were used.

At this Conference, Mr. Davey presented a paper on 'Trends in Agriculture: A Review of Current and Future Developments' which described recent developments in the structure and performance of the agricultural industry and gave an indication of the possible directions of change in the industry if present tendencies continue. The paper was intended as a background document for the conference discussions on research, education and extension in the industry. While the other papers presented at this conference constitute a self-contained volume of proceedings, this paper does not, perhaps, have the same relevance within such a publication. At the same time, Mr. Davey has assembled, collated and discussed much that is of value in considering the present position of the agricultural industry. It is consistent with the objectives of the Agricultural Adjustment Unit that his paper should reach a wider audience than the relatively restricted number of persons who participated in the Conference. It has therefore been published as one of the Unit's series of Bulletins.

JOHN ASHTON
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September, 1967

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INTRODUCTION

The objective of this paper is to review the developments which have been taking place in agriculture over the last decade and to assess what changes may be expected during the next ten years or so. The paper, therefore, is in two parts. Firstly, the current position of agriculture within the British economy is analysed and the main features of agricultural development over the last ten years are described. The second and major part of the paper is concerned with the development of agriculture through the 1970's. Predictions have been made, some firmly based and others rather more tentative, about the likely changes in agricultural production, resource requirements, structure and marketing arrangements. This section inevitably contains an element of speculation with which it will be possible to disagree. But at all stages the underlying assumptions are quite explicit and it should therefore provide a working basis for consideration of future requirements in the research, education and extension areas.

I. AGRICULTURE IN THE 1960's

Agriculture and the economy

Agriculture, though declining in relative importance, is an important sector of the economy. In 1965, with forestry and fishing, it accounted for £1,056 million, or 3·4 per cent, of the Gross National Product of £30,904 million.[1] Corresponding to this declining contribution to national income, the movement of labour out of agriculture has been a continuous feature over the last 20 years, and the proportion of the total working population now employed in agriculture is less than 4 per cent.[2] However, this decline in the labour force has been offset by a growth in productivity made possible largely through the application of technological improvements. Agricultural net output has risen from an average of 100 in 1954/55 —1956/57 to 135 in 1966/67, although production has tended to level off in the last two or three years.[3] The expansion in the production of cereals has been particularly marked, as a consequence of higher yields and in the case of barley a substantial increase in acreage. There has also been a steady expansion in the production of meat. Milk production, on the other hand, has remained relatively static, particularly over the last five or six years. Thus, although the U.K. continues to import a large proportion of its total food supplies, the degree of self sufficiency for those commodities which can be produced domestically has increased.

TABLE I

U.K. HOME PRODUCTION AS A PERCENTAGE OF TOTAL SUPPLIES AVAILABLE FROM HOME PRODUCTION AND IMPORTS [4]

Commodity	*Pre-War Average*	1953–4	1960–1	1965–6
Grains	31	57	52	62
Dairy Products	31	40	48	47
Milk (liquid consumption)	100	100	100	100
Meat	47	59	62	69
Eggs	61	80	92	96
Potatoes	96	98	96	96
Sugar	16	19	29	29

Policy

Since the war the major objective of agricultural policy has been to promote and maintain, by the provision of guaranteed prices and assured markets for the main commodities produced on British farms, 'a stable and efficient agricultural industry capable of producing such part of the nation's food and other agricultural produce as in the national interest it is desirable to produce in the United Kingdom, and of producing it at minimum prices consistently with proper remuneration and living

conditions for farmers and workers in agriculture and an adequate return on capital invested in the industry.'[5] While this still remains the basic aim of policy, important developments have recently occurred in British agricultural policy.

Firstly, certain modifications have been made to the system of supporting product prices through deficiency payments under which a payment is made to producers by the government to raise the price realised on the open market to a certain guaranteed level. For some commodities prices had been unstable through the varying pressure of supplies, both home produced and imported, on demand. It was thought necessary, therefore, for the government to take steps to secure greater market stability by relating supplies more closely to demand, not only to achieve a better phasing of supplies on the market, but also to limit the cost to the Exchequer of implementing the price guarantees to a reasonable level. Thus, the guaranteed prices for wheat, barley and pigs are now related to a 'standard quantity', defined as the amount of output which it is thought should be produced domestically, consistent with commitments to traditional overseas suppliers. Prices to producers are likely to be reduced if the standard quantities are exceeded. From April 1962, supplies of imported butter have been regulated by individual country quotas. In 1964, minimum import prices were introduced for cereals and a market sharing arrangement devised for bacon in an effort to control the pressure of imports on the home market. Arrangements have also been introduced to achieve more orderly marketing of eggs. The supply of milk, potatoes and sugar beet has, of course, been regulated for many years so that only beef cattle and sheep remain without schemes for supply management.

With the publication of the National Plan in 1965[6] the Government set out the part which it expected agriculture to play in the future development of the economy in the period up to 1970. Agriculture was assigned a two-part role in the Plan. First, it should help, through increased production, to meet a major part of the growth in demand for temperate foodstuffs and livestock feed and thereby contribute to import-saving. Thus a selective expansion programme was proposed based on a continuation of the improvement in the productivity of the industry. Although no production targets were laid down, considerable emphasis was laid in the programme on the need to increase the production of meat, in particular beef, and for a further expansion of cereal production, partly to supply much of the feed required in livestock production. Secondly, by continuing to improve its labour productivity, which during the period 1954–1964 improved at the rate of 5·1 per cent per annum,[7] agriculture would be expected to release manpower resources to other sectors of the economy where they could be more profitably employed. Although subsequent events have rendered much of the National Plan redundant, the government still adheres to these agricultural objectives and the favourable outcome of the 1967 Annual Review can be interpreted as an incentive for agriculture to achieve them.

