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Agricultural Economics Division

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Sources and Allocation of Capital for Investment in Agriculture

by

R. G. CASON, B.Ag.Econ. (New England), Dip.Agric.

July, 1971

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Corrigenda

Economic Report No. 129.

Page 21. Para. 1, line 2. Delete '1957' and insert '1956'.

Page 97. Bottom para. Delete last two sentences and insert:

'The capital requirement for investment in land, was not considered in the estimated requirements for production increases [2] and as discussed previously need not cause an increase in production (pages 16 and 17). Unless capital investment on farms has reached the point of "over capitalisation"⁽¹⁾, farmers who have invested in land should not be experiencing a shortage of capital in relation to their existing holdings.'

Page 106. Para. 11, line 1. Insert 'of investment' after '55 per cent'.

(i)

THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE

AGRICULTURAL ECONOMICS DIVISION

SOURCES AND ALLOCATION OF CAPITAL

FOR INVESTMENT IN AGRICULTURE

by

R. G. Cason, B.Agric. Econ.(New England), Dip. Agric.

SOURCES AND ALLOCATION OF CAPITAL
FOR INVESTMENT IN AGRICULTURE

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SOURCES AND ALLOCATION OF CAPITAL FOR INVESTMENT IN AGRICULTURE

OUTLINE

This report is part of a wider study into aspects of capital investment in agriculture. It presents the results from data collected to show the structure of capital investment in agriculture. The investigation reported here has three main objectives in view.

1. To compare movements in the level of investment and output with predictions for planned growth in investment and output. An attempt is made to determine whether the results can answer the claim that there is a shortage in the supply of capital required for agriculture.
2. To investigate some factors associated with investment in agriculture in the United Kingdom, in Scotland and on individual farm units.
3. To study the structure of investment at the individual farm level by examining the sources of capital, the allocation of capital within the farm firm and the effects on the farm financial position. At the same time, due to the source of the individual farm data, the study should indicate the structure of investment in the North of Scotland.

The study has been based on the farm account data for a sample of 176 farms in the North of Scotland College of Agriculture area and on the national statistics of the United Kingdom and Scotland. The data for national statistics are presented as a time series from 1956 to 1968, to show changes in the structure of investment. The farm account data are given per year and as the average of 3 years from 1965-66 to 1967-68, and on a cross section basis grouped by farm tenure, farm type and farm size in standard man days.

The report consists of four sections. The first presents some popular view points on the current rôle of capital in agriculture in the United Kingdom, and an outline of a theoretical framework for analysing the sources and allocation of capital with respect to its rôle in agriculture. In the second section results from the analysis of national statistics for the United Kingdom and Scotland are presented. The third section contains the analysis of data from the sample of farms, on the allocation and sources of capital at the individual farm level. A final section draws together certain conclusions arrived at from the study.

SECTION I

INTRODUCTION

MEANING OF CAPITAL, INVESTMENT AND CAPITAL GOODS

It is desirable to define the interpretation to be placed on certain of the common terms as they are used in this report.

Capital In this report the term capital refers to money and is synonymous with the term money. The supply of capital is the quantity of money available for investment. Money is the unit of measurement of capital.

Investment Is the process of transforming capital into some form of capital goods. It should be noted that capital can also be invested in various types of securities as well as in capital goods.

Capital Goods Are goods used in the process of production apart from land and labour. Capital goods can be classified as fixed capital or working capital. The classification of capital goods will be explained and defined in greater detail in Section 2 of the report.

A. THE NEED FOR AN INVESTIGATION INTO CAPITAL IN AGRICULTURE.

1. THE CURRENT RÔLE OF CAPITAL IN AGRICULTURE AND IN THE FARM BUSINESS

The current rôle planned for agriculture in the economy is to produce a greater proportion of the nation's food requirements. The intention is to expand agricultural output selectively, using the effect on the long term balance of payments as a guide line. At the same time, this expansion has to take place under conditions of a declining labour supply and increasing capital requirements both for agricultural production and to finance the current movement towards owner occupied farms. The proposals have been set out in various government publications .
[Ref. 1, 2, 3]

These proposals have stressed the significance of the rôle of capital investment to achieve the stated objectives. Estimates have been made of the resource adjustments, improvements in labour productivity and additional capital investment required.

It has been estimated that an extra £232M investment would be required between 1967-72, with an extra £112M required annually after 1972 for additional inputs to maintain the higher level of output.⁽¹⁾ It is estimated that the net annual savings in imports as a result of the proposed investment and expansion of output would be £18M per year [Ref. 2]. The proposals dictate that, at the national level, returns to additional capital investment should be measured as the balance of payments effect of imports saved. However, the measurement of balance of payments effects is complex and is beyond the scope of this report. Any measurements of returns in the report refer to direct returns to capital at the farm level.

Two main sources of capital for agriculture are mentioned: (a) re-invested profits, and (b) borrowing from lending organisations, although no precise recommendation is made about the quantity of additional capital which should be provided from each source.

Additional capital is required for one or a combination of the following functions in the farm business:

- (1) To Increase Output Output can be increased by increasing the ratio of capital to land. Assuming, as in most cases, that the farm enterprises are operating at sub optimum levels of variable inputs in combination with land and fixed capital, output can be increased through the use of capital to increase the level of variable inputs. Extra fertiliser can be applied to crops, new seed varieties purchased, or more concentrates fed to livestock.
- (2) To Reduce Costs Profits can be increased by reducing costs. Capital is used to purchase machinery or buildings which reduce labour costs or other operating costs.
- (3) To Reduce Risk and Uncertainty Farmers use capital to reduce the risk element in farm operations. An investment in larger harvesting equipment reduces the risk of crop loss due to weather, by increasing harvesting capacity. In a normal year there may be no improvement in profits attributable to this investment, but in unfavourable years there may be substantial benefits.

(1) The £232M extra investment includes the cost of new buildings, machinery, equipment and drainage, plus lime, and additional costs incurred as a result of expansion of livestock output which are mainly fertiliser costs. Some of the £232M would be invested after 1972. Additional inputs include fertiliser, seeds, sprays, fuel and power, machinery repairs etc. The cost would increase from 1967 to reach an annual level of £112M after 1972.

Thus the additional investment provides a form of insurance. Insurance can also be bought direct, to cover certain losses such as weather damage, but again capital is needed to buy the insurance.

- (4) To Improve Working Conditions Capital can be invested in goods which improve conditions of work, reduce drudgery or reduce the physical effort involved. There may be no significant increase in output, but there is an increase in real income, e.g. it may lead to more leisure time.
- (5) To Service Fixed Capital In the normal life of the firm, capital goods wear out and depreciate. Capital is required to maintain fixed capital in working order and eventually to replace it with new capital goods.
- (6) To Counteract Inflation Over time prices increase for new fixed capital goods and items of working capital. If the firm is to remain in business over time, additional quantities of capital will be required from revenue or outside sources to cover these price increases.
- (7) To Facilitate Transfer of Land Ownership Capital is required to purchase a farm and to give the operators greater security over his business and over the fixed factors land and structures. Because of the large sums involved, capital for this purpose becomes a limiting factor for many farms. The trend today in the United Kingdom is towards an increase in the proportion of owner occupied farms.
- (8) To Aid Growth of the Firm Growth of the firm can take two forms. At both stages capital is required. Output can be increased as explained in (1) above and the increase maintained by continuing to operate at the higher level of inputs, or with improved husbandry or other technology. If this growth is to continue, however, an expansion in the level of fixed capital will be required at some stage. A vivid example is in livestock enterprises, where livestock output can be intensified, but eventually capital is required for additional buildings and forage machinery. When inflation is superimposed on a situation of growth, the effect becomes complex in relation to the additional items of capital required. The demand for capital will increase for all the above functions for farm firms that are to remain in business. In aggregate, it is evident that capital is becoming an increasingly important resource to agriculture.

2. POPULARLY HELD VIEWS ON THE SHORTAGE OF CAPITAL

Farmers' spokesmen have stressed their conviction that there is insufficient capital available to farmers to allow them to achieve the objectives of the proposed expansion of agricultural

output. They reason that there are limitations to the supply of capital to agriculture, that interest rates are too high, that overdraft restrictions operate etc. If the quantity of borrowings available to farmers is not increased then they can not increase output and the planned expansion of output will not be achieved. Shortage in supply of capital is restricting output. This line of reasoning assumes that capital is the resource which is restricting output, implying that if more capital could be borrowed at the present interest rates or even greater quantities borrowed at lower interest rates, agricultural production at current product prices would be increased.

Spokesmen have also stressed the importance of re-invested profits and, in some instances, this has been regarded as the main source of capital for farmers [Ref. 2, para. 86]. It is argued that farm gate prices must be increased to increase farm incomes, so that the additional income can be used as capital for investment to expand output. This reasoning assumes that the additional income will be re-invested in the farm business and not invested outwith the farm or spent on personal consumption. It ignores the effect of taxation on increased incomes. In addition, there appears to be no reliable figures available of the amounts of additional capital which would be provided for investment as a result of various levels of price increases.

3. OTHER POSSIBLE RESTRICTIONS ON PRODUCTION

There are other factors which affect the problem of the rôle of capital in agricultural production and which do not appear to have been considered by those holding the popular views just expressed.

- (a) The following points should be considered along with the view that capital is limiting the expansion of output:
 - (i) Other resources besides capital can restrict output. For instance, land is in limited supply. Additional output from land can be achieved by improvements in technology, the introduction of new plant varieties, the application of improved husbandry etc., all of which could be restricting factors. Whilst improved technologies require capital before they can be applied in practice, the mere absence of knowledge restricts output to known limits. When the limits imposed by knowledge are extended, expansion of output may be

limited by the reluctance of farmers to adopt new ideas.

- (ii) Capital may be restricting output, but the return to capital on individual farms may be less than its cost, at which point further investment would be irrational until returns are increased and/or costs reduced.
- (iii) There seems little evidence to suggest that production will increase due to capital simply being made available for investment. In general the most significant output response stems from price increases.

Points which should be considered together with the view that Farm prices must be increased are:

- (i) Re-invested profits may not be the main source of capital for additional investment above the normal level of replacement investment. An earlier investigation for the period 1949/50 - 1958/59 showed that farms financed investment out of income, but towards the end of the period there was increasing recourse to the use of borrowed funds to finance additional investment. [Ref. 4, pp 142 - 146]. The report of this investigation predicted that with the increasing capital requirements of farming, and the move towards owner occupied farms, there would be an increase in the need to use borrowed funds in agriculture.
- (ii) There may be a case for reducing the drift of labour from agriculture. With substitution between labour and capital, increased production may be possible only by maintaining the present labour supply and this may occur only if capital is limited.

Looking at these alternative possibilities there appears to be a need for an investigation into the rôle of capital in agriculture, to note the sources of capital and see if it is allocated to achieve the greatest possible output.

B. A NOTE ON THE THEORY OF CAPITAL, INVESTMENT AND INTEREST

Factors affecting the availability of capital for investment in agriculture can be better explained if viewed in a general theoretical framework. The framework for the theory is the concept of supply and demand. Various quantities of capital will be invested at varying costs of capital (rates of interest) and various quantities of capital will be supplied for investment at varying returns to capital (rates of interest).

1. GENERAL CONCEPT OF DEMAND

There is a demand by agriculture for capital along with the demand from all other sectors of the economy. Capital is demanded by management for investment because it can be used to purchase capital goods which produce some output. The net revenue from this output is the return to the capital invested in the goods. The return on capital is determined initially by the productivity of the goods in which it is invested. But the revenue from this output is determined by the price and therefore the demand for the products produced by the capital goods.

Demand for capital is based on the expected return, since the output and revenue from the capital goods cannot be predicted with absolute certainty when the investment decision is made. The longer the period of uncertainty, and the greater the uncertainty of outcome, the greater the risk involved, so the expected return must increase before the capital enters demand considerations. Demand is based on expected return and security for the capital. For comparative purposes, return is measured as rate of return.

Some capital goods can be expected to give a higher rate of return than others. A schedule of yields of various opportunities for investment could be drawn (Fig. 1A) to give a curve DD sloping downwards from left to right. This is a demand curve for investment by all industries, indicating that as the rate of return decreases, more opportunities for investment become possible, hence a greater quantity of capital is demanded.

2. DEMAND BY AGRICULTURE

The demand for capital by agriculture will be determined by the demand and price for farm products and the productivity of the capital goods. Features of the agricultural industry which will affect the demand for capital include:

- (a) the uncertainty of production due to biological and environmental factors;
- (b) the variation in prices for farm products;
- (c) the long life period over which returns must be obtained on certain forms of investment in agriculture, e. g. land, buildings and land improvements or the 1 year production cycle which may apply to short term borrowings.

Agriculture must compete with all other industries in the demand for capital. Because of the above features and the more limited opportunity available, it could be expected that the demand by agriculture would require a larger proportionate fall in the cost of borrowing than total demand to give an equal proportionate increase in demand, i.e. demand by agriculture is inelastic in relation to the total demand curve (Fig. 1A). To obtain capital the rate of return in agriculture must be greater than or equal to that obtained by other industries (OR Fig. 1A). It may sometimes appear that capital is entering agriculture for a rate of return which is less than that in other industries. In these cases farmers, either consciously or subconsciously, will be taking into account non-material benefits such as the security or prestige of land ownership or the desire for a certain way of life, in evaluating their returns to capital.

3. GENERAL CONCEPT OF SUPPLY

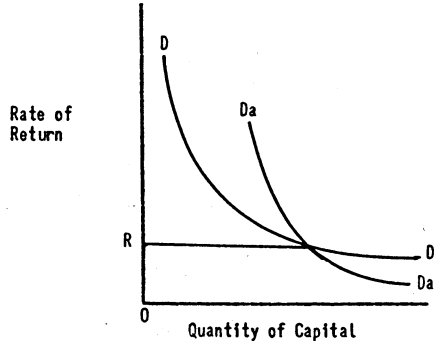
The supply of capital that agriculture might tap can be regarded as the supply of capital to the whole of the "money market"⁽¹⁾ plus government grants. Capital for investment is provided out of income in the form of savings after providing for consumption. Revenue to suppliers of capital is interest, measured as the rate of return. Interest is the reward to suppliers for foregoing present consumption of capital (savings) and supplying it to others for investment.

The supply of capital could be plotted as a curve sloping upwards from left to right, with quantity of capital, or quantity of income on the horizontal axis, indicating that more capital will be supplied as rate of interest increases. (SS Fig. 1B)
The slope of the curve is determined by the level of income and the rate of interest. If income is barely sufficient to provide for consumption then little can be supplied to investment. Given the level of income, the higher the return to savings the greater the

(1) The money market is interpreted in a wide sense, meaning any organised facility which undertakes to transfer money from savers to investors.

Figure 1A

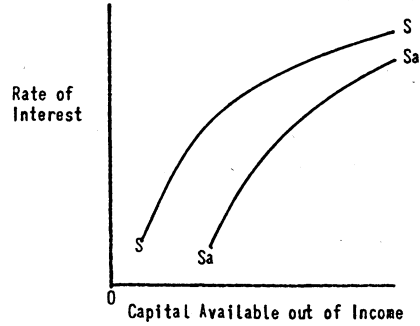
Demand for Capital



DD = Demand by all industries
Da Da = Demand by Agriculture

Figure 1B

Supply of Capital



SS = Market Supply
Sa Sa = Additional Supply from
Agriculture

Note Agricultural demand and supply would be on different horizontal scales from DD and SS.
DaDa and SaSa are superimposed to show their relative slopes.

return for foregoing consumption and the greater the proportion of income which will be supplied for investment. Therefore, the supply curve representing the amount capital provided for investment out of income could be expected to increase in elasticity (change from a steep to a flatter gradient) as interest rates rise, as shown in Figure 1B.

4. SUPPLY TO AGRICULTURE

The first and most commonly used source of capital available to agriculture is provided out of income. Capital from farm income is supplied to the farm, after making an allocation between the competing demands of farm expenses and personal living expenses.

Capital is supplied directly from government revenue through grants and subsidies. There are organisations which obtain capital specifically for allocation to agriculture, e.g. Agricultural Mortgage Corporation, Scottish Agricultural Securities Corporation, Central Council for Agricultural and Horticultural Co-operation. Farm firms obtain capital from banks in direct competition with other industries.

5. IMPERFECTIONS IN APPLYING THE GENERAL CONCEPT TO PRACTICE

In effect, the supply of capital available to agriculture does not follow the simple rules of perfect competition. Government funds are allocated by decisions of policy, not necessarily determined by the expected returns to capital. Organisations have developed which compete for capital on behalf of industries for allocation for specialised purposes e.g. building societies. Characteristics of the agriculture industry with thousands of individual small firms, restrict direct competition in certain sections of the market - farm firms are restricted by their size from competition for capital on the stock exchange.

Farm businesses contribute indirectly to influencing market supply through re-investing non-consumed profits, at lower rates of return than could be obtained from supplying to sections of the money market. Under these conditions agriculture could be receiving an excess supply of capital in relation to the market rate of interest.⁽¹⁾

These imperfections to the general concept of supply stem from sources of supply falling into three categories suggesting that there may be as many different supply functions:

- (a) Banks and specialised lending institutions.
- (b) Farm Income.
- (c) Government subsidies and grants.

It seems then that it should be possible to postulate a second supply curve for (b) falling below the market supply curve. (SaSa, Figure 1B). If farmers prefer to make investments out of profits at unknown rates of return in preference to investing outwith the farm at a given rate of interest, the farm supply curve would be different from the market supply curve. Farmers seem willing to re-invest profits at rates of return lower than the market rate and therefore the farm supply curve would lie below the market curve.

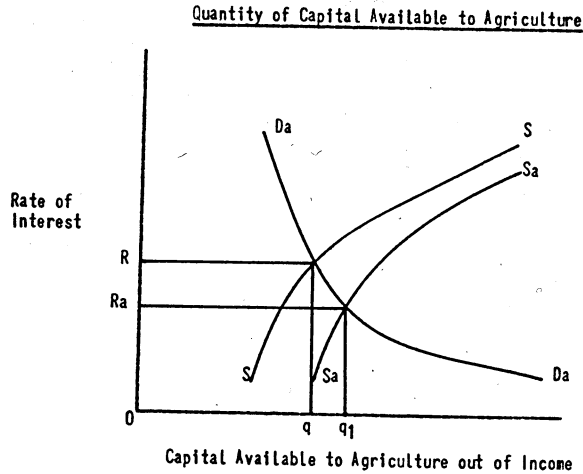
Numerous hypotheses could be postulated about the relative position and slope of the supply curves for Figures 2A and 2B, but no firm conclusion has been drawn here. The relative position and slope of the capital supply function for agriculture would be influenced by numerous exogenous factors, such as import saving, balance of payments, income parities and the political influence of the farming sector.