Additionally, a number of measures aimed at achieving further increases in productivity and improving farm structure and marketing arrangements have been introduced.[8] The Government stated (in the White Paper following the 1965 Annual Review) that 'if farmers are to be able to earn proper remuneration on the basis of prices consistent with an efficient industry, more must be done to help those occupying holdings capable of providing a reasonable full-time livelihood who at present find it difficult to earn such a livelihood owing to the character or situation of their business.' Steps have been taken, therefore, to extend the scope of the Small Farmer Scheme, to improve credit facilities, to encourage more co-operation between producers and to increase the special assistance given to hill farming areas. But in addition, for those units which are too small to earn a decent living at reasonable product prices, the Government has introduced legislation (Agriculture Act, 1967) which will enable schemes to be introduced to help farmers enlarge their farms by obtaining more land, to encourage them to join together in co-operative efforts to obtain some of the benefits of producing and marketing on a large scale, or, if they wish to give up an unrewarding struggle, to relinquish their farms or retire from farming altogether.

Finally, an attempt has been made to improve the marketing arrangements for agricultural commodities. Co-operative and group marketing have been encouraged. On the horticultural side, wholesale markets are being improved and modernised and a start has been made on a statutory grading scheme for horticultural crops. On the farm side, steps have been taken to improve the marketing of those commodities not covered by producer marketing boards. The Home-Grown Cereals Authority has been established to improve the marketing of home-grown cereals; its main functions are to encourage the more orderly marketing of cereals throughout the season and to provide improved market intelligence on cereals. The 1967 Agriculture Act gave the government authority to set up an independent Meat and Livestock Commission; the Commission's function is to bring about a wide range of improvements in the production, marketing and distribution of fatstock and meat.

Agricultural Development

Since the war agriculture has been going through a period of rapid technical change analogous to the technological revolutions which occurred in farming during the eighteenth and nineteenth centuries. This has been reflected in the rapid rate of increase in the labour productivity of agriculture over the last ten or fifteen years. As already noted, labour productivity during the period 1954–64 improved at the rate of 5·1 per cent per annum; the comparable figure for the economy as a whole was 2·5 per cent. About half the improvement in productivity can be ascribed to the expansion of output, the other half to the reduction in manpower; between 1954–1964 the labour force in agriculture, forestry and

fishing fell by 18 per cent from 1,164 thousand to 950 thousand,[2] due mainly to the decline in the number of workers employed on British farms, and partly to a small decline in the number of farmers. The factors which have contributed to this growth in productivity fall into two broad groups, namely technological improvements and organisational changes.

Much of the growth in agricultural productivity has followed the adoption on a wide scale of the many technological improvements developed by agricultural scientists and disseminated by the educational and extension services. These developments include the introduction of new, higher-yielding varieties of crops, the use of more fertilisers and the introduction of chemical methods of weed, pest and disease control. Similar developments have been taking place in animal production where genetic improvements and new means of controlling and preventing animal diseases have contributed to the rise in productivity. Thus, yields of crops and livestock have increased substantially (Table II).

TABLE II

YIELDS OF SELECTED CROPS AND LIVESTOCK, 1954 and 1964 [9]

	1954	1964
Wheat (cwt. per acre)	22·7	33·0
Barley (cwt. per acre)	21·7	29·1
Oats (cwt. per acre)	18·9	23·6
Potatoes (tons per acre)	7·8	8·9
Sugar Beet (tons per acre)	10·4	14·2
Milk (gallons per cow)	675(a)	780(b)
Eggs (number per bird)	166(c)	206(d)

(a) 1955
(b) 1965
(c) 1954/55 June-May Year
(d) 1965/66 June-May Year. Provisional

At the same time, there has been considerable success in breeding for improved feed conversion in pig, egg and poultry production. The requirement of feed per dozen eggs has probably declined by about 40 per cent in the last fifteen years, while a recent estimate[10] suggests that the feed requirement per lb. of liveweight gain in pig production has declined by 14 per cent in the same period.

The second set of factors contributing to improved productivity can be grouped under the heading of structural and organisational improvements. These structural

changes are themselves composed of two main types. Firstly, there has been some change in the acreage size structure of British farms. These are summarised in Table III.

TABLE III

NUMBER OF AGRICULTURAL HOLDINGS IN U.K.
BY SIZE OF HOLDING [9]

Size of Holding (Acres of Crops and Grass)	*Number of Holdings* 1954	1964	*Difference*
Under 50	347,521	281,982	−65,539
50–149	120,868	104,977	−15,891
150–299	41,237	39,156	−2,081
300 and over..	15,499	18,017	+2,518
Total	525,125	445,132	−79,993

TABLE IV

SPECIALISATION AND SIZE OF ENTERPRISE IN ENGLAND AND WALES [11] [12]

Enterprise	*Number of Holdings with the enterprise* 1960	1965	*Enterprise Size Group*	*Per Cent of Total Enterprise in the Size Group* 1960	1965	*Average annual increase in size of enterprise (Per Cent)*
Dairy Cows	140,109	114,497	50 or more cows	21	30	4·5
Beef Cows	64,050	61,022	50 or more cows	15	19	2·5
Breeding ewes	87,795	83,755	500 or more ewes	16	21	2·5
Breeding pigs	81,843	73,040	50 or more sows and gilts	16	25	8·5
Wheat	77,721	65,373	100 or more acres	26	42	7·5
Barley	90,826	106,292	100 or more acres	41	50	5·5
Main crop potatoes ..	92,327	65,830	50 or more acres	19	27	6·0
Fowls 6 months or over	216,501	187,376(a)	1,000 or more birds	25	46(a)	10·0
Broilers	5,729	2,790	20,000 or more birds	42	71	33·0

(a) 1963. In 1965, there were 158,103 holdings with fowls for producing eggs for eating and 62 per cent of laying fowls were in flocks of 1,000 or more birds.

There was a fall of over 15 per cent in the number of holdings between 1954 –1964. Part of this decline can be attributed to modifications and improvements in the statistics, but it is clear that the decline has occurred among the small farms, with a slight increase being recorded in the number of large holdings.

Secondly there has been a trend towards a greater concentration and specialisation of production. This has been reflected in an increase in the average size of enterprise and an increase in the volume of production originating from large units. In addition, the number of producers of most of the main crop and livestock products has been falling. The figures in Table IV illustrate the trend for England and Wales. Similar developments have been taking place in Scotland and Northern Ireland. Many factors have encouraged this concentration of production and one should be singled out for comment. This is the pressure imposed on farmers by the adverse movement in the cost/price ratio in the last ten years, and in particular, since 1958, the pressure from rapidly rising rents and land values. Farmers who have to meet current land charges have been compelled to intensify their farming systems in order to maintain their incomes.

The changes described above have resulted in a substantial increase in the amount of capital invested in agriculture. Agriculture has become a capital-intensive industry and considerable substitution of capital for labour has taken place. Mechanisation has proceeded apace (Table V).

TABLE V

SOME EXAMPLES OF THE DEVELOPMENT OF MECHANISATION IN AGRICULTURE [13]

	1956	1963
Pick-up Balers	39,830	94,380
Combine Harvesters	32,890	61,810
Grain Driers	9,380	24,760
Forage Harvesters	—	21,470
Complete potato harvesters	1,020(a)	4,060
Complete sugar beet harvesters ..	2,160(a)	13,130

(a) 1954

Considerable investments have been made in farm buildings and other fixed equipment; examples include the provision of winter housing and feeding systems on livestock farms and grain drying, storage and handling facilities on cropping

farms. Thus gross fixed capital formation in agriculture has risen from £104 millions in 1955 to £176 millions ten years later (Table VI).

TABLE VI

GROSS FIXED CAPITAL FORMATION IN AGRICULTURE (£m.) [1]

	1955	1960	1965
Vehicles	18	24	22
Plant and Machinery	60	76	86
Buildings and Works	26	45	68
Total	104	145	176

Much of the additional investment in buildings and works was undoubtedly the effect of the assistance provided by the Government under the Farm Improvement Scheme introduced in 1958. The increase in investment in vehicles, plant and machinery is, of course, a further reflection of the mechanisation of agriculture over the last decade. In addition, a large amount of working capital has been required to finance the expansion in crop and livestock production which has taken place. Table VII illustrates the trend in the amount of capital invested in U.K. agriculture.

TABLE VII

VALUE OF CAPITAL IN U.K. AGRICULTURE [14]

	1937–38 £m	1952–53 £m	1963–64 £m
Landlord's Capital	800	1,850	6,000
Tenant's Capital	450	1,600	2,200
Total Capital	1,250	3,450	8,200
Capital per Man	1,320	3,450	9,460

To sum up, the picture which emerges is that of an industry undergoing a process of modernisation, and improving its efficiency and productivity, by the adoption of new technology, the intensification of the use of capital and by sweeping organisational and structural changes. What, however, do the 1970's hold for agriculture? The answers to this question are sought in the second half of this paper.

II. AGRICULTURE IN THE 1970's

In attempting to predict how the agricultural industry in Britain might develop through the 1970's several broad topics are discussed under the following headings:

(1) The growth in agricultural output required to meet part at least of the additional demand for temperate foods by 1975. This section includes a comparison between possible changes in the pattern of U.K. farm output assuming we join the E.E.C. compared with probable developments in production if we remain outside the Common Market. It is based on predictions of the volume of U.K. agricultural production in 1975 made by Unilever Ltd. and published by the Confederation of British Industry.[15]

(2) Resources in agriculture; a discussion of future trends in agriculture's land and manpower resources and the demand for extra capital.

(3) Farm Structure; an indication of future trends in the number of commercial farm units, scale of production etc.

(4) Marketing and Distribution, including a description of changing consumer requirements for food, developments in food retailing and the likely changes in the relationship between producers, processors and retailers.

Trends in Agricultural Production

Substantial changes in the volume and pattern of production can be expected to occur during the years to 1975 as domestic agriculture strives to meet the growth in demand for temperate foods and make a further contribution to import-saving in accordance with Government policy. Additionally, entry into the Common Market and acceptance by the U.K. of the Common Agricultural Policy would have a substantial effect on the pattern of British agriculture. Future trends in production to 1975 were recently predicted by economists at Unilever Ltd. and published in 1966 by the Confederation of British Industry.[15] Two sets of assumptions were used (a) Britain remains outside the E.E.C. and (b) that she is a full member after the completion of any transitional period. The projections were on the basis of constant 1965 prices; the E.E.C. prices used for 1975 are those which were implemented on 1st July, 1967. No significant changes in the real level of agricultural prices are predicted if we remain outside the E.E.C. These predictions provide a useful working basis for an examination of farming in the 1970's and the following discussion of possible trends in agricultural production are based largely on the findings of the Unilever study.

In the long term, the volume of agricultural output will be determined by the level of producer prices and costs, affecting crop acreages and livestock numbers,

and by technical efficiency, in terms of such factors as yields, feed conversion, labour and capital use. Whether we enter the E.E.C. or not, the improvement in technical efficiency in agriculture, described in Part I, is expected to continue—yields and feed conversion rates will improve—and this will have an upward effect on production. If we join the Common Market, however, the major influence will be changes in the level and pattern of prices and costs, giving rise to substantial changes in farm output. The price changes that would take place at the moment if Britain joined the E.E.C. are shown in Table VIII.

TABLE VIII

U.K. PRODUCER PRICES IN E.E.C.

Product	*Unit*	*U.K. Producer Price*(a) 1965/66 £	*E.E.C. Target Price* £	*U.K. Producer Price in E.E.C.* £	*Per cent change in Producer Price*
Wheat	Long ton	24·6	39·7	37·0	+50
Barley	Long ton	24·7	33·5	32·0	+30
Sugar Beet	Long ton	6·5	6·2	6·2	−5
Beef	Live cwt.	8·9	12·1	12·0	+35
Milk	Pence/gallon	38·25	39·0	40·0	+5
Pigs	s.d./live sc.	32/7d	—	37/3d	+15
Broilers	live lb.	1/6d	—	1/6d	0
Eggs	dozen	3/2½d	—	3/–	−8
Potatoes	Long ton	13·4	—	14·5	+10
Fruit and vegetables	—	—	—	—	−5
Lamb	Long ton (d.c.w.)	350	—	400	+15

(a) including subsidy payments.

The substantially higher cereal prices in the E.E.C. would obviously result in a marked increase in the cereal acreage. When yield improvements are taken into account, it is expected that U.K. cereal production inside the E.E.C. could rise by 45 per cent by 1975. Even if the U.K. remained outside, output could increase by 22 per cent, mainly through higher yields. The expected increases in cereal production inside and outside the E.E.C. and the consequent reductions in imports are summarised in Table IX.