6. SOLUTION SUGGESTED BY THEORY AND POLICY IMPLICATIONS

As a general concept, capital will be available to agriculture provided the expected return in agriculture is greater than or equal

(1) It could be argued that within the money market outside of Government funds some capital is directed to special uses and does not enter the market e.g. re-invested company profits, building society funds. In effect these funds are competed for within the market, since investors have the opportunity to invest where returns are highest or safest or money is held because of its prospective yield in the case of company profits. Only private loans which are made irrespective of rate of interest are not available for competition within the market. Farm businesses do share in this source as the results of this study show and appear to pay a low rate of interest for this money in some cases.

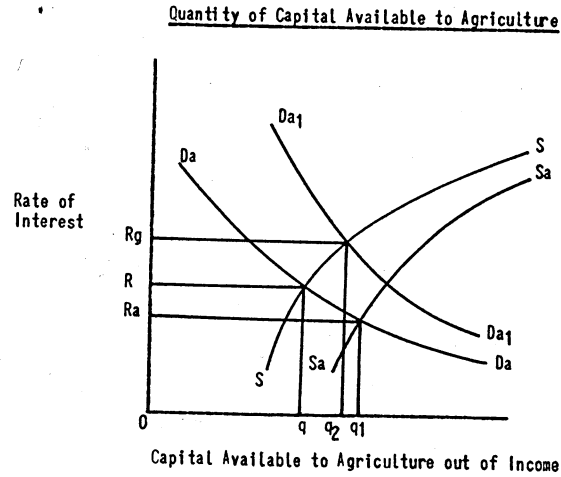
Figure 2A



q = Capital available from "Money Market"

q_1 = Additional capital from farm income

Figure 2B



Agriculture contributes to the market supply of capital available out of income at market rates of interest up to the amount indicated by SS. Additional capital provided by agriculture out of farm income, below the market rate of interest, is represented by the difference between SS and SaSa.

to the expected return in other industries. In Figure 2A, $0q$ of capital is supplied to agriculture from the normal market supply, including farm incomes, at interest rate OR . If the amount of capital available to agriculture at this rate of return is not sufficient to meet the needs of agriculture then it is because the expected rate of return on additional capital in agriculture is less than the current rate of interest. Savers can invest money more profitably in other industries. Additional capital demanded beyond this level can only be obtained at lower interest rates. In reality it is likely that any deficiency between the level of capital provided at competitive market interest rates and that required for the farm to remain in business is made up by the provision of capital out of farm income at rates lower than the market rate of interest. The amount q, q_1 , in Figure 2A is provided from farm income at an interest rate of OR_a which is below the market rate.

This phenomenon could be explained if there were two demand curves for agriculture (Figure 2B). The first, $Da Da$, would represent the demand for capital to service the replacement of fixed capital and provide working capital. This is capital which must be obtained for the business to survive and for which farmers will accept a low return because of their determination to remain in business. Capital is provided for these purposes from the normal market sources which include farm income, at market rates of interest up to amount $0q$ at interest rate OR . The additional quantity used, qq_1 , is provided solely from farm income, at a reduced interest rate OR_a .

A second demand curve $Da Da$, would be for growth capital such as additional machinery and buildings which would only be obtained if the expected return equated with the rate of interest. The expected return for $Da Da$ is equated with the rate of interest OR_g . At this level of return qq_2 of capital can be obtained from the normal market supply after meeting the requirements of the first demand function 0_q [Ref. 5].

To bring about any desired change in the supply of capital to agriculture through the market, policy-makers would need to know the slope of the agricultural demand curve in relation to the slope of the competing demand curves, at the margin. For example, to

achieve a greater proportionate increase in the supply of capital to agriculture than to other industries, agricultural demand must be elastic and competing demand inelastic or less elastic. However, it seems reasonable to expect that the aggregate demand from other sectors of the economy would be more elastic than the demand from any one sector. It seems therefore, that to attempt to increase the supply of capital to agriculture through the money market would cause a greater proportional increase in investment in the rest of the economy, through reducing interest rates generally in the money market.

If supply of capital to agriculture alone is to be increased it must be done by fiscal measures, through price subsidies, grants, or specialised agricultural lending institutions. If it is done through subsidies, the questions must be raised: "What additional investment will be made and at what cost compared to the costs in obtaining the capital in the capital market?", and "What proportion of the additional income will be re-invested in the farm business compared with that allocated to personal consumption or even invested outside agriculture!" The position appears to be that capital made available through specialised institutions at market interest rates would guarantee the most rational distribution of additional capital.⁽¹⁾

(1) The supply of capital from government subsidies and grants is not included in SS, since it is not directly related to the rate of interest.

SECTION 2

INVESTMENT AT THE NATIONAL LEVEL

A. ASPECTS OF INVESTMENT IN AGRICULTURE IN THE UNITED KINGDOM

1. DEFINITION OF CAPITAL GOODS AND MEASUREMENT OF INVESTMENT

The report now turns to an examination of investment of capital in agriculture over a 12 year period from 1956. In order to classify investment it is necessary to define the classification of capital goods into fixed capital and working capital and clarify the distinction between capital and land. The definition of terms is governed partly by the desired classification of items to which the terms are intended to refer, and partly by the practical feasibility of obtaining the demand measures of the respective items. The classification of investment throughout this report is based on the following definitions although the actual measurement varies slightly according to the sources of data.

Capital Goods Goods used in the process of production, apart from land and labour. Capital goods are measured in units of money, hence in everyday language the term "Capital" is often used to refer to capital goods⁽¹⁾, but as far as possible this ambiguity is avoided throughout the report. (See introduction for the meaning of capital). The following characteristics peculiar to capital goods, distinguish them from land:

- (a) Capital goods are a creation of man, produced by other production processes and therefore their supply is not strictly limited.
- (b) Capital goods are used up during the production process and therefore they must be replaced at some stage.

The classification into fixed and working capital is based on the nature of the good, its rôle in the production process and the ease with which the good can be marketed.

Fixed Capital Consists of those goods which do not undergo a transformation themselves in the production process, but they are

(1) Capital can occur in other forms such as time, as explained in the classical Robinson Crusoe case. Time should be measured as the cost of labour. The investment of surplus agricultural labour on farm improvements is a source of capital which would be difficult to measure.

subject to wear and depreciate in value with use and time. They may be physically fixed to the ground e.g. buildings, fences. Fixed capital goods tend to be economically fixed implying that they cannot be readily transferred into money. Whilst tractors, cars, and some implements may be readily "traded in" this often results in a loss on value being incurred and necessitates the purchase of replacement capital goods.

Working Capital Consists of all other items of capital goods shown on a balance sheet except land. In general these are goods used for production into output and therefore sale, within the accounting period. Working capital includes the output from production which is unsold (unsold produce) or output that has been sold but revenue not received (debtors). It includes money required to purchase items of working capital (cash). Livestock, including breeding stock, are included as working capital under these definitions. Whilst breeding livestock are sometimes classified as fixed capital, it has been found necessary to include them as working capital throughout this report, since information on investment in breeding livestock from national statistics and farm accounts, is not available on the same basis as investment in other forms of fixed capital.

Land

Since its inception, the study of economics has been concerned about the distinction between land and capital. A distinction is made in this report for clarity in the definition and interpretation of data.

Because of its unique characteristics, land is identified as a separate factor of production from capital goods. It is fixed or diminishing in supply. Therefore, as the demand for land increases so its price increases. Capital goods are combined with land in the process of production. Land is valued in money units like capital goods, but since it is a factor of production distinct from capital it must be measured separately from capital goods. When capital goods become fixed on the land in the form of buildings, land improvements or residuals of fertiliser, then the problem arises of valuing land as distinct from capital goods.

Capital in the form of land is considered in this report, but is not analysed in detail on the following grounds. One aim of the

study is to see if there is a shortage of capital in agriculture which is limiting the increase in the level of capital goods causing a restriction to the increase in output. However, since the supply of land is fixed, investment in land, does not cause an increase in the quantity of land, but only involves a transfer of ownership of a fixed factor. Again, investment in land does not necessarily result in an increase in output from land. The value of land may increase with inflation, but this also does not reflect an increase in the level of capital goods which could increase production. A change of ownership, although it may result in an increase in production through the introduction of improved management, only has the effect of causing a two-way transfer of money within the industry or into and out of the agricultural sector and has no effect on the supply of capital to agriculture. ⁽¹⁾

2. MEASUREMENT OF CAPITAL INVESTMENT IN THE UNITED KINGDOM (AT CURRENT PRICES)

The accurate measurement of net investment requires data on the type, quantity and changing valuation of current capital goods, in order to arrive at the net value of the addition to capital goods. Information in such detail is not readily obtained for statistical purposes. Alternatively statistics on gross investment can be used. These can relate to actual production of capital goods from the source of supply, or to data of expenditure on capital goods. The latter source gives a more accurate measure because it provides data on actual purchases by industry groups. Because inaccuracies are too great, estimates of stock appreciation on an industry basis are not made.

Estimates of gross domestic fixed capital investment are made for the United Kingdom by industry type (Figure 3.) These are published in the "Blue Book" [Ref. 6] and defined as "expenditure on the replacement, additions and major improvements to fixed capital assets located in the United Kingdom" [Ref. 7 p. 281].

¹⁾ Investment in land purchases can take place for purposes other than agriculture, e.g. urbanisation, and forestry. In such cases the land is lost to agriculture and the supply of money for these purchases is not a problem involving the supply of money to agriculture. However, if farmers who lose land in this way wish to continue in farming then the money received from the sale of their land enters into the supply of money available to agriculture, including that available for land purchase.

The figures do not include repairs/maintenance expenditure which, because of difficulties of measurement, is regarded as part of operating costs.

Estimates for agriculture are obtained from various data sources for the following classifications:

- (a) Machinery. Figures are estimated from Machinery production data, plus statistics on imports.
- (b) Vehicles. Estimates are made from censuses of equipment in use on farms.
- (c) New Buildings and Works. Figures for building licences provide estimates of buildings, while Government grants' figures are used to estimate expenditure on ditching, drainage and water supply.

The reliability of figures for capital investment in agriculture is in the range of ± 10 per cent.

It is worth noting the different methods of measurement of capital investment for agriculture. In the "Blue Book" this is measured at the source of supply, whereas the investment recorded from farm accounts for the sample of farms in Section 3 is measured as actual purchases, net of sales and grants.

The measure of gross domestic fixed capital formation, as defined, closely parallels the measure of investment in fixed capital, defined for this study, and is similar to that obtained from a farm account. Gross domestic fixed capital formation can therefore be used as a measure of the level of investment.

The figures on investment in the United Kingdom are presented in time series for the period 1956-1968. A feature inherent in time series data is that figures increase, through an increase in prices over time, without reflecting any increase in physical quantities. To overcome this problem and to measure physical changes, figures can be presented at constant prices.

However, in referring to investment it is the actual money involved which has to be measured. The prime concern is the quantity of capital and the value of capital goods in money terms, irrespective of their physical levels, since it is the price of capital goods on which investment decisions are based. Unless otherwise specified the figures used in this Section refer to current prices.

Constant prices have been used only when comparisons in physical terms were required.

3. TOTAL INVESTMENT IN FIXED CAPITAL IN THE UNITED KINGDOM

Theory has indicated that details of capital should be analysed into categories of demand and supply. The quantity of capital invested in agriculture in relation to the rest of the economy, is shown in Figure 3 and Table 1.

Table 1 Changes in Percentage Composition of Gross Domestic Fixed Capital Formation at Current Prices by Industry Type, United Kingdom 1956-1968

Type of Industry	1956 £M	1962 £M	1968 £M	% Change		
				1956-62	1962-68	1956-68
Agriculture (1)	94 (3.0)	152 (3.2)	211 (2.7)	62	39	125
Forestry and Fishing	8 (0.3)	11 (0.2)	10 (0.1)	38	-9	25
Mining and Quarrying	91 (2.9)	99 (2.1)	137 (1.7)	9	38	51
Manufacturing	854 (27.5)	1,168 (24.7)	1,565 (20.0)	37	34	83
Construction	53 (1.7)	74 (1.6)	161 (2.1)	40	118	204
Distributive Trades	160 (5.2)	300 (6.3)	387 (5.0)	88	29	142
Dwellings	634 (20.4)	891 (18.8)	1,585 (20.3)	41	78	150
Gas, Electricity, Water	342 (11.0)	523 (11.0)	902 (11.6)	53	73	164
Transport and Communication (2)	363 (11.7)	447 (9.4)	887 (11.4)	23	98	144
Other Services (3)	460 (14.8)	1,009 (21.3)	1,887 (24.2)	119	87	310
Balance	44 (1.5)	57 (1.4)	66 (0.9)	30	16	50
Total	3,103 (100)	4,731 (100)	7,798 (100)	52	65	151

Source: National Income and Expenditure, 1969, H.M.S.O.

() = Percentage of Total Gross Domestic Fixed Capital Formation.

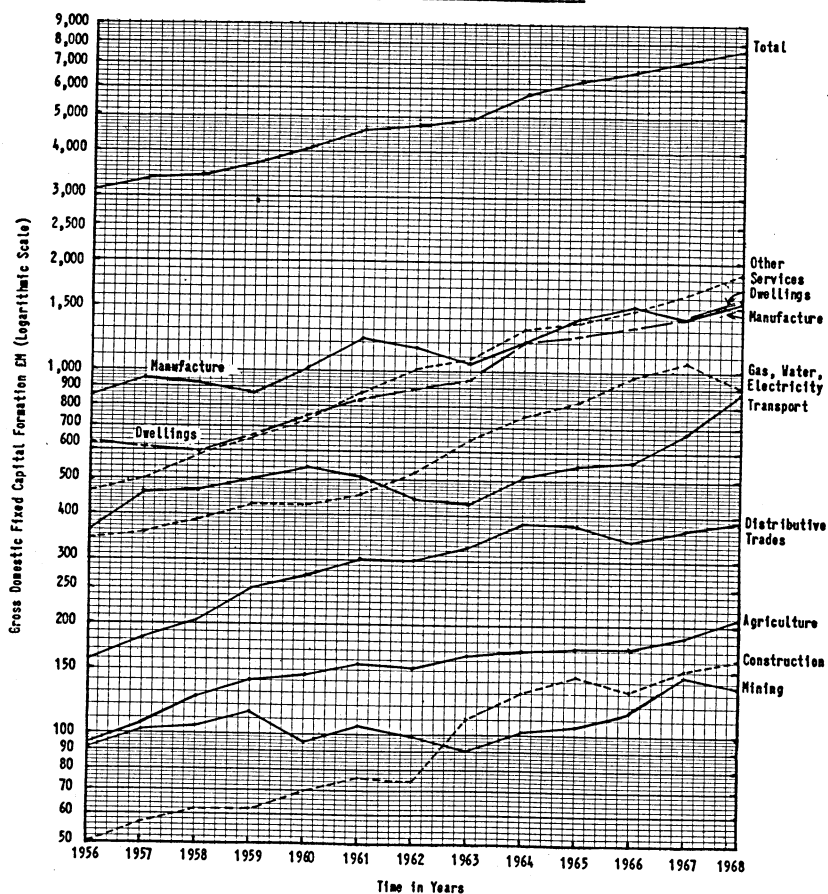
(1) Covers agriculture, stock rearing, horticulture, market gardening and agricultural contracting.

(2) Excludes road haulage and prior to 1960 taxis and private hire cars.

(3) Covers Service Industries; Social Services; Public Services. Service Industries includes Road Haulage and prior to 1960 taxis and private hire cars.

Figure 3

Gross Domestic Fixed Capital Formation by Industry Type,
United Kingdom, 1956-1968, (Current Prices)



Source: National Income and Expenditure 1967, 1969. H.M.S.O.

Fixed Capital, Comprises land, buildings, civil engineering, vehicles, ships, aircrafts, planes and machinery.

Industry definitions. Follow those given in "Standard Industrial Classification" H.M.S.O. 1958.

Total investment in agriculture has increased over 120 per cent from £94M in 1957 to £211M in 1968 compared with an increase of 150 per cent for total investment in the United Kingdom, and therefore the proportion of capital invested in agriculture has declined from 3.0 per cent to 2.7 per cent of the total over the period. The rate of increase in investment in agriculture has not been as high as for the economy as a whole. If the allocation of capital to other industries reflects the market supply and demand conditions, then the demand for investment by agriculture (opportunities for investment) is not as great as from the other sectors of the economy, e.g. construction, and other services. It is worth noting that these same conclusions apply to manufacturing industries which now contribute less to total investment than "Other Services".

Agriculture commands only about 3 per cent of fixed capital formation in the United Kingdom, a very small percentage of total investment in the United Kingdom. Other sectors contributing less than 5 per cent to the total are 'Forestry and Fishing', 'Mining and Quarrying', 'Construction' and 'Distributive Trades'.

Contributing only a small proportion to total investment can be an advantage to agriculture if it is going to require additional supplies of capital from public funds, above those available at the going market price, to achieve the policy objectives. Total investment is one of the major factors affecting the balance of the economy, rate of growth and inflation, through the multiplier effect of increasing the supply of money. Therefore if an increase in supply of capital to agriculture can be achieved without increasing the supply to other sectors the objectives for agriculture could be achieved without seriously affecting the balance of the economy, although the increment would cause above normal expansion in some sectors, e.g. agricultural machinery manufacture and buildings.

Figure 3 is given in semi logarithmic scale. With this scale the large range of values between industry types can be incorporated on the vertical axis without loss of detail. In addition, use of the log scale helps in the interpretation of the data as the slope of the line on the vertical scale indicates the rate of change between years and therefore lines of equal slope indicate the same rate of change.

4. TOTAL INVESTMENT IN FIXED CAPITAL IN AGRICULTURE

The composition of investment in fixed capital in agriculture is shown in Table 2. Investment is allocated to vehicles, plant and machinery and new buildings and works. Whilst these are broad categories they indicate the type of goods in which capital is being invested, so that it can be seen in which particular rôles capital is being used in agriculture. It will be possible to generalise and to see if capital is being allocated in areas which will achieve the desired levels of output.

The greatest proportion of capital is allocated to plant and machinery. This proportion has declined, however, from near 60 per cent in the late 1950's to around 50 per cent from 1960 onwards. The quantity of investment in plant and machinery has increased 106 per cent, but there has been a greater relative increase - 218 per cent - in the quantity of investment in new buildings and works. The quantity of investment in vehicles has remained relatively constant. Linear trends have been fitted to the investment data. The different patterns of the residuals around the trend line show that investment in different types of capital goods does not follow similar movements over time. Total fixed capital investment increased by £7.857M per year over the period. The standard deviation about the trend was £8.5M. On this trend, fixed capital investment would reach between £246M and £267M by the mid 70's. These figures contrast with estimates of a total of £232M, or an additional £56M per year of fixed capital between 1967-72 to achieve the proposed import saving rôle of agriculture. [Ref. 3 Table 3].