TABLE IX

U.K. PRODUCTION AND IMPORTS OF CEREALS, 1965 and 1975

(million tons)

	1965			*Inside E.E.C.* 1975			*Outside E.E.C.* 1975		
	Home Production	*Imports*	*Total Supply*	*Home Production*	*Imports*	*Total Supply*	*Home Production*	*Imports*	*Total Supply*
Barley	6·80	0·28	7·08	10·80	0	10·80	9·50	0	9·50
Wheat	3·44	4·58	8·02	5·90	3·50	9·40	4·10	3·60	7·70
Maize	—	3·21	3·21	—	1·00	3·40	—	3·15	5·50
Other	2·80	0·53	3·33	2·40			2·35		
Total	13·04	8·60	21·64	19·10	4·50	23·60	15·95	6·75	22·70

Demand for grain, both for human and animal consumption, on the other hand will be rather lower if we enter the E.E.C. than if we stay outside; in 1975, therefore, assuming we join E.E.C. 1·75 million tons of grain (barley and feed wheat) could be available for export. This reflects a decline in the number of grain-consuming livestock units and a switch from systems based on concentrate feeds to grassland systems under the impact of higher feed costs.

The national dairy herd has been more or less static during the last three or four years. In the future, the number of dairy-type cows could decline whether we join the E.E.C. or not. Outside the E.E.C., dairy cow numbers will be determined by the rate of increase in the demand for milk and milk products relative to the rate of increase in yield per cow. Since the demand for milk rises little faster than population growth, while yield per cow rises faster, some decline in cow numbers seems inevitable unless a major programme for replacing existing imports of dairy products is introduced. Moreover, firm prices for beef are more likely to encourage an expansion of the beef breeding herd rather than in dairy cows. Inside the E.E.C., the size of the national dairy herd will be determined by the relative profitability of milk production. Since dairying will become relatively less profitable than beef and cereals as feed prices go up while milk prices remain

fairly stable, a faster rate of decline can be expected as producers switch over from milk production to beef or cereals. In addition, there will be a change in the pattern of production in the E.E.C., as the more or less even E.E.C. milk price throughout the year encourages a shift in emphasis from winter to summer milk production. So far as the beef herd is concerned, the high beef prices in the E.E.C. and the improvement in the profitability of beef production relative to dairying should result in a larger increase in beef cattle numbers inside the E.E.C. compared to the increase which will occur if we stay out.

For pigmeat, poultry meat and eggs, where feed accounts for about 75 per cent of total production costs, the situation in the E.E.C. will tend to be less favourable at first than if we stay outside. The rise in the cost of feedingstuffs will generally be greater than the increase in product prices, leading to a lower level of production than might otherwise be expected. The expected changes in livestock numbers are set out in Table X.

TABLE X

U.K. LIVESTOCK POPULATIONS 1965 and 1975 ('000 Head)

	June 1965	*June* 1975 *Inside E.E.C.*	*June* 1975 *Outside E.E.C.*
Dairy Cows	3,187	2,900	3,050
Dairy Replacements	621	580	590
Beef Cows and Heifers in Calf	1,162	1,400	1,350
Other Beef Cattle	6,881	8,300	8,000
Total Cattle	11,851	13,180	12,990
Pigs	7,979	8,775	9,175
Laying Hens	80,073	68,000	80,000
Broilers	28,500	42,750	48,500

The main change in U.K. meat production will be an expansion in beef production, particularly if we enter the E.E.C. where the higher prices for beef would be an incentive to expand output. For pig and poultry meat, however, output will expand more slowly if we join the Common Market because the effect of any increase in prices will be offset by the rise in feed costs. A similar situation exists for eggs. On the consumption side, consumer prices for meat will increase in the E.E.C., and, since demand for meat is fairly sensitive to price changes, the consumption of meat will not increase as rapidly inside the E.E.C. as it would outside. The exception is poultry meat where consumer prices will probably remain stable.

Poultry meat can, therefore, be expected to gain at the expense of other meats. Changes in the production, imports and consumption of meat by 1975 are summarised in Table XI.

For sugar, vegetables and fruit, a fall in producer prices can be expected if Britain joins the E.E.C. Any consequent decline in acreage, however, will probably be compensated for by higher yields and U.K. production will change little from the 1965 level. If the U.K. remains outside, fruit and vegetable production might rise slowly, but sugar production is not likely to show much increase because of our obligations under the Commonwealth Sugar Agreement. On the demand side, consumption of fruit and vegetables is likely to rise more rapidly if we are in the Common Market as a result of (a) lower consumer prices and (b) the longer availability of seasonal items.

To sum up, the main changes in U.K. agricultural production by 1975 will be a substantial increase in the production of cereals and beef, particularly if we join

TABLE XI

U.K. PRODUCTION, IMPORTS AND CONSUMPTION OF MEAT 1965 and 1975 ('000 Tons)

	1965			1975					
				Inside E.E.C.			*Outside E.E.C.*		
	Production	*Imports*	*Con-sumption*	*Production*	*Imports*	*Con-sumption*	*Production*	*Imports*	*Con-sumption*
Beef and Veal	818	278	1,090	1,060	190	1,250	980	330	1,310
Mutton and Lamb	241	340	573	265	365	630	265	365	630
Pigmeat ..	918	513	1,400	1,010	600	1,610	1,100	580	1,680
Poultry ..	400	12	410	600	15	615	690	10	700

the E.E.C., a relative decline in the size of the national dairy herd and a larger beef herd; a less rapid increase in pig and poultry production in the E.E.C., rather than out, due mainly to the impact of higher feed prices. The effect will be to raise the value of U.K. agricultural output at 1965 U.K. producer prices by about £360 million in 1975 if we are by then members of the E.E.C., or by about £300

million if we remain outside (Table XII). These developments in production will be associated with changes in the resource pattern in agriculture, farm structure and the marketing and distribution of agricultural products. The rest of this paper discusses these changes.

TABLE XII

ESTIMATED INCREASE IN VALUE OF U.K. AGRICULTURAL OUTPUT BY 1975
(at 1965 U.K. Producer Prices)

Commodity	*Increase in Output by* 1975 *In E.E.C.*	*Outside E.E.C.*	*Price* £ *per ton*	*Increase in Value by* 1975 *In E.E.C.* £m	*Outside E.E.C.* £m
Barley (tons)	4·0 m	2·7 m	24·6	98·4	66·4
Wheat (tons)	2·46 m	0·66 m	24·7	60·8	16·3
Other cereals (tons)	−0·4 m	−0·45 m	24·5	−9·8	−11·0
Beef and veal ('000 tons) ..	242	162	330	79·9	53·5
Mutton and Lamb ('000 tons) ..	24	24	350	8·4	8·4
Pigmeat ('000 tons)	92	182	260	23·9	47·3
Poultrymeat ('000 tons)	200	290	224	44·8	65·0
Milk				31·4	33·0
Eggs (a)				12·2	14·4
Potatoes				6·7	6·7
Total				356·7	300·0

(a) Assuming an increase of 8 per cent on value of output in 1965-66 to allow for population increase. Milk and eggs have been adjusted for changes in livestock populations.

Resources in Agriculture

The pattern of resources employed in agriculture has been changing throughout the 1960's. In particular capital has been substituted for labour and during the 1970's agriculture can be expected to become even more capital-intensive as this trend continues. At the same time, the pressure on land for non-agricultural uses will continue to cause a reduction in the area of agricultural land.

Agriculture is, of course, the largest user of land in Britain, but the pressure from the other main users of land—urban development and forestry—has been increasing throughout the present century. Table XIII illustrates the changes in the pattern of land use over the last sixty years.

TABLE XIII

MAJOR LAND USES IN GREAT BRITAIN 1900-1960 [16]

Type of Use	1900 *m. acres*	1935 *m. acres*	1960 *m. acres*
1. Agriculture:			
Crops and Grass	32·4	29·6	28·8
Rough Grazings	12·9	15·8	17·5
Total	45·3	45·4	46·3
2. Woodland	2·8	3·2	4·1
3. Urban Development ..	2·2	3·2	4·5
4. Other Uses (a)	5·9	4·4	1·3
Total	56·2	56·2	56·2

(a) Includes special uses (military, mineral workings, etc.), ungrazed deer forest and a residual area which has escaped enumeration under the other categories. Thus the agricultural areas, particularly rough grazing, may be under-estimated in the earlier years.

The main features are a doubling of the area of urban land between 1900 and 1960, a rise in the area of woodland and a decline in the crops and grass area. These trends may be expected to continue in the future.

So far as the urban area is concerned, more land will be needed for the construction of new towns and the expansion of existing ones. Around the large conurbations in the south-east, the midlands and the north, land will be required for new housing and slum clearance schemes, schools, hospitals, industrial sites and so on. The further development of modern transport systems, particularly motorways and airports, will also make heavy demands on farmland. Thus, by 1975, it is estimated that urban development, may account for 4·9 (a) to 5·15 (b) million acres of Britain's total land area, that is an increase of about half a million acres over 1960. Although some people may deplore this loss of agricultural land for urban developments, particularly if the development is concentrated on the more productive land (as so often seems to be the case), it must be remembered that this provides the industry with a 'windfall profit' which is a useful source of capital to finance the continuing expansion of agricultural output. In any case, it is often inevitable that urban development should occur on the 'best' agricultural land, because, in general, it is not feasible to divert new development to the 'worst' farmland. For instance, it would be ludicrous to site a major new town in a remote hill area, where farmland is of very poor quality, where it would be totally divorced from the existing urban and industrial infrastructure. On the contrary, new towns have to be sited in relation to the existing concentrations of population, as well as to existing industrial areas, and with regard to accessibility to ports, railways and motorways. Similarly, there are sound reasons why motorways should run directly from one conurbation to another, and why airports and seaports should be developed in as convenient a situation as possible to the areas they serve. But where there are alternative sites for a major new development, and if these sites are equally suitable on all other grounds, there is obviously a case for undertaking the development on the site which has least agricultural value. Thus, when planning where new development should be sited agricultural considerations should not be ignored but, inevitably, they will have a relatively minor influence on any decisions which are made.

The pressure on Britain's land area will also increase in the more remote hill and upland areas as additional land is developed for forestry or for the construction of reservoirs for town water supplies. In 1964 there were 4·3 million acres of woodland in Great Britain. Of this privately-owned productive woodland occupied 1·5 million acres and the remainder (1 million acres) was scrub and felled areas.[16] Over the decade 1964–73 the Forestry Commission expects to plant a further 450,000 acres, mainly in upland areas. Thus if new plantings on private land continue at the present rate of 15,000 to 20,000 acres a year, the total area of woodland may reach 5 million acres by 1975. In addition, some land may be affected by the provision of recreational and tourist facilities for an enlarged urban population. For example, the number of National Parks may be increased.

(a) Assuming a population increase of 0·5 per cent per annum and 0·084 acres of urban land per head.
(b) Assuming a population increase of 0·75 per cent per annum and 0·1 acres of urban land per head.

However, there are no prima facie reasons why the productivity of such areas should decline. Moreover, the provision of amenities for tourists (e.g. meals and accommodation, caravan and camping sites, fishing) could become an important source of income for these areas. The development of recreational facilities near towns and cities, however, could have a more direct impact on farming as land is taken for parks and public open spaces, golf courses and for comprehensive recreational development schemes such as the one planned for the Lee Valley.

These changes in land use up to 1975, and their consequent effects on the area of agricultural land, are summarised in Table XIV.

TABLE XIV

LAND USE IN GREAT BRITAIN 1960 and 1975

(million acres)

Type of Use	1960	1975
1. Agriculture:		
Crops and Grass	28·8	28·4–28·15
Rough Grazing	17·5	16·6
Total	46·3	45·0–44·75
2. Woodland	4·1	5·0
3. Urban Development	4·5	4·9–5·15
4. Other Uses	1·3	1·3
Total	56·2	56·2

A further contraction in the agricultural area may, therefore, be expected by 1975. As the area of woodland increases, by 0·9 million acres, the rough grazing acreage will decline by a similar amount. The expansion of urban development will affect mainly the crops and grass acreage which will fall by about half a million acres. It follows, of course, that if a higher volume of output is to be produced from a smaller acreage a further improvement in the productivity of land will be needed. This can be achieved by the development of yet higher yielding crop varieties, increased fertiliser use on both arable crops, and, especially, grassland, and the improvement in stocking densities through better grassland management. Given these predictions of a decline in the agricultural area of abour 3 per cent by 1975, an improvement of approximately 20 per cent in productivity per acre would be required to achieve the projected increases in agricultural output. Provided

that the improvements in yields over the last decade continue, there should be no difficulty so far as crop husbandry is concerned in achieving the desired increase in productivity. But a much faster rate of increase will be required in the per acre productivity of grazing livestock production than has occurred hitherto.