The estimated requirements are greatly in excess of the levels of investment which will be achieved from following the previous trend, although the estimates include provision for capital items not included in fixed capital investment, such as fertiliser and lime costs to intensify production.

The rise in investment in buildings and machinery since 1966 may be the result of a response towards meeting the proposed objectives. Buildings investment has increased more rapidly than machinery over the period 1966 to 1968. If this trend continued the proportion of investment in buildings would be the same as for machinery by the mid 70's.

Table 2

Gross Domestic Fixed Capital Formation in Agriculture for the United Kingdom by Asset Type, 1956-1968

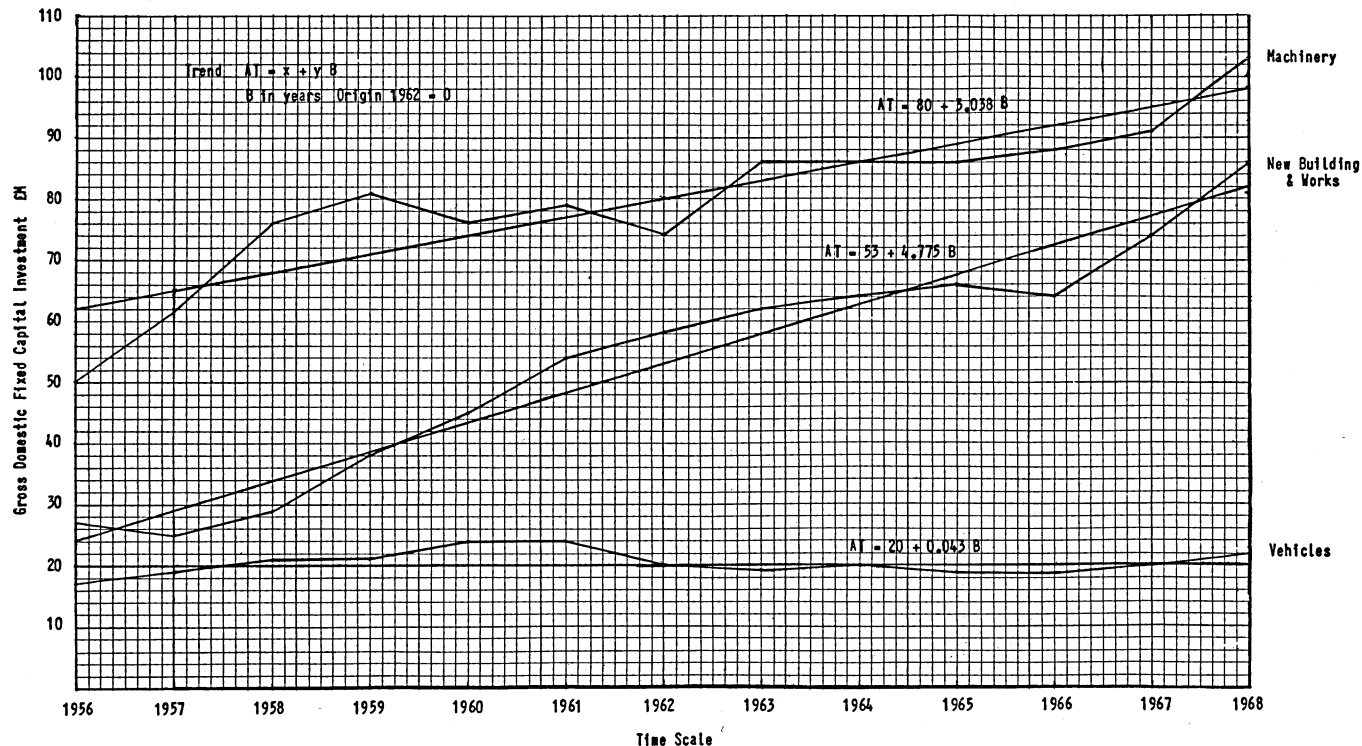
Asset Type	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	£M	£M	£M	£M	£M	£M	£M	£M	£M	£M	£M	£M	£M
Vehicles (1)	17 (18)	19 (18)	21 (17)	21 (15)	24 (17)	24 (15)	20 (13)	19 (11)	20 (12)	19 (11)	19 (11)	20 (11)	22 (10)
Plant & Machinery (2)	50 (53)	62 (58)	76 (60)	81 (58)	76 (52)	79 (50)	74 (49)	86 (52)	86 (50)	86 (51)	88 (50)	91 (49)	103 (49)
New Buildings & Works (3)	27 (29)	25 (24)	29 (23)	38 (27)	45 (31)	54 (35)	58 (38)	62 (37)	64 (38)	66 (38)	64 (39)	74 (40)	86 (41)
Total	94 (100)	106 (100)	126 (100)	140 (100)	145 (100)	157 (100)	152 (100)	167 (100)	170 (100)	171 (100)	171 (100)	185 (100)	211 (100)
Agriculture, Fishing & Forestry Current Prices	102	114	134	151	157	168	163	176	177	181	180	194	221
Constant 1958 Prices	108	117	134	151	157	165	157	168	170	166	162	170	186

- (1) Vehicles: Farm investment in cars and trucks i.e. passenger cars used on business account and vehicles intended mainly for use on public roads.
- (2) Plant & Machinery: Includes all fixed assets other than vehicles, land, buildings and works, ships and aircraft; it therefore covers tractors, implements and fittings and would include portable poultry housing.
- (3) New Buildings & Works: New constructions, extensions and improvements to existing buildings and works, including fittings and machinery which form an integral part of a building or works.
- () = Percentage of Total Gross Domestic Fixed Capital Formation in Agriculture.

Source: National Income and Expenditure, 1969. H.M.S.O.

Figure 4

**Level and Trend of Gross Domestic Fixed Capital Formation
in Agriculture for the United Kingdom by Asset Type, 1956-1968**



Changes of this type in the proportion of investment, suggest that capital is being allocated to goods which will lead to or are the result of an increase in output. The increase in buildings and works is associated with the provision of government grants, increases in stocking rates, construction of grain drying and storage plant and expansion of the dairy herd with addition of expensive dairy buildings, whereas most investment in machinery is required to maintain previous levels of machinery. An increase in output is not dependent on an increase in investment in vehicles. That this figure has remained constant could be associated with a decline in the number of farm units (one car one farm) and the fact that vehicle prices tend to be more stable over time than the costs of buildings and machinery. The effect on output of increased investment in machinery is governed by the types of machinery being purchased. If investment is in machines of a labour saving type or to improve working conditions, there will be no significant increase in total output.

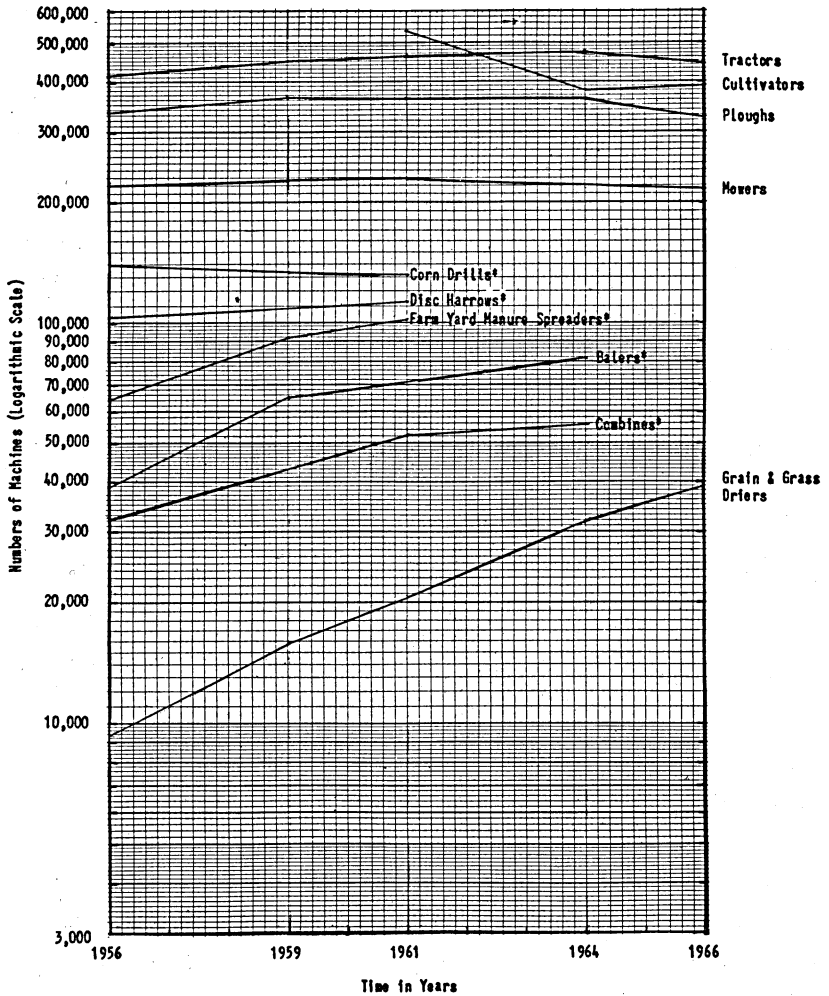
5. INVESTMENT IN MACHINERY

Some indication of the allocation of investment in different types of machinery can be obtained from the changes in numbers of machine shown in the machinery census data. (Figure 5). The census does not indicate value, hence the number of machines should be given some imaginary weighting when used to indicate movements in the quantity of investment, e.g. a large increase in numbers of cultivators would have less effect on capital investment than a similar increase in the number of combines.

The increase in investment in machinery is attributable to the rise in numbers of high cost equipment, grain and grass driers, combines and balers, whilst types which have declined or remained static in numbers are relatively less costly machines - ploughs, corn drills and mowers.

Changes in the pattern of machinery investment are therefore directed towards increased output in corn and livestock production. The rise in numbers of certain machines - combines, grain driers and disc harrows - is associated with arable production, whilst balers, grass driers and manure spreaders are identifiable with increased livestock production. The decline in numbers of cultivators, ploughs, and corn drills may be the result of an increase

Figure 5 Numbers of Agricultural Machines, Tractors and Implements
In Use in the United Kingdom, 1956-1966



Source: Annual Abstract of Statistics, 1963, 1968.

H.M.S.O. Compiled from Machinery Censuses carried out every three years by Agriculture Departments in Scotland, Northern Ireland, England and Wales.

*Figures not available for unplotted time periods.

in machine size effected to improve labour productivity and reduce per unit costs. A contributing factor would be the decline in farm numbers leading to larger farm units, requiring larger machines, but reduced numbers of items of capital equipment.

6. INVESTMENT IN FIXED CAPITAL AND FARM INCOME RELATIONSHIPS

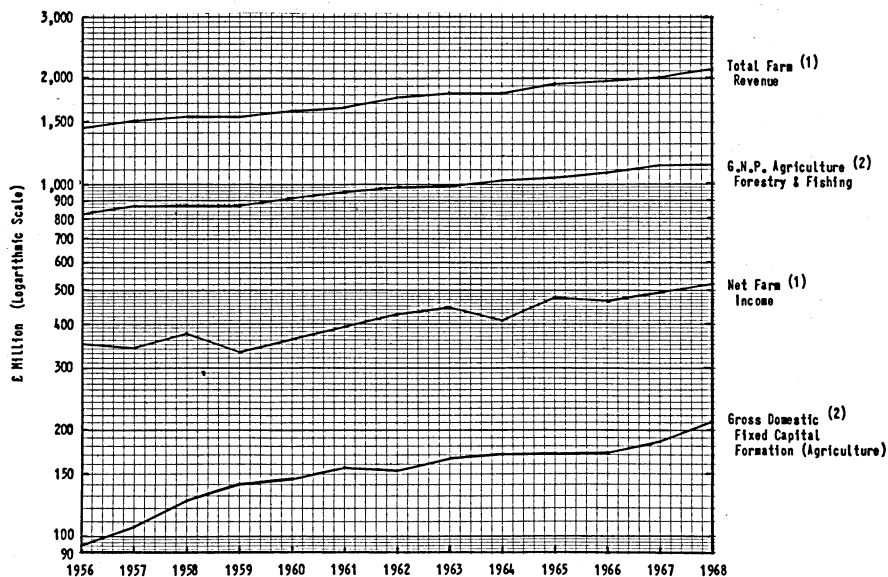
The next step is to investigate factors associated with fixed capital investment. Variations in the supply of capital will have the greatest influence on investment. Theory and hypothesis have suggested that farm income is the main source of capital, and that investment is dependent on past and expected future levels of farm income. Therefore variations in the level of farm income may explain variations in the level of investment. To test this reasoning, fixed capital formation has been related to three measures of farm income as independent explanatory variables, and tested by fitting a simple regression for each variable.

Levels of farm income and gross domestic fixed capital formation are shown in Figure 6. Farm income is measured as total farm revenue, net farm income and gross national product for agriculture, fishing and forestry. Since prices are increasing over time irrespective of changes in output or reduction in costs, all measures show increases over the period 1956 to 1968. There has been a steady increase in total farm revenue from £1,448M to £2,123M and in gross national product from £823M to £1,127M. Net farm income has fluctuated over the period with falls in 1957, 1959, 1964 and 1966.

Actual increases over the period, and the proportion of income by investment are shown in Table 3A. There has been a greater relative increase in investment than in farm incomes; investment increased by 120 per cent whereas the various income levels have increased by only around 40 per cent.

A greater proportion of farm income is now allocated to investment, than in 1956. The proportion of net farm income covered by investment has increased from 27 per cent to 41 per cent. Since net farm income can be allocated to consumption expenditure, investment in the farm, or invested outwith the farm, it is a strong possibility that capital for the increased level of investment is

Figure 6 **Gross Domestic Fixed Capital Formation and Measures of
Farm Income United Kingdom, 1956-1968**



Total Farm Revenue: Income from farm production including crops used on farm for feed i.e. sales of crops, livestock, dairy produce, poultry and horticultural produce, plus the increase in value of farm stocks and work in progress (at cost) plus, production grants and other grants.

Gross National Product: The net addition to output compiled by source of income i.e. income from employment, from self employed persons, and other trading income in agriculture, forestry and fishing. Includes allowances for depreciation and stock appreciation, estimates for perquisites consumed on the farm and income for unpaid family labour.

Net Farm Income: Total farm revenue net of labour, rent, interest, feeds, fertilisers, seeds, machinery running costs and cost of inter-farm livestock purchases and other farming expenses.

Source: (1) Annual Abstract of Statistics 1966, 1968 H.M.S.O.
(2) National Income and Expenditure 1967, 1969 H.M.S.O.

being provided from the increase in net income. In 1968 investment was £117M greater than in 1956, and net farm income £159M higher. This increase in investment is 75 per cent of the increase in net farm income suggesting that not all of an increase in income will be allocated to investment.

Table 3B shows the results from fitting a linear regression of each income measure with gross domestic fixed capital formation as the dependent variable. Regressions at current prices give the best results, but these do not necessarily indicate causative relationships, since both variables are rising over time due to price increases and time effects. Two methods were used to account for these effects: trends were removed from current prices to remove the effect of increases over time and constant price series were used to account for changes in prices.

Table 3A Changes in Farm Income Measures and Proportions Covered by
Gross Domestic Fixed Capital Formation in Agriculture, 1956-1968

Percentage Measure	Farm Income Measures			Gross Domestic Fixed Capital Formation
	Total Farm Revenue	Net Farm Income	Gross National Product*	
	%	%	%	%
Percentage Increase 1956-62	22	21	20	62
" " 1962-68	17	14	14	26
" " 1956-68	47	46	37	124
Percentage Farm Income Measure Covered by Gross Domestic Fixed Capital Formation				
1956	7	27	12	-
1962	9	36	17	-
1968	10	41	19	-

*For agriculture, forestry and fishing.

Table 3B

Statistical Relationships of Fixed Capital Formation

To Farm Income Variables

Explanation Variable	Regression Coefficients Y = a + b X		Standard Error of Estimate ± £M	Significance Test t	Correlation Coefficient R ²
	a £M	b £M			
<u>At Current Prices</u>					
Total Farm Revenue ⁽¹⁾	-92.729	0.140	0.015	9.169	0.88
Net Farm Income ⁽¹⁾	-37.722	0.462	0.079	5.872	0.75
Gross National Product ⁽²⁾	-120.998	0.291	0.036	8.052	0.85
<u>Current Prices, Trend Removed</u>					
Total Farm Revenue ⁽¹⁾	0.553	-0.103	0.087	1.179*	0.10
Net Farm Income ⁽¹⁾	0.539	-0.130	0.125	1.037*	0.09
Gross National Product ⁽²⁾	1.74	-0.323	0.176	1.833*	0.23
<u>Current Prices, Trend Removed</u> <u>& Lagged One Year</u>					
Net Farm Income	1.734	-0.165	0.114	1.442*	0.17
<u>Constant 1958 Prices⁽³⁾</u>					
Total Farm Revenue ⁽¹⁾	-29.603	0.103	0.017	6.123	0.77
Net Farm Income	7.979	0.186	0.039	4.814	0.68

Source: (1) Annual Abstract of Statistics, 1966, 1968, H.M.S.O.
 (2) National Income and Expenditure 1967, 1969, H.M.S.O.
 (3) G.N.P. at constant prices for agriculture, forestry and fishing, not available

*Not Significant at 0.05 per cent level of significance.
 Remainder significant at 0.01 per cent level of significance.

The regression coefficient "b" shows the amount by which investment changes for each unit increase in the respective income measure. It measures the amount of variation in investment which is explained by the respective unit of income. Of the three income variables, net farm income at current prices explains the most variation in fixed capital investment. For every £1M increase in net farm income, investment increases on average by £462,000. This result is statistically significant at the 99 per cent level. The variation of investment around this estimate, is given by the standard error of the estimate, which measures the absolute dispersion of investment around the linear regression line. The standard error for the estimate of investment based on net farm income is £79,000.

R² of 0.75 for net farm income at current prices indicates that 75 per cent of the variation in investment is explained by the relationship with net farm income. R² measures the strength of

the relationship between the two variables and indicates the closeness of levels of investment around the regression line. The nearer R^2 approaches to unity the closer the distribution of the variables approximates to a straight line.

Total farm revenue and gross national product also give regression coefficients significant above the 99 per cent level. The strength of these relationships is also high at 88 per cent and 85 per cent respectively, but because of the small amount of variation explained by "b" the coefficients do not give predictions close to current investment using 1968 figures.

Regressions at current prices show there is a strong correlation of investment with all three measures of farm income at current prices, and any one of these measures could be used for prediction purposes. However, predictions on this basis should be used with caution, since they are based on current prices and will only indicate money values of investment, not gross stock of investment.