Farm Structure

Structural changes have been taking place in agriculture in recent years, in particular farms have become fewer in number and larger in size (including multiple occupancies) and production has become more specialised and concentrated into fewer hands.

The number of farm units will continue to fall during the 1970's both as a result of the losses of land from farming to other uses and through the amalgamation of small, uneconomic holdings in larger and more viable units. Indeed, if the Government's policy of encouraging structural improvement through its schemes for grant-aiding farm amalgamations and its assistance for farmers who wish to leave the industry altogether is successful, the trend towards fewer and larger farm units may be expected to accelerate. In 1965 there were some 220,000 full-time farms in the United Kingdom and these were responsible for over 90 per cent of total agricultural output. According to the Ministry of Agriculture the number of full-time farms is already declining by between two and three thousand a year.[11] If this rate of decline continues, then by 1975 the number of full-time farms in the U.K. may be fewer than 200,000 (see Table XV). But as suggested above, the rate of structural change will probably increase as the Government's new structural improvement policy begins to take effect. For example if by 1975 half of the 96,000 holdings at present in the 275–600 standard man-day group were amalgamated into fully commercial units (i.e. above 600 s.m.d.'s) the number of full-time farms would fall to 170,000.

TABLE XV

NUMBER OF FULL-TIME FARMS IN U.K.

1965 and 1975

	1965	1975
(i) Present trends continue with number of full-time farms falling by 2,000 to 3,000 per annum ..	220,000	190–200,000
(ii) Implementation of structural policy —50,000 'small' farms amalgamated into commercial units	220,000	165–175,000

Corresponding to the decline in the number of farms, there will be an increase in the size of the remaining farm businesses. There is no sound basis on which to base projections of changes in the size structure of British farms and any conclusions which are drawn must, therefore, be very tentative. It is suggested, however, that, given the success of the structural improvement policy and a total of 170,000 full-time farms, the distribution of farms and output by size of business in 1975 could approximate to the following pattern.

TABLE XVI

ESTIMATED DISTRIBUTION OF FULL-TIME FARMS AND AGRICULTURAL OUTPUT BY SIZE OF BUSINESS IN 1975

Size of Business (s.m.d.'s)	*Number of Farms*		*Per cent of Output*	
	1965	1975	1965	1975
1,200 and over	42,000	50,000	47	55
600–1,199	67,000	75,000	26	30
275–599	111,000(a)	45,000	19	10
Total	220,000	170,000	92(b)	95(b)

(a) includes 15,000 'full-time' farms with less than 275 s.m.d.'s.

(b) the remainder is produced on part-time farms.

Although this may exaggerate the changes over the next eight years, it does indicate how the structure of farming will develop. The major changes which will take place are an increase in the number of large and medium-sized farms and a reduction in small farms. Consequently, a much higher proportion of output will originate on large farms, and the contribution of medium-sized units will also increase; small farms, on the other hand, will become even less important as a source of output than they are at present.

At the same time as these changes in the size and number of full-time farms are taking place, the average size of crop and livestock enterprises will also be changing. Enterprise size will depend upon the interaction between trends in acreages and livestock numbers, improvements in yields and the trend to fewer farms. Table IV illustrated how average enterprise size had increased over the period 1960 to 1965 and how the large production units were increasing their share of total production. The following table illustrates how the average size of the major farming enterprises on full-time farms might develop by 1975. A range of possibilities are shown related to the various assumptions described above.

TABLE XVII

ESTIMATES OF AVERAGE SIZE OF ENTERPRISE ON FULL-TIME FARMS IN 1975

Enterprise	1965	1975 195,000 *Farms*		1975 170,000 *Farms*	
		In E.E.C.	*Outside E.E.C.*	*In E.E.C.*	*Outside E.E.C.*
Wheat (acres)	41	53	38	58	43
Barley (acres)	49	61	55	67	60
Dairy herd (no.)	27	28	29	31	32
Beef herd (no.)	11	15	14	16	15
Breeding ewes (no.)	135	164	164	179	179
Breeding pigs (no.)	12	14	15	16	17

Estimates for laying hens have been excluded because of the limitations imposed by the inclusion in the statistics of small farmyard flocks which depress very substantially the average enterprise size. By 1975, it is likely that the bulk of egg production will be in commercial flocks of several thousand birds.

These changes in average enterprise size will, of course, be compounded from a combination of some producers ceasing production and others remaining in business and increasing their scale of operations. The number of producers of each enterprise will continue to fall,* and an increasing proportion of output will be produced in large-scale units. For instance, by 1975, it is expected that dairy herds of 150 to 200 cows will be commonplace, and the 1,000-cow herd by no means a rarity. Similarly, the arable farming 'empire' of 10,000 acres or more will be a familiar component of the agricultural industry. The current trend towards simplification of farming systems and specialisation of production with more of the output being concentrated into fewer hands will therefore be a major and continuing feature of agriculture in the 1970's. It is difficult, however, to do more than indicate, in fairly general terms, the range of possible outcomes.

Labour and Capital

Since the war there has been a continuous reduction in the size of the agricultural labour force and a concomitant substitution of capital for labour in agriculture. During the 1970's the manpower resources employed in agriculture will be further reduced as the attraction of higher wages and better amenities in towns continues to 'pull' workers away from the countryside. This is a trend which will be halted

* For the purpose of this paper, it has been assumed that the number of producers of each enterprise will decline at the same rate as the fall in the number of full-time farms.

only if wages and working conditions on farms improve relative to other occupations. A rise in wage rates, however, would tend to intensify the other set of factors affecting the movement of labour out of agriculture; this is the 'push' exerted by farmers who, under the pressure of rising labour costs, are reducing through mechanisation and other organisational improvements the labour required to operate their farming systems.

In the decade between 1956 and 1966 the number of regular whole-time workers on British farms declined at the rate of about 3·5 per cent per annum. This annual loss of labour shows no sign of reducing and by 1975 the number of regular whole-time workers may have fallen to around 250,000, compared with 363,000 in 1966. It can be argued, of course, that this trend cannot continue indefinitely and that eventually the size of the labour force will stabilise itself at the level necessary for the efficient management of the crops and livestock on British farms. But this is not a valid argument so long as there is any slack in agriculture's manpower resources. In this connection it is interesting to note that the National Plan envisaged a reduction of 142,000, or 15 per cent, in agriculture's total manpower resources between 1964 and 1970 on the basis of current trends in farming structure and technology. Clearly then, assuming that the pace of structural change is likely to quicken, there is still plenty of scope for agriculture to release labour to other sectors of the economy.

Mechanisation has compensated for the loss of manpower which has occurred in the past. If agriculture is to increase its output, whilst at the same time continuing to release labour, it will be essential that the mechanisation of farming jobs, particularly those which, like root-harvesting, are labour-intensive, should continue. Similarly, there will be a need for the introduction of new labour-saving techniques, for example by the spread of mechanisation to livestock production, by the design of new and improved farm buildings, and by better management of labour in general. These modern techniques will, of course, require a labour force trained to operate them efficiently and there is likely to be pressure on the Agricultural Industry Training Board to ensure that proper facilities are provided by farm institutes and Local Education Authorities to train farm workers in the skills of modern husbandry.

It should be noted in passing that the effects of a declining farm labour force are not confined solely to agriculture. There are also other social effects in those areas where there are no alternative employment opportunities for the displaced labour. For example, there may be a reduction in the facilities provided by the transport, health and educational authorities and by tradespeople. This might give rise to the development of a vicious circle in these areas with fewer farm workers resulting in less adequate amenities; this, in turn, could lead to more workers leaving the rural communities.

If agriculture is to increase its output from less land and with a smaller labour

force it is obvious that a further improvement in the productivity of the industry will be called for. This, in turn, will necessitate the investment of additional capital. It is estimated that the changes in production described above will add (at 1965 U.K. producer prices) approximately £360 million to the value of agricultural output if we have entered the E.E.C. by 1975, or about £300 million if we remain outside. This is broadly equivalent to an increase of £135 to £160 million in agricultural net output (gross product). On the basis of agriculture's current Incremental Capital Output Ratio of 5·4,[17] an additional £730 to £870 million will need to be invested in fixed capital assets—vehicles, plant and machinery, buildings and works—to produce this extra output. By 1975, the annual gross fixed capital formation in agriculture would reach £250 to £265 million compared with £176 million in 1965. In addition, a substantial amount of extra working capital would be required to purchase the necessary livestock and requisites such as feedingstuffs, seeds and fertilisers.

From what sources will this additional capital come? Much of it will be provided by existing and traditional agricultural credit institutions, particularly, so far as short-term working capital is concerned, the joint stock banks. Government grants will, no doubt, continue to be an important source of capital for new buildings (farm improvement grants) and for the purchase of machinery (investment grants) and some capital will be provided out of income earned in current farming activities. The sale of land for urban development has yielded not less than £50 million per annum—and probably considerably more—and part of this has been and will continue to be available for reinvestment in farming, although the Betterment Levy will reduce by about £15 million the total amount available from this source. Some capital might be invested in farming by food manufacturing and processing interests as they become more closely involved in the production of their raw material. On the other hand notwithstanding the greater concentration and increasing scale of farming operations, it seems unlikely that agriculture will be able to raise a significant proportion of its capital requirements through the stock exchange because the returns to be earned in agriculture and the risks involved often compare rather unfavourably with alternative opportunities available to investors. A further problem which is likely to arise by 1975 is the effect of taxation—and particularly capital gains tax—on farming assets; it seems quite likely that in many cases assets may have to be sold in order to meet demands for estate duty and capital gains tax. This would be contrary to the policy of encouraging, through government initiative, the growth of larger and more efficient farming units. It could also render very difficult the formation of capital from savings out of income derived from farming. By 1975 therefore, if the increase in farm size is to continue, it may be necessary to establish a specialised agricultural credit institution which would provide the capital needed to assist the amalgamation of small uneconomic farms into viable units, to stimulate a greater degree of co-operation in production

and marketing, especially between smaller farmers, and to enable commercial farms to add to and improve their fixed equipment. Similar institutions already exist in many countries of Western Europe and entry into the E.E.C. might hasten the formation of a U.K. 'Agricultural Bank'.

Marketing and Distribution

At the same time as changes in the volume of agricultural production, the resources employed in agriculture and the structure of the industry are taking place, developments will also be occurring in the marketing and distribution of food and other agricultural products. In this paper it is proposed only to review in broad terms the developments which seem most likely to take place during the next ten years or so.[18]

Before moving on to predict these developments it is necessary to describe briefly the major features of food processing, marketing and distribution during the 1960's. Four main strands of change and development can be identified as follows:

(1) Technological developments in food processing, for example the prepacking of meat products and the accelerated freeze-drying of vegetables, have occurred. These have been associated with the increasing importance of national brands and the presentation of these brands to consumers in wrapped form. (It should be noted that developments in food technology may take a much more dramatic form in the years ahead. For instance, non-agricultural, that is synthesised, food products are already appearing on the shelves of American supermarkets and this is a development which can be expected to accelerate and spread to this country during the 1970's. In addition these synthetic foods could help to solve the food problem in the developing countries).

(2) Linked to this has been the housewife's increased demand for products which can be prepared and served quickly with the minimum of trouble. An indication of the growing market for these convenience foods is provided by the results of the National Food Survey[19] which show that between 1958 and 1964 the quantity of convenience foods purchased by households increased by 17 per cent.

(3) The major changes in methods of food retailing in recent years have been the rapid increase in the number of supermarkets and self-service stores and, as suggested above, the development of prepacked and branded food items of consistent quality. There has also been a movement into self-service food retailing by large national chains (e.g. Woolworths and Marks and Spencer) formerly not concerned at all, or to only a limited extent, with the retail sale of food.