The regressions at constant prices show the relationships with the effect of price changes removed. There is a reduction in the amount of explained variation due to net farm income from £462,000 to £186,000 and the strength of the relationships is reduced. i.e. At constant prices £1M increase in net farm income results in an increase in investment of £186,000 at constant prices, in other words in the physical quantity of goods invested. Measured at current prices the increase was £462,000, the difference of £276,000 is a measure of the increase in prices of an identical basket of capital goods over the period. Some of the difference could be attributed to the effect of innovations in capital goods over the period. It suggests that the greatest proportion of an increase in investment associated with an increase in net farm income, goes to compensate for the rise in prices, while less than 50 per cent is due to an increase in the physical quantity of capital goods. The results are still significant at the 99 per cent level, and over $\frac{2}{3}$ of the variation is due to the relationship with net farm income or total revenue (R^2 of more than 0.69). An interesting result here is the positive value for the constant "a" for net farm income, indicating that in physical terms, even when net farm income is zero, £8M worth of investment will still take place.

To test for more significant causal relationships in monetary terms, the effect of time on each variable at current prices has been accounted for by removing the trend values and fitting a regression to the residual. If investment is related to income in a positive manner i. e. when income increases above the trend and investment also increases above the trend, then there would be a positive correlation coefficient. But results of all three measures give negative correlation and regression coefficients, and are not significant at the 95 per cent level. Thus when income is above the trend, investment tends to move below the trend. However, only 10 per cent of the variation is explained by the relationship with total and net revenues. This suggests that an increase in income (above the trend) is not in general allocated to investment in that year. To see if this additional income was allocated to investment in the following year, investment was lagged one year and a regression fitted, but this only increased the degree of the negative relationship.

The analysis in this section has shown that whilst investment increases as farm incomes increase over time, marginal variations in income do not generally result in similar marginal variations in investment. The results are useful for long term decisions. Investment is strongly related to farm income at current prices. Around 45 per cent of net farm income is allocated to investment.

7. LEVEL AND SOURCES OF CAPITAL FOR AGRICULTURE

From knowledge of the real world it can be stated that not all capital in agriculture is required for fixed capital investment and not all investment is provided out of income as may have been previously implied. Capital is also required for working capital and demand is also placed on the money market as well as on farm income.

The main expression of demand for capital by agriculture in the money market is through the level of farm borrowings. Credit sources are outlined in detail in Table 4 with the usual reservations about the reliability of estimates.

Banks are the major source of borrowing for agriculture. Both estimates quoted in Table 4 place a high figure on private sources, indicating that this is an important source of capital for agriculture. It is suggested that private borrowings are used mainly for land

purchases [Ref. 11]. The discrepancy in estimates for sundry lenders is interesting; the detailed list of sundry sources illustrates the increasing number of fringe institutions supplying capital for specialist purposes to the agricultural sector. ⁽¹⁾

Table 4 Estimates of Sources and Levels of Borrowings in
Agriculture for the United Kingdom

Source of Loan	Source of Estimate					
	Bosanquet (Ref. 8), 1965				Hooper (Ref. 12), 1966	
	Landlord's Capital	Tenant's Capital	Total	%	Total	%
Clearing Banks	£M 50	£M 450	£M 500	42	£M 500.0	44
Agricultural Mortgage Corporation	70	-	70	6	78.5	7
Scottish Agricultural Securities Corporation	-	-	-	-	6.5	0
Relatives and Private Mortgages	345	115	460	39	300.0	27
Merchants	-	130	130	11	135.0	12
<u>Sundry Lenders</u>						
Insurance Companies					25.0	
Building Societies					15.0	
Hire Purchase					15.0	
Co-operation					30.0	
Other					20.5	
	20	10	30	2	105.5	10
Total	485	705	1,190	100	1,125.5	100

In referring to borrowings in Table 4 it must be remembered that the figures shown do not represent an annual flow of capital like investment or income. These are estimates of total borrowings at a point in time, not new borrowings taken out in the years referred to. Ideally the most detailed information on the flow of capital to agriculture would be revealed from figures of new borrowings and

⁽¹⁾ Many readers may require further information about the various sources of borrowing. For further details about particular sources of loans for farming, the types of loans serviced by each lending source and detailed information which potential borrowers should present to lenders, see [Refs. 12 and 19].

repayments effected each year. Data of this type are unavailable and only the net effect of repayments plus new borrowings can be derived by calculating the change in borrowings between time periods.⁽¹⁾

Bank advances to agriculture in the United Kingdom rose from £216.6M in 1958 to £410.6M in 1963, an increase of £194M.⁽²⁾ In 1968 total bank loans to agriculture amounted to £515M,⁽³⁾ an increase of over £100M from 1963. The proportion of total bank loans allocated to agriculture has fallen from 11.3 per cent in 1956 to 9.2 per cent in 1966 [Ref. 11 p. 97].

The study sought, amongst other things, to answer the questions: "Is there an adequate supply of capital available to agriculture to meet the present and future needs of the industry?" Clery [Ref. 11] claims that the decline in the proportion of total bank advances to agriculture is evidence that the supply of capital is adequate. Since banks offer the cheapest and easiest source of finance to farmers, and banks like to loan money to farmers, the implication is that if the proportion of total advances going to agriculture is declining while farm borrowings are increasing then farming is getting all the capital it requires and the residual is available to other sectors. But this change in allocation could be due to the demand from other sectors increasing in relation to agriculture. Clery claims "there is little evidence of a shortage of capital in agriculture in relation to the earning capacity of agriculture". Money has been going into the agricultural industry at a correct rate in relation to the earnings obtainable on capital in the industry. However, he admits there may be a shortage of capital to finance land purchase, implying that the return to capital in land is below the market rate of interest.⁽⁴⁾

(1) Calculations of this type do not indicate the flow of funds since if EX is repaid and EX allocated to new borrowings, the supply of capital is EX but the difference measured is zero.

(2) Source: Bank Advances to Scottish Agriculture. G. F. Hendry, Scottish Agricultural Economics Vol. XIV 1969.

(3) Source: Midland Bank Review May, 1969.

(4) Clery was referring mainly to borrowings from commercial banks, but the function of banks is to lend short-term whereas land purchase requires long term funds.

8. TOTAL LEVEL OF CAPITAL IN AGRICULTURE
AND YIELD

To derive estimates of the yield on capital in agriculture, requires some estimate of the total level of capital in the industry. It is the total level of capital goods which is of ultimate significance in relation to total output. Total level of capital indicates the productive capacity of the capital goods for the industry from which the total output can be obtained. Table 5 shows figures at current prices of stocks of capital goods available for production from 1958 and gives an estimate of £2,359M for 1968. The table comprises estimates equivalent to fixed capital and working capital, but the fixed capital does not include buildings.

Gross capital stock is calculated from gross fixed capital formation less capital disposed using the perpetual inventory method to give the gross stock of fixed capital goods available for production. Stocks and work in progress are those items of capital that are held for future production and which can only be used once, or they may represent goods awaiting sale. The combination of these two items is the stock of capital available for production. It is not identical to the normal meaning of tenant's capital since gross capital stock does not account for depreciation of fixed capital goods still in use.

Table 5

Stock of Capital Goods in Agriculture for the
United Kingdom at Current Prices

Item	1958 £M	1961 £M	1963 £M	1964 £M	1965 £M	1966 £M	1967 £M	1968 £M
<u>Gross Capital Stock</u> ⁽¹⁾	670	781	800	814	842	982	997	1,025
<u>Stocks & Work in Progress</u> ⁽²⁾								
Increase	22	38	33	47	50	43	40	58
Total	925	1,035	1,096	1,143	1,193	1,236	1,276	1,334
Total Productive Capital	1,595	1,816	1,896	1,957	2,035	2,218	2,273	2,359

Source: National Income & Expenditure, 1969. H.M.S.O.

- (1) Gross Capital Stock Calculated at 1963 constant prices raised by price index for gross domestic fixed capital formation for the current year. Refers to machinery and equipment only. Calculated by aggregating gross fixed capital formation for the given period, less the value of assets disposed of during the period, all at constant prices. The constant prices are converted to current prices by using price indices as explained.
- (2) Stocks & Work in Progress. Based on data from the agricultural census and annual calculation of farm incomes. Changes in stocks for farm years June to May, are converted to calendar years by taking 5/12 and 7/12 of the appropriate years. Stocks include: raw materials, feeding stuffs, fertilisers, seeds; Work in progress includes: livestock including breeding stock, growing crops, grass and cultivations, stocks of finished products such as hay, potatoes and cereals. Values taken as purchase price less subsidy, or estimated cost of production.

An alternative estimate, called tenant's capital, has been made by Bosanquet (Ref. 8) based on an earlier estimate by Price [Ref. 9]. (Table 6A). Unfortunately Price does not give the source of or method on which his "guesstimate" is based.

Table 6A

Comparative Measures of Total Level of Capital in
Agriculture and Yield for the United Kingdom

Capital Type	National Income and Expenditure		Bosanquet	
	1964 £M	1967 £M	1963-64 £M	1967 £M
Gross Capital Stock	814	997	535	NE
Stocks & Work in Progress	1,143	1,276	1,665	NE
Total Capital Goods	1,957	2,273	2,200 ⁽²⁾	2,700 ⁽²⁾
Net Farm Income		492		492
Less Interest		27		27
Less Labour of Farmer ⁽¹⁾		<u>110</u> <u>137</u>		<u>110</u> <u>137</u>
Return to Capital Goods		355		355
% Return to Capital		15.6		13.1

NE = No estimate given

(1) Based on Bosanquet's assumptions: 220,000 full-time farmers in 1964-65 with a wage cost of £500 each.

(2) These accounts are referred to by Bosanquet as 'Tenant's Capital'.

Since the national income estimate for gross capital stock is a higher figure than the depreciated value of capital stock, Bosanquet's estimate of £2,700M tenant's capital is higher than a comparable figure from national income statistics; likewise his estimate of the increase over the period is higher.

Table 6A provides calculations of estimated yields on the value of capital goods. The average of around 14 per cent is better than that quoted for many individual farms. The return obviously varies between farms according to size and type of farm. Table 6B, gives some estimates of the return to capital, excluding land and buildings, for various sizes and types of farm for England and Wales. The returns range from 1.3 per cent for livestock mostly sheep type farms under 600 S.M.D.'s to 24.5 per cent for pig and poultry farms between 1,800 and 2,400 S.M.D.'s. The return on most farm types lies between 4 per cent and 20 per cent.

Table 6B

Estimated Return* for Management and Investment Income
on Tenant's Capital By Size and Type of Farms
England and Wales, Average for 1967 and 1968

Farm Type	Farm Size in S.M.D.'s				
	275-599	600-1,199	1,200-1,799	1,800-2,399	2,400-4,199
	%	%	%	%	%
Specialist Dairy	9.7	14.8	17.6	16.0	-
Mainly Dairy	11.8	15.5	13.9	18.2	15.5
Livestock mostly sheep	1.3	8.0	15.7	-	-
Livestock cattle & sheep	7.8	13.0	13.1	-	-
Cropping mostly cereals	4.6	15.2	15.2	20.2	19.4
General Cropping	12.1	16.7	21.5	18.9	21.2
Mixed	13.6	12.3	20.1	13.0	15.1
Pigs and Poultry	7.3	12.7	19.9	24.5	20.2

Source: Farm Incomes in England and Wales, 1968. M.A.F.F. H.M.S.O. Tables 4,76 and 59

*Return calculated as average net income less average cost of farmer and wife labour for years 1967 and 1968.

Ranges of this magnitude illustrate the limited importance which can be placed on a single figure estimate of return on capital in agriculture.

Land as a productive asset is not included in the estimate of capital stock since its quantity is fixed or diminishing. For the individual farm, however, land has a high capital requirement and the value of land (quantity of capital) has a significant influence on the return to capital. It will therefore be interesting to examine the return to capital including land.

One estimate of the total value of land is a figure of between £5,500M and £6,500M in 1967 ventured by Bosanquet, based on earlier figures of Price. Once again no basis for the estimate is given. Taking this estimate of land value to refer to the conventional meaning of landlord's capital, and applying the Ministry of Agriculture's estimate of paid and imputed rents, gives a return on landlord's capital of 2 per cent.

		<u>LOW</u>	<u>HIGH</u>
1966-67	Total value of landlord's capital	£5,500M	£6,500M
	Tenant's rent and imputed owner occupier's rent	£129.5M	£129.5M
	Return on landlord's capital	<u>2.4%</u>	<u>2.0%</u>

However, these figures make no allowance for the cost of repairs,

depreciation or other expenses incurred on landlord's capital, which makes the estimates around 2 per cent, a gross return compared with the net estimate of return for tenant's capital.

Including landlord's capital with capital goods gives a measure of return to total capital in agriculture. (Table 6C).

Table 6C Estimates of Return on Total Capital, 1966-67

Capital Type	National Income and Expenditure		Bosanquet	
	LOW EM	HIGH EM	LOW EM	HIGH EM
Landlord's Capital	5,500	6,500	5,500	6,500
Capital Goods	<u>2,273</u>	<u>2,273</u>	<u>2,700</u>	<u>2,700</u>
Total Capital	7,773	8,773	8,200	9,200
Return to Capital Goods	355.0	355.0	355.0	355.0
Return to Landlord's Capital	<u>129.5</u>	<u>129.5</u>	<u>129.5</u>	<u>129.5</u>
Total Return	484.5	484.5	484.5	484.5
% Return	6.2%	5.5%	5.9%	5.3%

Two points of importance emerge: (i) the rate of income on landlord's capital is low in comparison with interest rates and (ii) incorporating the value of land in the stock of capital goods, reduces the rate of income on capital in agriculture by 8 - 9 per cent. The term "rate of income" has been used in preference to the usual "rate of return" in referring to the return on capital when land is incorporated. This term is used to refer to the direct income from the land, whereas rate of return usually refers to all returns. In the case of investment in land the returns also include non material benefits and expected future returns such as allowances for appreciation in land values, tax benefits from the ownership of land and the security factor in land as an investment.

The answer to the question of the adequacy of supply of capital to agriculture comes in two parts. Land is an investment which gives a low rate of income on its market value. The low returns on the capital value of land support the view that there must be a shortage of capital to agriculture for investment in land. But since investment in land only implies a change of resource ownership within the

agricultural industry this is not a shortage to the industry. When land values are incorporated in farming capital the returns on fixed and working capital are reduced to below competitive levels. This argument suggests that if there is a shortage of capital to agriculture then it is a shortage for investment in land. However, the industry picture masks the fact that individual "real farmers" within the industry may well be experiencing difficulties in obtaining finance for investment in both land and fixed and working capital. Returns to tenant's capital on average seem high enough (Table 6B) on most farm types of over 1,200 S.M.D.'s in size to allow these farms to meet the market rate of interest with adequate security. Farms, on average, in these categories should be able to obtain adequate fixed and working capital at market rates.

9. ADDITIONAL ECONOMIC FACTORS ASSOCIATED WITH LEVELS OF INVESTMENT IN FIXED CAPITAL

The supply of capital and level of investment in agriculture has a significant influence on changes in the supply of labour, the level of output and the number of farms. Although these factors may not come directly within the scope of "The sources and allocation of capital" they fall within the scope of the general policy aim to increase output from agriculture and, because of their relation to the supply of capital, will be briefly mentioned here.

(a) Labour and Output

Labour and output are dealt with together here since the yield to labour is measured as labour productivity, i.e. output per unit of labour input. It is planned to achieve part of the increase in output through an increase in labour productivity⁽¹⁾. However, since there is a continual population drift from the land, there must be an additional increase in labour productivity, to maintain output at its current level. Labour productivity is increased through the employment of skilled and experienced labour, training and educating labour, and by increasing the quantity of capital goods available to each unit of labour. The supply of capital therefore affects the productivity of labour.

Figure 7A shows the decline in the number of full time workers in relation to levels of investment in fixed capital. The number of full time employees in agriculture in the

(1) Note: Labour productivity is not an exact measure of the yield to labour since increases in output will also be a response to other inputs such as capital, technology in the form of improved varieties, husbandry methods, etc.

United Kingdom has fallen from 566,000 to 324,000 between 1956 and 1968, a fall of 43 per cent. This represents a decline of 21,000 per year in the labour supply.

Output measured as gross output at constant prices, has increased from £1,478M in 1956 to £2,058M in 1968, a rise of 39 per cent. (Figure 7B). The average annual increase over the period has been £49M. Output per worker, therefore, increased by 143 per cent, from £2,611 to £6,352. The increase in output per worker can be divided into two parts. First, to maintain the 1956 levels of output with the declining labour force, output has increased from £2,611 per worker in 1956 to £4,562 per worker in 1968, an increase of 75 per cent. For the second part, gross output has increased by £580M at constant prices on 1956 levels, which represents an output of £1,790 per worker for the number of employees in 1968. This additional increase in gross output represents a 68 per cent increase on the level of output per worker in 1956, and comprises the balance of the total increase in output per worker.

Estimates of levels of the continued decline in labour up to 1972, vary between 20,000 to 30,000 per year. [Ref. 2]. It is estimated that to compensate for the decline in labour, and improve productivity, increases in output per worker will have to be maintained at greater than 9 per cent per annum, to achieve the output targets [Ref. 2 p. 24]. Figure 7B suggests that the increase in labour productivity has been averaging around 10 per cent per year.

Fears have been expressed that the continued loss of labour from agriculture may become the factor restricting achievement of the output targets [Refs. 2 and 3]. Present trends suggest that the annual loss of labour will be nearer 20,000 per year in which case the required productivity increases would be around $7\frac{1}{2}$ per cent. The availability of capital to maintain and increase the ratio of capital goods to labour, must be a significant factor in achieving these productivity increases.