(4) Production has become more closely geared to the needs of the market. Contract production with the requirements of the processor specified to the

producer both in terms of quantity and quality, and even management, has become an integral part of poultry meat and vegetable production. There has also been a trend towards more orderly marketing of other commodities (e.g. meat, eggs, potatoes and horticultural produce) through the establishment of contractual arrangements between producers, or organisations acting on their behalf, and processors, and in a few cases between producers and retailers.

What are the developments in food marketing and distribution which will occur during the 1970's? Firstly, it seems probable that, in response to pressures of consumer demand and technological progress in the food processing and manufacturing industry, the food available to the consumer will be in a rather different form in the 1970's than at the present time. The housewife will wish to purchase food in a form which reduces the skill and time involved in preparing, cooking and serving it to her family. She will demand consistency in quality so that an identical and standardised product can be purchased from week to week. Eventually, she is likely to replace her frequent, perhaps daily, purchases of food by a once-weekly shopping visit. She will, therefore, require her food to be in such a form that it can be stored for relatively long periods of time. Thus the trend to increased purchases of convenience foods noted above may be expected to continue and perhaps even to accelerate.

Linked with these changes in the type of food required by consumers will be changes in the structure and organisation of food retailing as this country moves more and more towards the pattern which already exists in the United States. During the 1970's the number of self-service retail food outlets will continue to grow whilst concentration within food retailing will cause the total number of outlets to decline. A greater proportion of supplies will be marketed through supermarkets in a highly processed form, usually prepacked and in branded lines associated with a standardised and predictable product. This has important implications for producers. The demand of the food trades for specified produce of consistent quality, coupled with regularity of supplies, will grow. Farmers will be faced with fewer buyers for their output and these buyers will be dominated by a few relatively large retailers and/or processors with clearly defined requirements. Production, therefore, will have to become more orientated to satisfying the needs of the market as specified by the buyer of the final product.

This all points to a substantial increase in the influence of the marketing and distribution system on the pattern and type of production. A growing volume of production will be produced on contract terms with the farmer required to conform to the demands of the processor with regard to the quantity and quality of his product and the timing of its delivery. Moreover, it is likely that retailers, and particularly the large supermarket chains, will wish to integrate the processing and prepacking of the products they sell into their own organisations; in this way the large scale food processors, manufacturers and retailers could become an

important source of capital to the farming industry. The contract farming of the future, therefore, may well include farmer-retailer agreements as well as farmer-wholesaler/processor arrangements. Under these circumstances, farmers may find it essential to increase their market power through the formation of corporate groups to deal directly with the large scale purchasers. Such organisations, acting on behalf of producers, would more likely be able to cope with negotiating contracts, ensuring that produce fully matched requirements in terms of both quality and timeliness, and, in return for this service, obtaining for the producer the appropriate premium for the quality article. But whatever the precise arrangements are, the development of a more integrated marketing and distribution chain from the producer of the raw material right through to the consumer of the final product seems certain to be a major feature of the food and agricultural industries in the 1970's.

Conclusion

The 1970's will see agriculture continuing to undergo a process of modernisation and change. A further expansion in production will be required to meet the anticipated growth in demand for temperate foodstuffs and, perhaps, to replace, rather than merely save, imports. Changes in the pattern of production will occur, particularly if we succeed in our attempts to join the E.E.C., with greater emphasis placed on cereals and beef and less on milk, pigs and poultry. With the continued loss of land to non-agricultural uses and the release of more labour to other sectors of the economy a further improvement in the industry's productivity will be needed. This will call for the investment of additional capital in agriculture and the further improvement of input/output ratios through yield-increasing technological developments and better farm organisation and management. Production will become more specialised; the number of full-time farms will fall, production units will become larger and a higher proportion of output will be produced in large scale units. At the same time, production will become more orientated to satisfying the needs of the consumer as contract production spreads throughout the industry and as processing and retail establishments become more directly involved in the production process.

Much of the increase in the productivity of agriculture in recent years can be attributed to the rapidity with which farmers generally have adopted the latest technological advances developed by agricultural scientists and technologists and demonstrated and disseminated by private and public advisory services. Many of these developments have been described in this paper. During the 1970's an enhanced contribution from agricultural scientists, educationalists and extension workers is imperative if agriculture is to succeed in fulfilling its role in the economy by expanding its output and increasing its productivity.

REFERENCES

1. National Income and Expenditure 1966. H.M.S.O.
2. The British Economy, Key Statistics 1900–1964. London and Cambridge Economic Service.
3. Annual Review and Determination of Guarantees, 1967. Cmnd. 3229.
4. Agricultural Policies in 1966. O.E.C.D. 1967.
5. Agriculture Act, 1947.
6. The National Plan. H.M.S.O. 1965.
7. G. Sharp and C. W. Capstick. The Place of Agriculture in the National Economy. Journal of Agricultural Economics. Volume XVII, No. 1, May 1966.
8. The Development of Agriculture. Cmnd. 2738.
9. S. Robson, Food and Agricultural Statistics. University of Newcastle upon Tyne, 1966.
10. F. G. Sturrock and R. F. Ridgeon. A comparison of Pig Production in England, Denmark and Holland. Occasional Paper No. 11. Farm Economics Branch, School of Agriculture, Cambridge, 1966.
11. The Structure of Agriculture. H.M.S.O. 1966.
12. J. Ashton and S. J. Rogers. Agricultural Adjustment—A Challenge to Economists. Journal of Agricultural Economics. Volume XVIII, No. 2, May 1967.
13. Agricultural Statistics. Ministry of Agriculture, Fisheries and Food.
14. O. T. W. Price. Finance for Farming. Farm and Country, August 1966.
15. Britain and Europe—An Industrial Appraisal. Volume I. Confederation of British Industry. December 1966.
16. Report of Land Use Study Group. Forestry, Agriculture and the Multiple Use of Land. H.M.S.O. 1966.
17. K. Dexter. Productivity in Agriculture. Economic Change and Agriculture. Oliver and Boyd, 1967.
18. J. Ashton and B. H. Davey. Pigmeat Distribution in the Future. The Pig Industry in the 1970's. P.I.D.A. Conference, Brighton, April 1967.
19. Domestic Food Consumption and Expenditure, 1964. Annual Report of the National Food Survey Committee. H.M.S.O. 1966.

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October 1967