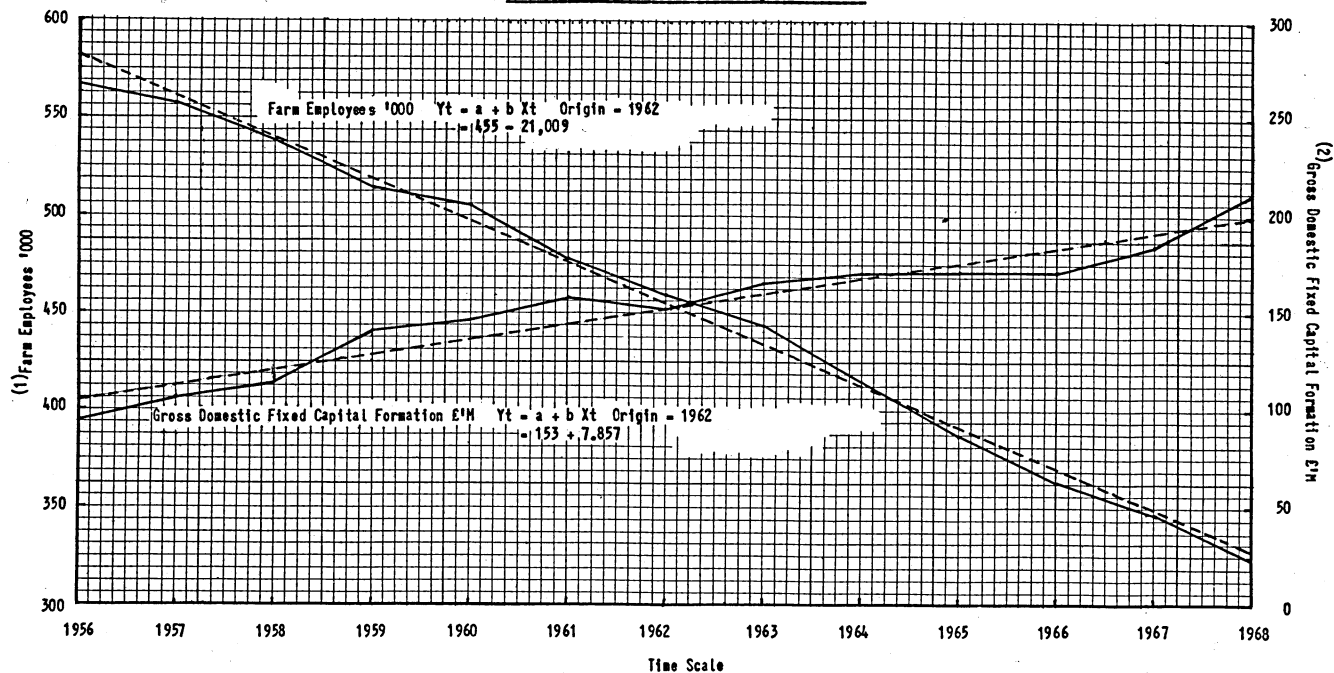
(b) Relation of Capital to Labour

Analysis of the data, has provided some measures of the relation of labour to capital investment. With the work force declining by 21,000 per year (See Figure 7A) and investment increasing by £7.857M per year, there is a substitution of labour by capital over time of £372.

A simple regression with number of employees as the explanatory variable (Table 7) shows that investment increases by £1M for every 362 employees leaving agriculture, i.e. on average, investment has increased by £2,762 for every employee who has left agriculture during the period. However, prices have changed during the period and at constant prices the figure is £4,366 for each employee leaving agriculture. Both these measures are significant at the 0.01 per cent level.

Figure 7A

Trend and Level of Gross Domestic Fixed Capital Formation and Number of
Farm Employees for the United Kingdom 1956-1968

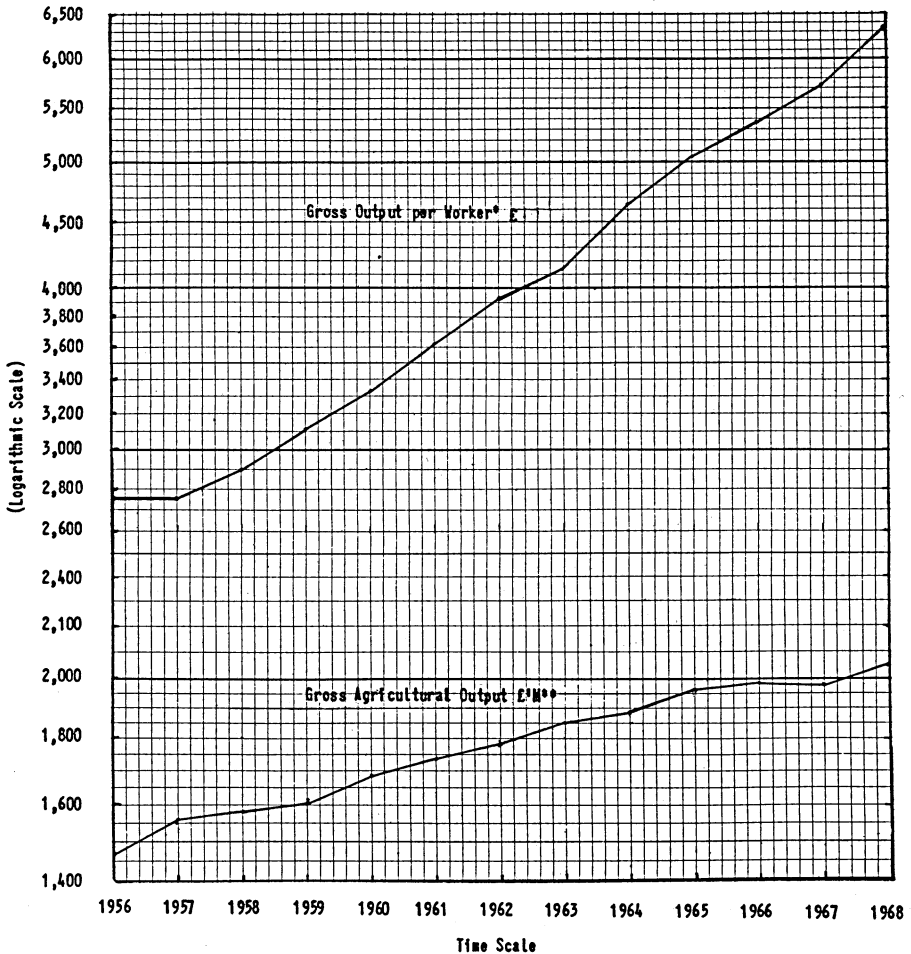


(1) Full-time male and female workers. Excludes labour of farm operator and wife and part-time labour, i.e. does not represent total labour supply.

Sources: (1) Annual Review and Determination of Guarantees 1969 H.M.S.O.

(2) National Income and Expenditure, 1969 H.M.S.O.

Figure 7B Gross Output and Labour Productivity for the United Kingdom, 1956-1968
(Constant Prices)



*Calculated by dividing Gross Agricultural Output by Number of Farm Employees

**Source: Annual Abstract of Statistics H.M.S.O.

Table 7

Regression of Gross Domestic Fixed Capital Formation
on Number of Farm Employees for the United Kingdom

Explanatory Variable	Regression Coefficient $y = a + b X$		Standard Error of Estimate \pm '000s	Significance Test t^*	Correlation Coefficient R^2
	a '000s	b			
Farm Employees (Current Prices)	454	-362	0.04	11.496	88
Constant Prices	454	-229	0.044	5.24	71
Trend Removed	0.538	932	0.255	3.656	55

*All significant at 0.01 level

These are not accurate measures of the substitution between capital and labour since the labour figures exclude operators' labour, and the annual capital investment figure does not include the value of fixed capital on hand. However, a special study, embodying other factors, and based on data from 1948-65 obtains similar results [Ref. 13 p.21]. This study concluded that:

- (i) there was an elasticity of substitution between capital and labour of about 2.0;
- (ii) there were increasing returns to scale for capital and labour of about 4 per cent;
- (iii) the increase in output due to the improved quality of capital goods was about 4 per cent and due to other technological improvements about 5 per cent;
- (iv) there was no evidence of increases due to improvements in the quality of labour.

(c) Changes in Number and Size of Farm Units

It has been mentioned that capital would be required to purchase land, so that efficiency of production could be improved by enlarging existing farms or through the amalgamation of holdings. It is useful to note in Table 8, the changes in farm size and number of farms that have taken place over the period.

There has been a vast drop of 137,000 in the number of holdings in the United Kingdom - a 27 per cent decline between 1957 and 1968. The decline has occurred in all acreage groups, except those over 300 acres. The drop in numbers of holdings is mainly accounted for by units in the less than 50 acre group while there has been a net decline of only 20,000 in the other groups. Some of this drop in numbers would be explained by 'paper amalgamations', after the system of recording was changed to registering farms as whole units rather than as a number of separate holdings.

The figures show that farms are increasing in size either through amalgamations or the acquisition of extra land. The number of farms in the over 300 acres size group has increased. It is possible that the average size of holdings in the other groups is increasing.

Table 8 **Number and Size of Agricultural Holdings***
in the United Kingdom, 1957, 1962 and 1968

Size Group (acres)(1)	Number of Holdings			Change 1957-68	
	1957	1962	1968	No. of Holdings	%
Less than 50	330,415	294,778	212,660	-117,755	-36
50 - 150	118,914	108,513	99,201	-19,713	-17
150 - 300	40,903	39,467	37,639	-3,264	-8
300 & Over	15,967	17,326	19,553	+3,586	+22
Total	506,199	460,084	369,053	-137,146	-27

Source: Agricultural Statistics. H.M.S.O.

(1) From 1960-65 all holdings were classified according to their area of crops and grass. For Northern Ireland from 1957-59 holdings were classified according to their total superficial area.

* Holdings over $\frac{1}{2}$ acre in size.

B. SCOTLAND: SOURCES AND ALLOCATION OF CAPITAL FOR INVESTMENT

1. RELATION TO UNITED KINGDOM INVESTMENT

Up to this stage the report has concentrated on analysing aspects of investment at the national level. A subsequent section will present the results of a detailed investigation into the features of investment on a sample of farms in the North East of Scotland during the period 1965-66 to 1967-68. A general resumé of statistics for investment in agriculture in Scotland is included here to provide a link to relate the two sections together.

Statistics for Scotland will provide information common to both sections, which can be used for comparison purposes. Features of investment in Scottish agriculture can be compared with those for the United Kingdom, and investment features in the North of Scotland College of Agriculture area can be compared with Scotland as a whole. It will be useful to measure the contribution of Scottish agriculture to the supply and demand for capital in agriculture in the United Kingdom, and noting the size of the agricultural industry in Scotland as a proportion of the United Kingdom industry; see if the shortage of capital in Scotland is relatively more or less than for the United Kingdom.

Unfortunately data for Scotland on the same basis as that presented for the United Kingdom in Part A of this section are not published. Even where apparently similar tables are available, the United Kingdom data has been compiled in most cases from different sources using different estimation techniques and different definitions. Therefore comparisons between the two figures may not always be reliable and, although not always referred to, this point should be borne in mind when interpreting any conclusions drawn from these two sets of data. Most of the statistics for Scotland are compiled by the Department of Agriculture and Fisheries for Scotland. The Department supplied most of the figures used and these relate to an identical period to that covered by the sample farm data in the next section.

2. INVESTMENT IN FIXED CAPITAL

Fixed capital investment in agriculture in Scotland is about 12 per cent of the United Kingdom figure. Since 1965-66 Scottish investment has increased by 11.2 per cent to £23.8M; but the comparable increase for the United Kingdom was 23 per cent. Over the period Scottish investment as a percentage of United Kingdom investment has declined slightly. The expansion of investment in Scotland has been less than for the United Kingdom which suggests that either demand has not increased at the same rate (less investment opportunities) or supply has been more restricted. This suggests that there have been relatively fewer investment opportunities in Scotland or a more limited supply of capital in Scotland compared with the United Kingdom.

The composition of fixed capital investment, in asset type categories, is shown in Table 9. The percentage composition is similar to the United Kingdom over the same period, (Table 2), with a greater proportion of investment in machinery, than in buildings.

Table 9 Fixed Capital Investment⁽¹⁾ in Agriculture for Scotland
1965/66 to 1967/68

Asset Type	1965/66	1966/67	1967/68	% composition 1965-68
	£M	£M	£M	%
Cars and Vehicles	2.235	2.097	2.175	10
Machinery	11.079	11.564	12.379	52
Farm Improvements	8.101	8.399	9.275	38
Total	21.415	22.060	23.829	100
% United Kingdom Investment	12.5%	11.9%	11.3%	-

(1) Includes investment in new and second hand machinery.

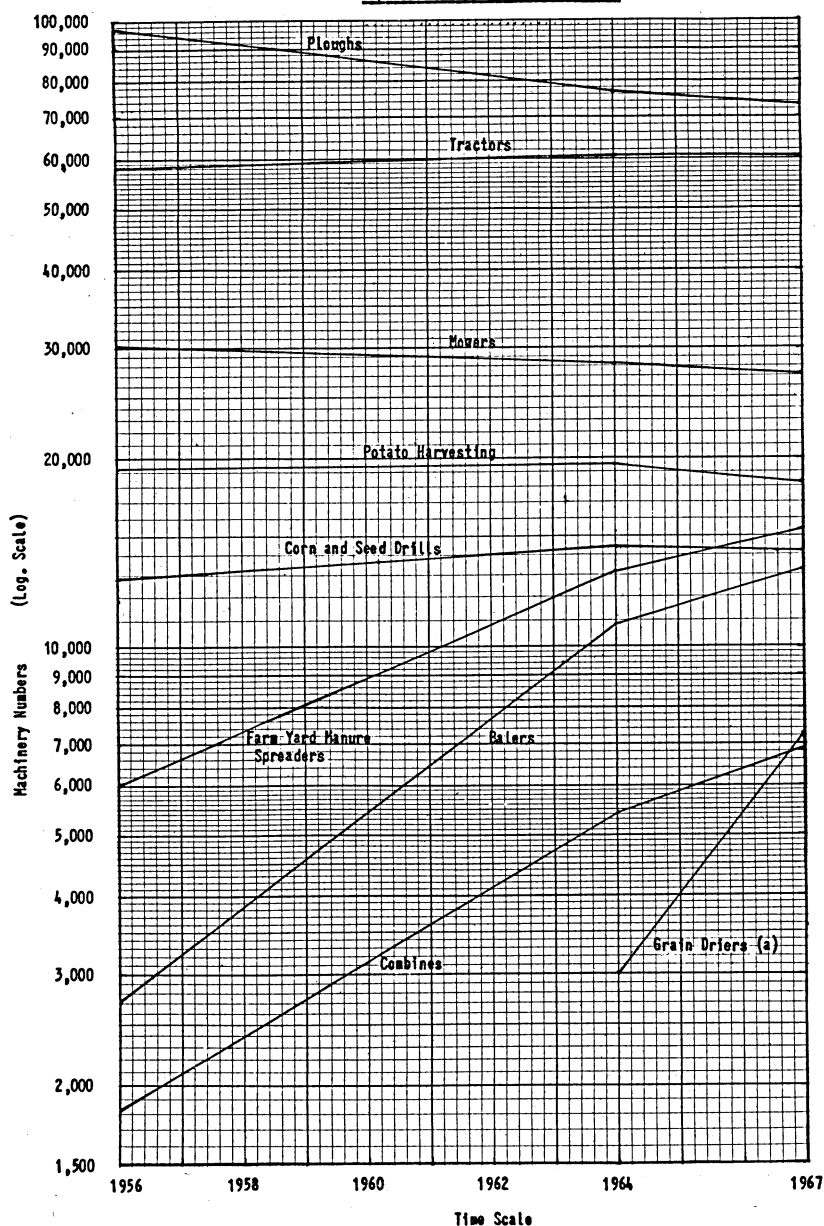
Source: D.A.F.S., Edinburgh. Private communication. Estimates are based on Farm account data, subsidies and grants, and field surveys.

3. INVESTMENT IN MACHINERY

More detail on machinery investment can be shown. The allocation of investment can be indicated by changes in the number of machinery types. Changes in machinery numbers in Scotland, (Figure 8), have been similar to those in the United Kingdom: cultivation machinery, ploughs, mowers, have declined; tractors have remained almost constant; whilst pasture and harvesting

Figure 8

Numbers of Agricultural Machines, Tractors and
Implements in Scotland, 1956-1967



Source: T. D. Sparrow. Mechanisation of Agricultural Production in Scotland.
Scottish Agricultural Economics Vol. XVIII, 1968.
(a) Includes Silos, bins, and floors.

equipment, grain driers, combines, balers, and farm yard manure spreaders have increased. The more expensive and rapidly depreciating types of equipment have increased in number, i.e. received the greatest allocation of investment.

4. LEVEL AND SOURCES OF CAPITAL

Table 10 shows estimates of the supply of capital from the main sources of borrowings in Scotland. The total level of borrowing of around £107M is only around 9 per cent of the estimated total for the United Kingdom shown in Table 4. Banks contribute almost 70 per cent of borrowings and merchant credit provides 28 per cent. Estimates of sources are not as comprehensive as those shown in Table 4. No estimate of private borrowings is given, which for the United Kingdom is estimated to contribute between 26 per cent and 38 per cent of borrowings, i.e. more than merchant credit.

The low percentage of total United Kingdom supply and high proportion of bank borrowings in relation to the United Kingdom suggest a shortage of supply of capital to Scottish agriculture compared with net borrowings for the United Kingdom. However, if borrowings from private sources were estimated at the same proportion of the total as for the United Kingdom, the apparent deficiency in supply would be removed.

Table 10 Estimates of Sources and Level of Borrowings in Agriculture for Scotland
1965/66 to 1967/68

Source of Borrowing	1965/66	1966/67	1967/68
	£M	£M	£M
Scottish Banks ⁽¹⁾			
To Owner Occupiers	60.767	59.020	58.476
To Tenants	11.117	10.850	10.595
Total	71.884	69.870	69.071
Merchant Credit ⁽²⁾	27.289	27.862	29.746
Hire Purchase	2.000	1.700	1.900
Scottish Agricultural Securities Corporation	6.500*	6.500*	6.483*
Total	107.673	105.932	107.200

Source: D.A.F.S. private communication.

(1) Net bank advances

(2) Includes an estimate for outstanding debts on purchases of livestock, machinery, feed, seed, fertilisers, lime.

* Figures taken from estimate given in Table 4.

5. TOTAL LEVEL OF CAPITAL AND YIELD

Estimates of the value of total capital in agriculture in Scotland have been supplied by the Department of Agriculture and Fisheries for Scotland, (Table 11). Total capital at £927.9M is around 10 per cent of estimates for the United Kingdom, (Table 6C).

Table 11 **Estimates of Total Capital and Yields for Scotland**
by Farm Type, 1967

Capital Type	Farm Type							Scotland
	Hill Sheep	Upland	Rearing			Cropping	Dairy	
			Arable	Livestock	Feeding			
Landlord's ⁽¹⁾	£M	£M	£M	£M	£M	£M	£M	£M
Tenant's	73.7	100.7	105.3	11.7	43.2	139.1	172.8	646.5
	12.4	29.6	44.2	6.8	19.4	53.6	71.5	281.4(4)
Total	86.1	130.3	149.5	18.5	62.6	192.7	244.3	927.9
<u>Income</u>	£M	£M	£M	£M	£M	£M	£M	£M
To Landlord's Capital ⁽²⁾	0.8	1.3	2.1	0.4	1.1	3.3	3.7	14.8(4)
<u>Yield</u>	%	%	%	%	%	%	%	%
% Return on Landlord's Capital	1.1	1.3	2.1	3.4	2.5	2.4	2.1	2.0
% Return on Tenant's ⁽³⁾ Capital	14.1	10.9	15.0	21.6	17.2	24.9	19.5	15.9(5)
% Return on Total Capital								6.4(6)

Source: D.A.F.S. Private communication

- (1) Value of land and buildings regarded as owned by the landlord.
- (2) Estimated rent on landlord's capital.
- (3) Refers to sample of farms only. (Source: Financial Results of Scottish Farming in 1967-68, L. V. McEwan, Scottish Agricultural Economics Vol. XIX 1969.)
- (4) Includes estimate for unsampled farms.
- (5) Return to tenant's capital for Scotland calculated as net income less landlord's income = £45M
- (6) Net income calculated from gross output less input, 1967-68. Scottish Agricultural Economics Vol. XIX 1969.

Estimates of yields have been derived from different data sources (Table 11). These differ from the United Kingdom data sources shown in Table 6C). The results show marginal differences in yield between Scotland and the United Kingdom, but no significance can be attached to these owing to the reliability of the data under

comparison and some differences in time periods being compared.

Returns for Scotland are slightly higher than for the United Kingdom - the return on total capital is 6.4 per cent compared with 5.5 - 6 per cent for the United Kingdom. Return on tenant's capital is 15.9 per cent for Scotland, compared with 13 per cent - 15 per cent for the United Kingdom. Estimates for landlord's capital confirm those made for the United Kingdom. Returns on tenant's capital for farm types, however, seem on average to be slightly less than for the United Kingdom (Table 6B).

6. RELATIVE SUPPLY AND DEMAND FOR CAPITAL IN SCOTLAND

Before putting forward conclusions on the relative supply of and demand for capital in agriculture in Scotland the relative sizes of the industries must be taken into account. Some relative measures of size have already been given. Table 12 contains some comparisons.

This table shows that Scottish agriculture is relatively less capital intensive than United Kingdom agriculture. Scotland has only 10 per cent of total capital and 13 per cent of labour, but has 34 per cent of the agricultural land. The ratio of capital to labour is higher for the United Kingdom.

In brief the suggestion is that the requirements for capital are lower in Scotland which could lead to claims of a greater shortage of supply. The substitution of labour by capital has not reached the same level as in the United Kingdom. The proportion of investment is lower in relation to the land and labour resources. Since 1965-66 investment has not increased by the same proportion as in the United Kingdom. The data presented show that yields to total capital are slightly higher in Scotland than in the United Kingdom, but for farm types the yields, on average, are slightly less. Gross Output and net farm income are relatively low as a proportion of the United Kingdom figures and therefore any shortage of capital in Scotland may be caused by the lower output, hence lower yield on capital.

Table 12. Measures of Size, United Kingdom and Scottish Agriculture, 1967-68

Resource	Unit	United Kingdom	Scotland	Scotland as a % of United Kingdom
Land(1)	H acres	48	17	34
Labour(2)	,000	324	41	13
Tractors(3)	,000	460	60	13
Total Capital(4)	£M	9,200	927	10
Gross Output(5)	£M	1,938	212	11
Investment(6)	£M	211	23	11
Borrowings(7)	£M	1,190	107	9
Net Farm Income(8)	£M	510	45	9

- (1) Crops, grass and rough grazings including common rough grazings. June 1966. Source: Agricultural Statistics 1966/67. H.M.S.O.
- (2) Full-time regular workers. Source: United Kingdom. Annual Review and Determination of Guarantees 1969. H.M.S.O. Scotland. Agriculture in Scotland. Report for 1969. H.M.S.O.
- (3) 1966 figures. Source: United Kingdom. Annual Abstract of Statistics, 1968. H.M.S.O. Scotland. T. D. Sparrow, "Mechanisation of Agricultural Production in Scotland". Scottish Agricultural Economics Vol. XVIII. 1968.
- (4) Estimated Value of Landlord's and tenant's capital. Source: United Kingdom C.I.C. Bosanquet, "Investment in Agriculture". Journal of Agricultural Economics. Vol. XIX. January, 1968. Scotland. D.A.F.S. Private communication see Table 11.
- (5) Gross Agricultural Output. Source: United Kingdom. Annual Abstract of Statistics H.M.S.O. Scotland. Scottish Agricultural Economics. Vol. XX 1970 Table 238.
- (6) Fixed Capital Investment. Source: United Kingdom National Income and Expenditure 1969. H.M.S.O. Scotland. D.A.F.S. Private communication see Table 9.
- (7) Source: United Kingdom. C.I.C. Bosanquet, "Investment in Agriculture". Journal of Agricultural Economics. Vol. XIX. January, 1968. Scotland. D.A.F.S. Private communication. See Table 10.
- (8) Net Farm Income. Source: United Kingdom. Annual Abstract of Statistics 1968. H.M.S.O. Scotland. Scottish Agricultural Economics. Vol. XIX. 1969 see Table 11 of this report.

SECTION 3

INVESTMENT AND THE FARM FIRM

A. FEATURES OF THE INDIVIDUAL FARM SAMPLE

1. COLLEGE AREA IN RELATION TO SCOTLAND

The sources and allocation of capital for investment have now been presented at the national or macro economic level for the United Kingdom and Scotland. In the remaining section data on investment at the farm level obtained from a sample of farm accounts collected by the Agricultural Economics Division of the North of Scotland College of Agriculture, are analysed. Whilst data of this type are most applicable to an investigation of the supply and allocation of capital at the individual farm or micro economic level they also throw some light on the pattern and level of investment on a regional basis.

The College area contains 37 per cent (8, 335) of the full-time farms in Scotland (22, 635). Adding part-time farms and others 60 per cent (33, 025) of the farm units in Scotland are in the College area.⁽¹⁾ There are 8 million acres of agricultural land in the College area and this represents 50 per cent of the agricultural land in Scotland (16 million acres)⁽²⁾. The figures in the remaining section therefore, refer to investment patterns relating to half the farming area of Scotland and to over one-third of the full-time farms. Over 95 per cent of the total agricultural investment in Scotland would be undertaken on full-time farms.

In view of the emphasis now being placed on the need to increase investment in agriculture, there is a need for information on the current position of the sources and levels of capital allocated for investment on farms. The only previous study undertaken in the United Kingdom to provide information on farm investment, based on farm account data was published in 1962.

[Ref. 4].

(1) Figures for June 1st 1968. Private communication, Department of Agriculture & Fisheries for Scotland.

(2) These are acreages of crops, grass and rough grazings.

2. THE SAMPLE IN RELATION TO THE COLLEGE AREA

The number of farm accounts used in this section represent a 2 per cent sample of the full-time farms in the College area. Whilst the sample data cannot be used to give statistically reliable estimates for the College area in aggregate, nevertheless it contains a sufficient number of farms to represent the main farming types in the area. (See Table 13)⁽¹⁾.

Table 13 Relationship of Sample Distribution to
Population Distribution

College Area	Full-Time Farms									Part Time
	Rearing			Cropping	Dairy	Upland	Hill Sheep	Intensive	Total	
	Arable	Livestock	Arable Feeding							
Total Farms	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Farms	2,621	413	1,048	1,233	733	1,790	273	224	8,335	3,940
Sample	67	15	30	20	12	19	8	-	171	5
Farms										
Sample as % of Total Farms	%	%	%	%	%	%	%	%	%	%
Farms	2.6	3.6	2.9	1.6	1.6	1.1	2.9	-	2.1	0.1

The sample was taken from farms in the Farm Accounts Scheme operated by the Agricultural Economics Division of the North of Scotland College of Agriculture. The sample was drawn from all farms which had been in the scheme for the years 1965/66, 1966/67 and 1967/68, for which the accounts were available when the data were extracted. Finally an identical sample of 176 farms was used. The distribution of the sample, by the 7 farm types defined by the College, by farm tenure and farm size measured in standard man days is shown in Table 14. A 3-way distribution table is shown in Appendix Table 1 and the percentage distribution in Appendix Table 2.

⁽¹⁾ Note that this is a farm classification for which the population details are known and differs from that used throughout the remainder of the report.

Table 14 Distribution of Farms in the Sample by Farm Type,
Farm Size and Farm Tenure

<u>Farm Type</u>			Dairy	Upland Rearing	Hill Farms	Crofts	Total
Cattle & Sheep	Arable	Intensive Pigs & Poultry					
85	22	21	12	13	15	8	176

Farm Types as classified in the Farm Incomes Report (15). Definition of each type is given in Appendix following Appendix Table 2.

Farm Size in S.M.D.'s

0-250	251-600	601-900	901-1,200	>1,200	Total
12	87	41	16	20	176

S.M.D.'s = Standard Man Days. Taking as a general assumption
1 man = 275 S.M.D.'s, groupings in man units are: 0-0.9;
0.9-2.2; 2.2-3.3; 3.3-4.4; over 4.4

Farm Tenure

Tenants	Owners	Mixed	Total
101	56	19	176

3. FARM STRUCTURE IN THE SAMPLE

Some general features are that most farms, 57 per cent, are operated by tenants, while only 32 per cent are owner operated. The majority of farms are in the 1 - 3 man size group (73 per cent and of these nearly 50 per cent are in the 1 - 2 man size group. Mixed farming types make up 73 per cent of farms in the sample of which 48 per cent consist of typical mixed cattle and sheep farms. The main physical and financial details are shown in Tables 15 and 16.

The farm averages represent an average or bench mark farm. On the physical side it is mainly a livestock and cropping farm consisting of 61 acres of crops with 69 livestock units, mainly

beef stock for fattening. The total adjusted acreage is 162 acres, with a S.M.D. requirement of 679 or $2\frac{1}{2}$ men. Physical features of the farm types within the sample classifications are shown in Appendix Tables 3A, 3B, 3C.

The average capital structure details are shown in Table 16. The average farm is in a sound financial position with total assets of around £16,000. Borrowings represent only 20 per cent of assets leaving farm capital at a level of approximately £13,000. Farm capital is the total capital including land belonging to the business, i.e. it is the value of total assets less borrowings. Borrowings are twice covered by liquid assets. However, the growth of the business is slow, and farm capital has only increased by £375 or 2 per cent of total assets. Capital structure for the farm types within the sample classifications are shown in Appendix Tables 4A, 4B, 4C.

These various physical and financial features reflect factors which will influence investment in the area. Other factors likely to affect investment on farms in the area are the general farming conditions, prices of inputs and outputs and the cost of borrowing money.

Table 15

Physical Features of the Sample Farms

(3 Year Average 1965/66 to 1967/68)

Physical Item	Unit	Sample Total	Per Farm	Standard Error of Per Farm Estimate
<u>AREA</u> Farm	Adjusted Acres	28,581	162	9
Crops	Acres	10,670	61	4
<u>LIVESTOCK</u>				
Total	Livestock Units	12,107	69	4
Beef Cows	"	1,797	10	1
Pigs & Poultry	"	917	5	1
<u>SIZE</u>	Standard Man Days	119,534	679	34

Table 16

Capital Structure of the Sample Farms
(3 Year Average 1965/66 to 1967/68)

Capital Item	Sample Total	Per Farm	% Total Assets	Standard Error of Mean
	£	£	£	£
<u>ASSETS</u> Cash (1)	132,451	752	5	92
Debtors (2)	62,084	353	2	52
Stock Valuation (3)	1,077,074	6,120	37	333
Cars and Machinery	358,909	2,039	13	140
Structures (4)	114,018	648	4	89
Heritable Property (5)	1,128,973	6,415	39	928
TOTAL ASSETS	2,873,509	16,327	100	1,294
<u>BORROWINGS</u> Overdraft	286,507	1,628	10	263
Creditors (6)	118,260	672	4	65
Loans (7)	199,615	1,134	7	186
TOTAL BORROWINGS	604,382	3,434	21	386
FARM CAPITAL	2,269,127	12,893	79	1,145
FARM CAPITAL OPENING VALUE	2,203,179	12,518	77	-
CAPITAL GROWTH (8)	65,948	375	2	71
FARM CAPITAL CLOSING VALUE	2,269,127	12,893	79	

Explanation of Terms. (Based on terms listed in Scottish Farm Business Record Book balance sheet).

- (1) Cash. Represents cash in hand + cash in bank.
- (2) Debtors. Represent short term trade debtors.
- (3) All valuations taken at closing valuation date.
- (4) Valuation of buildings owned by farm operator.
- (5) Heritable property was taken at the most recent valuation available during the period.
- (6) Creditors. Represent short term trade creditors.
- (7) Loans explained in detail Table 29.
- (8) Farm capital between the opening and closing valuation dates is increased by net profit less personal drawings and either decreased or increased by the balance of private money entering and leaving the business.

The effect of general farming conditions, which could be classified as the economic and climatic factors affecting farming, will be revealed by the average net farm incomes for the area. Net farm incomes will indicate the effect of changes in prices, output and seasonal weather conditions on farming. The net effect of these factors is generally referred to by the terms "good year" or "bad year". It can be expected that the psychological atmosphere or climate inferred by these terms will influence investment decisions. A measure of net farm incomes from 1963/64 is shown in Table 17. It should be noted, however, that these figures refer to different 3 year identical samples of farms, for each of the three reports. 1967/68 seemed to be regarded as a "good year", 1966/67 as a "bad year" and 1965/66 was somewhere in between.

Table 17 Average Net Farm Income Levels in the North of Scotland

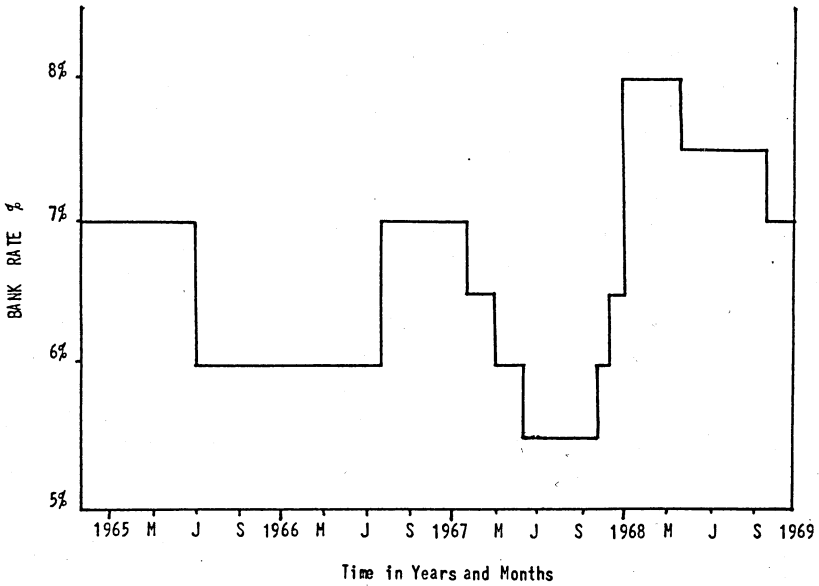
Year of Report	No. of Farms in Identical Sample	Average Net Farm Income £'s				
		1963-64	1964-65	1965-66	1966-67	1967-68
1965-66	137	1,150	1,440	1,260	-	-
1966-67	168	-	1,538	1,221	1,169	-
1967-68	205	-	-	1,284	1,176	1,815

SOURCE: Farm Incomes in the North of Scotland. 1967-68, 1966-67, 1965-66.
Agricultural Economics Division, North of Scotland College of Agriculture.

Changes in the cost of borrowing money are indicated generally by the bank rate. Lending rates of commercial banks are usually 1 per cent to 2 per cent above bank rate. Bank rate for the period from 1965 is shown in Figure 9. Bank rate has varied from $5\frac{1}{2}$ per cent to 8 per cent over the period.

Figure 9

CHANGES IN BANK RATE
November, 1964 - December, 1969



4. TREATMENT OF DATA

The remaining section of the report gives the results of the allocation of capital for investment, the allocation of fixed and working capital, and the sources of capital, in the farm business. Detailed results for farms grouped by farm type, farm tenure and farm size are included in the appendices.

Data have been extracted from the farm accounts and farm balance sheets which are compiled for each farm in the Farm Accounts Scheme at the College. Therefore, the procedure used to calculate the figures for the farm account, apply to the figures presented in this report. Most of the accounting periods end in March, April or May, although there are some November closures mainly on farms in the Hill Farm and Upland Rearing groups.

Capital is analysed on the basis of supply and demand to give estimates by type of farm, farm tenure and farm size.

Investment data are presented net of grants and resale value of goods exchanged for new capital goods. The validity of using net cost only could be challenged. A pertinent question to ask is "Do farmers base their investment decision on the net cost or total cost of the capital goods"? However, irrespective of which figure influences farmers' investment decisions, it is net cost which determines farmers' demand for capital i.e. the additional quantity of money required by the farmer for investment in capital goods. ⁽¹⁾

In practice taxation allowances will also influence individual farm demand, but these effects are complex and are not taken into consideration here. ⁽²⁾

(1) In practice there will be some qualifications to this general principle. There is a time lag between investment and the receipt of a grant requiring a short bridging loan. Therefore the amount of the grant should in practice be included in the demand for money in the form of short-term loans, and the cost of the short-term loan added to the net price of the good.

(2) As an example of the effects of taxation allowances on farm investments see [Ref. 18].

B. DEMAND FOR CAPITAL

1. INVESTMENT IN FIXED CAPITAL

Investment in fixed capital is shown in Table 18. This table shows that a greater proportion of investment is allocated to machinery on the sample farms, than in the United Kingdom or Scotland. For the sample 66 per cent of investment is in machinery and 23 per cent in structures compared with about 50 per cent and 40 per cent in machinery and structures for Scotland and the United Kingdom. However, the national statistics cover estimates for investment by landlords which are not included for the tenanted farms in the sample as such data were not available from the farm accounts. As most investment by landlords is in structures, the actual figure for this capital type would be higher than that shown. But the allocation of investment by owner-occupiers (Appendix Table 5A), still corresponds to that for all farms in the sample, while only mixed tenure farmers have an allocation similar to the national statistics.

Despite the lack of complete data it seems safe to conclude that for the area represented by the sample, the proportion of new investment being allocated to structures is far less than for the United Kingdom as a whole. In general figures, the difference is around 15 per cent. The tendency for investment in structures to approach the same level as for machinery is not evident in this sample. For a basically livestock producing area it would be expected that there would be a higher proportion of investment in buildings than the national average. The below average proportion of investment in buildings suggests that the rate of expansion and replacement of buildings for the area is below average. This may have serious implications regarding the potential for future production increases for the area.

Table 18

Net Fixed Capital Investment* Per Farm,
176 Farms in the North of Scotland
1965/66 to 1967/68

Capital Type	Average 1965/66 to 1967/68				Time Series per Farm			Percentage Change	
	Sample Total	Per Farm		%	1965/66	1966/67	1967/68	1965/66 to 1966/67	1966/67 to 1967/68
		Mean	S.E.						
	£	£	£		£	£	£	%	%
Structures	27,469	156 (2.28)	27	23	170 (2.58)	128 (3.52)	170 (3.86)	-25	33
Machinery	78,049	444 (1.18)	39	66	441 (1.49)	435 (1.50)	454 (1.56)	-1	4
Cars	13,215	75 (1.41)	8	11	59 (2.61)	62 (2.76)	105 (2.26)	5	69
*Total Fixed Capital Investment	118,733	675 (1.18)	60	100	670 (1.32)	625 (1.46)	729 (1.53)	-7	17
Repairs Cost	65,348	371 (1.05)	29	-	332 (1.04)	373 (1.08)	409 (1.28)	12	10
Total Expenditure on Fixed Capital	184,081	1,046 (1.07)	84		1,002	998	1,138	0	14

*Investment net of sales and grants.

() Coefficient of variation.

SE = Standard Error of the mean.

The type of farm appears to have a marked effect on the allocation of investment among the capital types. (Appendix Table 5B). Some farm types (dairying and mixed pigs and poultry) put a relatively greater proportion of investment in structures than machinery compared with the average. If capital for different types of fixed capital goods is obtained from different sources, these farms will have different demand functions for capital than the majority.

Investment per farm increases with size of farm although there is surprisingly little difference between the 600-900 and 900-1,200 S.M.D. groups - less than £100 in fixed capital investment, but over £300 in total expenditure. (Appendix Table 5C). This suggests that there is little substitution of capital for labour between a 4 and a 3 man size farm. Alternatively it may be that a shortage of capital exists on the larger farms.

A significant feature of investment by the individual farm is that investment of large amounts of capital in fixed capital is not an annual process. It tends to be undertaken at irregular intervals when the need arises or when money is available. Any indication of the extent of individual farm variation is mostly lost in using the average for such a large sample and taking the average of 3 years' data. Table 18 shows the variation per farm between years for the sample, varying by over £100 or around 17 per cent.

As part of the structure of investment it will be useful to show the variation of investment on the individual farm and between farms. Some indication of the variability of investment is given by the frequency distribution of farms by level of investment, the coefficient of variation of investment, and measures of the frequency of investment by farms for each year over the three year period. In addition the results by farm type, farm tenure and farm size in the Appendix, illustrate the possible range in variation.

The distribution of farms by size of total fixed capital investment (Table 19) shows that average investment over the 3 year period for the majority of farms was within the range of £100 to £1,000 per year. The table shows the skewed distribution of investment per farm with 74 per cent in the range of £0 to £1,000, 14 per cent between £1,000 and £2,000 and 6 per cent with investments greater than £2,000. Six per cent of farms have registered zero or negative fixed capital investment i.e. sold assets without replacing them.

Tables 18 and 19 also include figures for the coefficient of variation of investment. The coefficient gives a comparable measure of variation in investment, in the main capital types between farms. In many cases the coefficient is greater than one indicating that most farms in the group have an investment level less than the mean, but a few farms have investment levels greater than 2, 4 or 6 times the mean depending on the value of the integer in the coefficient. These instances indicate that the distribution is skewed with most farms having investment levels of less than the mean or zero, since few cases of negative investment were recorded in the data. (1)

(1) Coefficient of variation is measured as $\frac{\text{standard deviation}}{\text{mean}}$. If the coefficient is 1 then the values in the group could be expected to lie between 0 + mean and mean + SD. Therefore the expected range is mean x 2. If the coefficient is 2, and it is known (since 1SD = mean), there are no negative values in the distribution and then those values apparently falling in the negative range of the distribution (mean - 2SD's = -1SD) must lie on the positive side of the distribution. Therefore the expected range is mean + 2SD's + (-1SD) (since 1SD = mean).
 With a coefficient of 3 the expected range is mean x 6 etc. For example in the 0-250 S.M.D. group (Appendix Table 5C) the average machinery investment is £54. The coefficient of variation is 1.7 indicating that the expected range is £54 x 3.4 = £184. Some farms will lie outwith the expected range so some farms will have investment greater than £184. In fact 5 of the 12 farms have registered no machinery investment, two have investment greater than £200 and the remaining 5 less than £75.

Table 19

Frequency Distribution of Net Fixed Capital Investment Per Farm

176 Farms in the North of Scotland

(3 Year Average 1965/66 to 1967/68)

Item	Net Fixed Capital Investment Group £'s											
	< £1		£1-£100		£101-£400		£401-£1,000		£1,001-£2,000		> £2,000	
No. of Farms	10		22		58		51		24		11	
Capital Type	£	%	£	%	£	%	£	%	£	%	£	%
Structures	0 (-)	-	8 (1.88)	18	28 (1.86)	12	142 (1.16)	21	340 (0.94)	23	929 (1.04)	31
Machinery	-1 (3.79)	-	39 (0.87)	89	153 (0.54)	63	467 (0.39)	67	1,011 (0.37)	68	1,845 (0.29)	61
Cars	-0	-	-3 (8.33)	-7	60 (1.11)	25	84 (1.21)	12	126 (0.93)	9	230 (0.82)	8
Total Fixed Capital Investment	-1 (3.79)	-	44 (0.73)	100	241 (0.36)	100	693 (0.26)	100	1,477 (0.15)	100	3,004 (0.32)	100
Repairs	38 (1.11)		150 (0.65)		173 (0.46)		458 (0.74)		608 (0.55)		1,247 (0.44)	
Total Expenditure on Fixed Capital	37		194		414		1,151		2,085		4,251	

() Coefficient of variation.

The frequency of occurrence of investment by individual farms can be seen in more detail in Table 20 which shows the number of farms which have registered investment in the respective capital types over the period. The number is expressed as a proportion of the total number of farms which could have invested during each year of the period.⁽¹⁾ A high proportion of farms have undertaken investment in machinery each year (80 per cent) and most farms (over 95 per cent) have expenses on repairs which would include machinery repairs.

A useful application of this table is that dividing the proportion figure into the average for the group gives the average per farm figure for only those farms which have registered the particular investment.

Table 20

Frequency and Proportion of Investment.

176 Farms in the North of Scotland, 1965/66 to 1967/68

Capital Type	Frequency ⁽¹⁾	Proportion ⁽²⁾
Structures	154	0.292
Machinery	437	0.828
Cars	100	0.189
Total Fixed Capital Investment	460	0.871
Repairs	511	0.968
Total Expenditure on Fixed Capital	516	0.977

(1) Frequency is total of the number of farms that have recorded investments in each of the three years.

(2) Frequency expressed as proportion of the number of possibilities, i.e.

$$\left(\frac{\text{Frequency}}{\text{Number of Farms} \times 3} \right)$$

(1) The proportion is measured as a fraction of 1. If all farms in a group incurred the particular investment for each year, the proportion would be recorded as 1. A proportion of 0.333 indicates that either all farms incurred the investment for 1 year or $\frac{1}{3}$ incurred the investment for each year of the period, likewise 0.667 etc.

2. ROLE OF REPAIRS IN RELATION TO INVESTMENT

If there was no limitation to the supply of capital available to agriculture, then it could be expected that investment in aggregate would be continually rising as farmers expanded output replacing old capital goods and increasing the level of capital goods. But investment varies closely with net income, both at the national and regional level. The difference may be supplemented by repairs, since expenditure on repairs can be regarded as a substitute for investment.

Repairs and maintenance expenditure is a means by which investment in new capital goods is forestalled or postponed and the replacement rate reduced. It is a means of keeping fixed capital in productive condition. By foregoing repairs and maintenance expenditure capital goods would wear out (depreciate) over a shorter time period. Replacement investment would therefore take place at an earlier date than with normal maintenance expenditure. Repairs affect the valuation of capital goods already used in production.

Repairs fulfil a second substitution rôle. When a break-down occurs the capital good can be replaced or repaired to allow the production process to continue. The expenditure in both cases is an addition to the stock of capital goods, but appears in the accounts either as an investment in new fixed capital or as repair

In addition when the farm accounts are being prepared, expenditure on land improvements, repairs to fences and repairs to structures are included as repairs. In these instances the expenditure is equivalent to an investment in an item of fixed capital, but it is treated like other repairs as a varying cost. Expenditure on repairs is therefore added to investment in fixed capital in Tables 18 and 19 and Appendix Tables 5A, 5B, 5C, to give total expenditure on fixed capital.

The addition of repairs to fixed capital investment gives the expected condition of constant or increasing levels of investment over time. Repairs appear to substitute for replacement when expenditure on new fixed capital is reduced.

The features of allocation of investment within the various capital types can be investigated in more detail.

3. INVESTMENT IN MACHINERY

Machinery exerts the highest demand on capital for investment in fixed capital on farms. This applies to United Kingdom agriculture as well as to the current sample of farms. Machinery exerts a higher demand on the sample farms than in the United Kingdom or Scotland: 66 per cent of new investment is allocated to machinery compared with approximately 50 per cent for the United Kingdom and Scotland.

Demand for investment in machinery is directly related to the aim of maintaining and increasing output. Machinery depreciates more rapidly than other forms of fixed capital such as buildings or land improvements. Obsolescence is increasing with the rapid improvements in technology associated with certain machine types. Normal replacement, associated with normal price rises and increases in cost as machinery becomes more sophisticated in design, exerts an increasing demand on the quantity of money required to maintain the current level of machinery in use on farms.

Investment in machinery increases because certain items of machinery offer direct methods of increasing output. As labour becomes scarce and labour costs rise the demand for machinery increases to substitute for labour. In addition farm chores are becoming more mechanised, not only to increase output, but to reduce tedious work. For example, the mechanisation of slurry disposal or of forage conservation leads to increases in the quantity of machinery on farms.

Whilst the exact purpose behind every item of machinery investment cannot be identified from farm accounting data, the figures presented can indicate some of the features associated with investment in machinery. Most farms (over 80 per cent) have undertaken some investment in machinery in each year of the survey. This compares with around 20 per cent for structures and cars.

There is less variation in investment in machinery than in other items of fixed capital. The variation between years has been less than 5 per cent around the mean. The individual farm variation around the mean is proportionately less than for structures or cars. For some group classifications the coefficient of variation in machinery investment is within the range of the mean (Appendix Tables 5A, 5B, 5C).

It seems then that investment in machinery is a more consistent form of investment on farms than expenditure on cars and structures. Farmers in the sample are maintaining existing levels of machinery, with little expansion in annual level of investment, despite variations in net profits. Continued investment in machinery takes precedence over investment in structures.

The group classifications highlight features of investment in machinery on the individual farm. Dairy farms have the highest level of machinery investment per year: nearly £1,150. Machinery investment increases with farm size from £50 to £1,200. At £600 per farm there is virtually no change in level of investment on farms between 600 and 1,200 standard man days. It would be expected that machinery investment should be highest on arable farms, but over $\frac{1}{3}$ of these farms are less than 600 S.M.D.'s in size and the average per farm investment is reduced to £712. Investment is influenced by ownership status with mixed operators averaging £700 per year, and owners £600, which is nearly £300 per year more than tenants.

4. INVESTMENT IN TYPES OF MACHINERY

Information from the farm accounts enabled investment in machinery to be classified by type of machine. (Table 21).

Because of the diversity of types of farm implements, investment has been grouped on the basis of the use of the machine. For example, various types of machine such as forage harvesters, buck-rakes, etc. are used for making silage and they have all been classed as silage equipment. Where it was not possible to identify the type of machine from the farm account, or where the machine served more than one of the functions defined in the classification such as a truck or farm trailer, the amount involved has been included in general. Tractors, although they are used for general farm work, are included separately because they are a major item of investment and are easy to isolate in the farm accounts. The machine types are defined in the notes given below Table 21.

Few conclusions can be drawn from the variations between years. The proportion of farms investing in respective machine types in one year is only around 1 in 10, except for general service equipment, tractors, and tillage equipment. For this reason standard deviations for each type are of little relevance and are not shown.

Table 21

Investment in Machinery Per Farm by Machine Type,
176 Farms in the North of Scotland
(3 Year Average 1965/66 to 1967/68)

Machinery Type	Average 1965/66 to 1967/68			Time Series Per Farm			Percentage Change	
	Sample Total	Per Farm		1965/66	1966/67	1967/68	1965/66 to 1966/67	1966/67 to 1967/68
		Mean	%					
	£	£	%	£	£	£	%	%
Tractors	20,244	115	26	132	99	114	-25	15
Tillage Equipment	3,335	19	4	16	17	23	6	35
Grain Harvesting	11,714	67	15	64	86	50	34	-42
Driers	10,230	58	13	45	56	72	24	29
Baling Equipment	5,541	32	7	31	42	22	35	-48
Silage Equipment	3,359	19	4	21	20	17	-5	-15
F.Y.M. Equipment	2,679	15	3	13	17	16	31	-6
Potatoes	2,705	15	4	14	17	14	21	-18
Dairy	2,878	17	4	9	13	28	44	115
General	15,364	87	20	96	68	98	-29	44
Total	78,049	444	100	441	435	454	-1	4

Definition of Machine Types

Tractors

Tractors of all types.

Tillage Equipment

Any type of cultivation equipment, e.g. ploughs, cultivators, drills, harrows. Does not include any specialised potato cultivation equipment.

Grain Harvesting

Combines of all types and sales of binders.

Driers

Grain driers and associated equipment, e.g. elevators, bins, etc.

Baling Equipment

Balers and other equipment associated with handling hay and straw, e.g. sledges, muffers, loaders.

Silage Equipment

Forage harvesters, buck-rakes and other equipment associated with handling green grass, e.g. mowers, silage trailers, etc.

F.Y.M. Equipment

Any equipment associated with handling farmyard manure, e.g. scrapers, spreaders, portable tanks.

Potatoes

Specialised equipment used solely for potatoes.

Dairy

Equipment used solely for dairying, e.g. bulk tanks, etc.

General

Equipment for general farm use, e.g. farm vans, trucks, trailers, etc. and any machinery that does not fall into any of the above classifications.

Table 22 Frequency and Proportion of Investment in Machinery Types,
176 Farms in the North of Scotland 1965/66 to 1967/68

Machinery Type	Frequency ⁽¹⁾	Proportion ⁽²⁾
Tractors	141	.267
Tillage Equipment	137	.259
Grain Harvesting	42	.080
Driers	69	.131
Baling Equipment	101	.191
Silage Equipment	89	.169
FYM Equipment	69	.131
Potatoes	27	.051
Dairy	29	.055
General	295	.559

¹Frequency is the total of the number of farms that have recorded investment in each of the three years.

²Frequency expressed as a proportion of the number of possibilities i.e. $\left(\frac{\text{Frequency}}{\text{Number of Farms} \times 3} \right)$

Capital invested in machinery is chiefly allocated to general farm equipment, i.e. equipment serving more than one enterprise. Twenty-six per cent of capital is invested in tractors. Another 20 per cent is allocated to general equipment which includes investment in farm vehicles.

Whilst a large proportion of farms in the sample are mainly livestock farms there is little evidence of any intensive mechanisation of livestock enterprises. Expensive items of equipment involved in grain harvesting and drying account for 28 per cent of machinery investment, and it could be assumed that a large proportion of tractor time would be utilised in the grain growing enterprises. The data confirm the assumption regarding machinery investment for the United Kingdom, namely that additional capital in machinery is being allocated to increase the output of grain.

Most machinery investment is probably still of a replacement nature, concentrated in general farm servicing equipment (general, tractor, tillage). The frequencies suggest a replacement rate for tractors of 1 in 5 years. The average frequency of investment in tractors is $2\frac{1}{2}$ farms out of 10 per year, or for one farm, investment in a tractor every 4 years. However, it seems that

most additional capital in machinery is being allocated to enterprises showing a direct return on the investment, i.e. grain.

The allocation and quantity of investment varies among farm types. (Appendix Table 6B). Tractors in general are the main type of machinery for investment on all farms, but the amount of grain growing determines the allocation of investment among the alternative machine types.

5. INVESTMENT IN CARS

The national statistics showed investment in vehicles to be fairly static at current prices. Therefore the proportion of total investment allocated to vehicles has declined. Investment in cars has been classified separately as, although not exactly comparable, it may provide a basis for comparison with the national statistics. All vehicles in agriculture are included in the national statistics figure for vehicles whereas all general purpose farm vehicles are included in machinery in the farm account data. Data on investment in cars may reveal differences in attitudes to expenditure on personal consumption compared with investment in the farm, since part of the investment in cars is for personal use.

Investment in cars has increased each year whilst the two types of purely farm investment registered declines in 1966/67. This would suggest that cars are regarded by farmers as an essential form of capital because of their dual role of providing services both for the farm and the home. Personal demands for capital may outweigh purely farm demands. The implication is that the demand for investment in cars has high priority and is inelastic, i.e. it is least affected by factors affecting investment.

It seems feasible that since investment in cars is such a small proportion of total investment it would be least affected by changes in income. Since total investment for the United Kingdom has remained constant, yet the number of farms has decreased, the per farm investment in cars must be increasing nationally. Investment in cars should therefore be less variable than investment in other items of fixed capital and have first preference on demand for capital.

There is less variation between farm sizes in the level of

investment in cars (Appendix Table 5C) i.e. farmers purchase cars in a similar price range irrespective of the type and size of farm occupied. The frequency of investment in cars is generally around 1 in 5 years.

6. INVESTMENT IN STRUCTURES

The first obvious feature of investment in structures is the wide fluctuation between years and the wide variation between farms in relation to other forms of investment. However, the nature of structures as a form of investment suggests this type of result. Structures can involve large amounts of capital of around £6,000 - £8,000 or more for new dairy buildings. The addition of structures depends on the growth of the business and availability of capital. Existing old buildings can be improvised and adapted before accommodation becomes limiting and the erection of new buildings becomes imperative. In the College area, farms frequently have sturdy old granite buildings which, despite many defects, can be utilised to accommodate livestock for a period of years without requiring any initial capital investment. Investment in buildings therefore can be postponed. Besides, buildings have a longer life span than machines and thus regular replacement is not essential. In addition the return from investment on new buildings may be obtained via more roundabout processes than from other types of fixed capital and therefore it may be more difficult to measure accurately. Furthermore it is possible that the marginal increase in productivity from new structures is far less than the marginal cost of the large amounts of capital required to achieve this increase over a short term. These points could be contributing to the below average proportion of investment in buildings noted previously. Investment in structures is, however, a long term decision and non-monetary measures often have to be added to the calculation, e.g. convenience, better working conditions etc.

Investment between years has varied by 33 per cent. On average about 3 farms in 10 invest in structures in a year although the net investment on one of these farms, for example

in the dairy group, could be expected to be up to £1,400⁽¹⁾. The results (Table 18) suggest that farmers will forego investment in structures in preference to investment in machinery and cars, i.e. they invest in structures when there is capital surplus from requirements for machinery and cars.

Investment in structures increases with farm size. The proportion of total investment allocated to structures also increases with farm size. Since investment increases with farm size, part of the increase in level of investment is due to the increase in the proportion of investment allocated to structures, i.e. larger farms are investing relatively more in structures than small farms. The trend towards an increase in investment in this direction resulting from an increase in the number of larger farms will of course be influenced by the rate at which amalgamations into bigger units continues in the future.

Owner-occupiers, as might be expected, have a higher investment per farm than tenants (Appendix Table 5A), but there is surprisingly little difference in the average level of investment undertaken by investing farmers, £181 compared with £267 for owners.⁽²⁾ Mixed tenure farmers have a much higher figure of £1,235 for each farm that invested in structures. Dairy farms have by far the highest investment in structures for the period - £478 per farm.

7. INVESTMENT IN TYPES OF STRUCTURES

Investment in structures has been identified by the type of livestock enterprise using the structure (Table 23). This classification was used to overcome the

(1) The mean for investing farms was £521 and standard deviation £698.

(2) The coefficient of variation was 1.28 for tenants and 1.01 for owners.

difficulty of classifying the numerous different types of structures and as a guide to investment in overheads by livestock enterprises. The type groups used are explained in the definitions. 'General' includes buildings serving more than one enterprise, such as hay sheds or silos on mixed livestock farms. 'General' also includes items, for which the farm account did not give enough information to identify the type of structure. A large quantity of investment appeared to be in the form of structures for grain driers and silos. These figures have been recorded under the heading 'general', since they would be used by more than one enterprise - cropping and various forms of livestock.

The biggest percentage of investment is in general servicing structures rather than specialised buildings for any specific livestock enterprise. Much of this would be spent on buildings for storing hay and silage, and on implement sheds and animal buildings on mixed farms.

The highest total expenditure for the sample has been on buildings to house beef cattle. Individual farm investment has been high for dairy farms and on mixed pig and poultry farms (Appendix Table 7B). Investment in dairy buildings has been increasing each year over the period.

Whilst the investment per farm is high on dairy farms and pig and poultry farms, it must be remembered that the greatest amount of money in total is still being invested by the more numerous mixed cattle and sheep farms.

Table 23

Investment in Structures per Farm by Structure Type

176 Farms in the North of Scotland

(3 Year Average 1965/66 to 1967/68)

Structure Type	Average 1965/66 to 1967/68			Time Series per Farm			Percentage Change	
	Sample Total	Per Farm		1965/66	1966/67	1967/68	1965/66 to 1966/67	1966/67 to 1967/68
		Mean	%					
	£	£	%	£	£	£	%	%
Dairy	4,206	24	15	10	28	34	180	21
Beef	5,141	29	19	45	14	28	-69	100
Pigs	2,666	15	10	17	11	18	-35	64
Poultry	97	1	-	1	0	0	-	-
General	15,359	87	56	97	75	90	23	20
Total	27,469	156	100	170	128	170	-25	33

Definition of Structure Types

- Dairy Any building associated solely with dairying, e.g. dairy, cow houses, fodder storage where it is for dairying only.
- Beef Any building which can be identified as used for beef only.
- Pigs Any building which can be identified as used for pigs only.
- Poultry Any building which can be identified as used for poultry only.
- General Any building erected for general farm use, e.g. machinery sheds, fodder storage where it would be used for more than one enterprise.

8. GRANTS, SALES AND TOTAL COST OF FIXED CAPITAL GOODS

Whilst net cost gives the best measure of demand for money for investment by the farm, the components of total cost provide additional information on investment by the industry and the individual farm.

Government grants can be claimed for most structures, land improvements and on certain items of machinery [Ref. 16]. Since grants are a form of transfer payment by the State to agriculture, it seems that society should be aware of:-

- the amounts being received by agriculture,
- the sections of the industry which are receiving grants,
- whether an increase in the supply of food to society is being achieved at a lower market price than would be possible without the grant.

The effect of grants is to cause more resources to be

transferred into agriculture than would be the case under normal market conditions. However, these additional resources are supplied to agriculture at an increase in the price per unit. The increase in price is caused by grants reducing the price which farmers have to pay for capital goods, which produces an increase in demand. In the medium term, the additional quantity of capital goods can only be supplied through an increase in price.⁽¹⁾ Whilst the total amount of resources allocated to agriculture is small in relation to the economy as a whole these points are still valid although the price increases may be only marginal.

The effect of fixed capital having a resale value is to provide a supply of capital towards the cost of investment in replacement items. Resale value can influence the replacement rate of fixed capital. When the resale value of a machine becomes greater than the estimated depreciated value of the machine in use on the farm, the machine can be replaced at an economic advantage. In general, the greater the resale value as a proportion of replacement cost, the less additional capital is required and the greater the inducement to invest in the particular capital good. It seems therefore to be in the interests of agriculture to maintain a viable market in used machinery. Resale values are a useful guide to the rates of depreciation to apply to various items of capital goods.

Sales and grants for machinery, cars and structures as a proportion of total cost are given in Table 24. The proportions for the various classes of machinery, and structures are shown in Table 25. For investment in fixed capital in aggregate, additional capital is required for 73 per cent of the total cost of the goods. Seven per cent of the total cost is provided by grants, and 20 per cent from sales of fixed capital. In other words, the average demand for capital from this sample of farms over 3 years is only 73 per cent of the total cost of capital goods being added to the

(1) It would be desirable for any system of support involving grants to be protected from the possibility of monopoly suppliers raising the price paid by farmers, to the level which would operate without a grant and taking the grant as surplus profit.

Table 24 **Total Cost of Fixed Capital Investment, Sales and Grants**
176 Farms in the North of Scotland
(3 Year Average 1965/66 to 1966/67)

Capital Type	Total Cost of Fixed Capital Investment	Deductions			Net Cost
		Sales	Grants	Total	
	£	£	£	£	£
Structures	36,258	681	8,108	8,789	27,469
%	(100)	(2)	(22)	(24)	(76)
Machinery	104,118	23,015	3,054	26,069	78,049
%	(100)	(22)	(3)	(25)	(75)
Cars	21,849	8,634	-	8,634	13,215
%	(100)	(40)	-	(40)	(60)
Total	162,225	32,330	11,162	43,492	118,733
%	(100)	(20)	(7)	(27)	(73)

farms. In addition, the effect of taxation allowances will influence the end cost of capital goods to individual farmers, but as stated earlier, the application of these allowances has not been accounted for in this study.

Resale value contributes 27 per cent to the total cost of investment in grain harvesting machinery, 21 per cent for baling equipment and 36 per cent for tractors, but for other classes of machinery the contribution is less than 20 per cent. The implication is that on average tractors should be depreciated to near 40 per cent of replacement costs, and most other types to 20 per cent of replacement cost.⁽¹⁾ There appears to be little resale value for specialised potato equipment. Comparing Table 25, with Table 22 there appears to be no relationship between the proportion of resale value to total cost and the frequency of investment, with the data in aggregated form.

(1) An earlier study into resale values and depreciation rates for the year 1966/67 found that resale values for cars and machinery, represented 30 per cent of total costs, compared with 37 per cent for the 3 year average of this sample, but for tractors alone the proportion was 46 per cent [Ref. 17].

Table 25 Total Cost of Fixed Capital Investment, Sales and Grants
by Machine and Structure Type, 176 Farms in North of Scotland
(3 Year Average 1965/66 to 1966/67)

Machinery Type	Total Cost of Fixed Capital Investment	Deductions			Net Cost
		Sales	Grants	Total	
	£	£	£	£	£
Tractors	32,829 (100)	11,832 (36)	753 (2)	12,585 (38)	20,244 (62)
Tillage	3,919 (100)	584 (15)	-	584 (15)	3,335 (85)
Grain Harvesting	16,324 (100)	4,382 (27)	228 (1)	4,610 (28)	11,714 (72)
Driers	12,161 (100)	257 (2)	1,674 (14)	1,931 (16)	10,230 (84)
Baling	7,041 (100)	1,500 (21)	-	1,500 (21)	5,541 (79)
Silage	3,822 (100)	463 (12)	-	463 (12)	3,359 (88)
FYM	3,200 (100)	521 (16)	-	521 (16)	2,679 (84)
Potatoes	2,802 (100)	97 (4)	-	97 (4)	2,705 (96)
Dairy	3,573 (100)	311 (9)	384 (11)	695 (20)	2,878 (80)
General	18,447 (100)	3,068 (17)	15 -	3,083 (17)	15,364 (83)
TOTAL	104,118 (100)	23,015 (22)	3,054 (3)	26,069 (25)	78,049 (75)
Structure Type					
Dairy	5,322 (100)	-	1,116 (21)	1,116 (21)	4,206 (79)
Beef	7,338 (100)	83 (1)	2,114 (29)	2,197 (30)	5,141 (70)
Pigs	3,213 (100)	-	547 (17)	547 (17)	2,666 (83)
Poultry	97 (100)	-	-	-	97 (100)
General	20,288 (100)	598 (3)	4,331 (22)	4,929 (25)	15,359 (75)
TOTAL	36,258 (100)	681 (2)	8,108 (22)	8,789 (24)	27,469 (76)

Resale value of cars contributes almost 40 per cent to the total cost of investment in cars. This is achieved with an average replacement rate of nearly 1 in 5 years. (See Table 20.)

Grants for structures were allocated to dairying, beef, pigs and general farm structures, with over 50 per cent of the total being allocated to the last named category. The greatest proportion of grants in the sample goes to owner-occupied farms (Appendix Table 8a). It is worth noting from Table 24 that grants for structures as a proportion of the total cost of structures is equivalent to resale value of machinery as a proportion of the total cost of machinery.

9. INVESTMENT IN WORKING CAPITAL

The features of working capital were defined in the introduction. The significant feature with respect to investment in working capital is that the money outlayed is recovered when the transformed working capital good is sold at the completion of the production cycle. Since most production cycles are completed within about a year (except for beef cattle) the demand for money for investment in working capital is essentially short term.

If output is to be increased, there will be an increase in the quantity of money outlayed in working capital, because of the necessary increase in variable inputs. The increased demand for variable inputs can be met by increasing the amount of income invested in working capital or by an increase in the demand for capital outwith the farm. In analysing the aggregate demand for money for investment, the demand for short term investment in working capital to some extent can be compared with the long term investment in fixed capital.

The accounting procedures applied to farm accounts give some indication of the increase in investment in working capital. Since the end of production cycles either overlap or do not coincide with the end of accounting periods, some money is usually recorded as invested in working capital at the end of the accounting period. Any change in working capital from the beginning to the end of an accounting period, gives a measure of

the change in investment in working capital. But for some items this method does not measure the actual money invested in working capital since some figures estimate potential revenue rather than money invested.⁽¹⁾ Besides, working capital which is invested and recovered within the accounting period, is not recorded by this method.

The various items of account classified as working capital are shown in Table 26 which indicates the net annual change in value during the three years. There has been an annual increase for the sample of £295 per farm during the three years. No estimate of the individual farm variation around this figure has been obtained, but it could be expected that large and negative values would be feasible. Investment increased during each year of the survey with an increase of £544 or 8 per cent on the previous level of working capital during 1967/68.

The greatest increase in investment took place in livestock, with cultivations and crops and debtors also showing significant increases. The decline in level of capital in produce unsold during the first two years is noticeable.

To compare working capital investment with fixed capital investment, the quantities involved in the two measures should be clarified. The net increase in working capital contains an allowance for depreciation of livestock, includes sale of working capital goods, and increases in market value of some items. It does not give total investment in working capital in the period. Therefore a better measure of comparison between investment in working capital and fixed capital would be to compare the net increase in value of fixed capital which includes total expenditure on fixed capital less repairs and depreciation.⁽²⁾ The net effect of both forms of investment is shown in Table 27.

(1) Debtors record the market value of debts not cost of the goods. Produce unsold is valued at estimated market value rather than cost of production. Livestock is valued at estimated cost of production and breeding stock is depreciated. Accurate measures of cost are difficult to allocate. In general farmers' values are accepted, but these tend to be conservative.

(2) The diminishing balance method of depreciation used in the farm accounts, appears to over-estimate the market value of machinery in early years, but tends to be more accurate for machinery in later years. [Ref. 17]. The position will vary with the degree of inflation.

Table 26

Average Net Increase in Working Capital per Farm

176 Farms in the North of Scotland

(3 Year Period 1965/66 to 1967/68)

Capital Item	Average Net Increase in Working Capital 1965/66 to 1967/68			Annual Net Increase Per Farm(1)			% Change		
	Sample Total Per Year	Per Farm Per Year	% Total(2)	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
	£	£	%	£	£	£	%	%	%
Cash (3)	9,090	52	17	60	50	46	9	7	6
Debtors	8,621	49	17	6	53	88	2	8	26
Produce Unsold (4)	3,482	20	7	-8	-16	83	2	-4	24
Cultivations and Crops (5)	7,070	40	14	11	46	63	1	5	6
Livestock (6)	21,343	121	41	102	17	245	2	-	5
Stores (7)	2,310	13	4	17	3	19	28	4	23
Total Working Capital	51,916	295	100.0	188	153	544	3	2	8

(1) Annual net increase calculated as the difference between closing valuations at end of each accounting period.

(2) Percentage of working capital

(3) Cash in hand and cash at bank.

(4) Estimated value of produce, harvested but unsold. Includes value of farmyard manure and unexhausted manurial residues (UMR), at market value.

(5) Value of cultivations and growing crops at cost.

(6) Closing valuation of all livestock on hand, valued at cost of production or purchase price (if bought), less depreciation on breeding stock.

(7) Goods purchased for use in production, but not yet used in production. (Probably underestimated on many farms).

Table 27

Net Increases in Fixed Capital and Working Capital per Farm,
 176 Farms in the North of Scotland, 1965/66 to 1967/68

Capital Type	Average Net Increase 1965/66 to 1967/68		Annual Net Increase			£ Change		
	Sample Total Per Year	Per Farm Per Year	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
Working Capital	£ 51,916	£ 295	£ 188	£ 153	£ 544	£ 3	£ 2	£ 8
Machinery	11,745	67	89	47	64	5	3	4
Cars	2,879	16	7	7	35	3	3	14
Structures	7,140	41	67	19	36	12	3	6
Total Fixed Capital	21,764	124	163	73	135	7	3	5

The level of working capital showed an average increase of £295 per year, which is £171 per year more than the average increase in fixed capital. The average increase in capital in livestock has been £121 per year, where as the average increase in machinery was only £67 per year.⁽¹⁾ This would suggest that the greatest demand for capital is for short term capital. There is a greater demand for capital for livestock activities than for investment in machinery.

These findings for net increase in investment are confirmed by reference to the total allocation of capital among fixed and working capital goods shown in Table 28.

Table 28

Allocation of Capital per Farm
176 Farms in the North of Scotland
(3 Year Average, 1965/66 to 1967/68)

Capital Type	Total	Per Farm	S.E.	% Capital Employed
	£	£	£	
Cash	132,451	752	92	7
Debtors	62,084	353	52	4
Produce Unsold	65,828	374	49	4
Cultivations and Crops	176,307	1,002	71	10
Livestock	819,773	4,658	264	47
Stores	15,166	86	25	1
WORKING CAPITAL	1,271,609	7,225	372	73
Machinery	314,113	1,785	128	18
Cars	44,796	254	19	3
Structures	114,018	648	89	6
FIXED CAPITAL	472,927	2,687	197	27
CAPITAL EMPLOYED ⁽¹⁾	1,744,536	9,912	540	100
Heritable Property	1,128,973	6,415	928	-
TOTAL ASSETS	2,873,509	16,327	1,294	-

(1) Capital Employed = Working Capital + Fixed Capital

(1) Some of the increase in livestock could be attributable to a rise in market values.

10. ALLOCATION OF CAPITAL

The average levels of capital for the sample are shown using balance sheet valuations. The deficiencies of these figures as a measure of capital invested, outlined earlier, are still present. Allocation for farm types, ownership and farm size are shown in the Appendix. With slight variations in percentage the general pattern is one showing livestock, machinery, crops and cultivations as the main types of capital goods in proportions of 45, 20 and 10 per cent. Capital allocation appears to be influenced most by farm type, where for dairy, pig and poultry types, more capital is invested in structures than in cropping activities.

There is over 160 per cent more capital in working capital than fixed capital. The difference appears to be getting greater as the level of fixed capital increased by 8 per cent over the period whilst working capital increased by 10 per cent.

This supports the finding that more money is required for working capital than for fixed capital. Since working capital is essentially short term capital and short term borrowings are more readily available than medium term borrowings, the shortage of borrowings in relation to aggregate demand should not be so acute.

Livestock receive the greatest allocation of capital, besides showing the greatest net increases. But the demand for capital for livestock can be met by various alternatives - from feed merchants, selling agents or through contract rearing. When capital

can no longer be obtained from the normal money supply channels these methods provide sources of capital though at additional cost.

The next greatest allocation of capital is in machinery which again reinforces the need for medium term borrowings. But when traditional sources of finance can no longer be tapped there are ways of overcoming shortages of capital through the use of contracting services, the formation of machinery co-operatives, machinery leasing and hire purchase finance.

On most farms cultivations and crops receive the next greatest allocation of capital and capital in these items has also shown a high net increase. Short term borrowings needed for this investment can also be obtained outwith the normal money market through merchant credit and loans.

The increase in capital involved with debtors may be reduced by improved business administration.

Capital for investment in structures appears to be of major importance only on specialised farms engaged in dairying, pigs and poultry.

C. SUPPLY OF CAPITAL

1. FARM BORROWINGS

Borrowings are a measure of some of the finance obtained from sources outwith farm income. Farm accounts' data have the advantage of recording accurately capital introduced from private and family sources, as well as that obtained from traditional sources - bank overdrafts and institutional lenders such as the Scottish Agricultural Securities Corporation Ltd.

Borrowings increase the level of capital available to a firm. However, it should be remembered that there are alternatives to borrowing money as a means of increasing the level of capital available to a farm. Substitutes for borrowing money as a means of increasing capital goods on a farm include the following: machinery can be hired, contract services can be used or livestock can be supplied by commercial firms for fattening. The use of these alternative sources is increasing and should be exploited more if there is a restriction to the supply of money for investment on farms.

The limitations on the measurement of borrowings recorded in national statistics also apply to borrowings recorded in farm accounts, i. e. the figures only measure the net change in total borrowings between accounting periods and not total repayments and new borrowings.

Average borrowings for the sample are shown in Table 29. The main source of farm borrowings is through bank overdrafts. Family loans are the other major source of finance for the sample. Creditors, in general, include normal trade credit, i. e. short term borrowings outstanding at the date at which the accounting period ends. (This allocation follows similar patterns to the estimates for the United Kingdom. Scottish figures do not give an estimate for family loans). All the figures show that the specialised agricultural lending institutions contribute only a small proportion to total farm borrowings.

The extent to which farms use outside finance will be some indication of the effective demand for money by farms.⁽¹⁾ The

⁽¹⁾ Assuming that money is available for borrowing.

Table 29

Source of Borrowings per Farm, 176 Farms in the North of Scotland

(3 Year Average 1965/66 to 1967/68)

Borrowing Source	Average 1965/66 to 1967/68				Net Change in Borrowings per Farm			% Change		
	Sample Total	Per Farm		S.E.	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
		Mean	$\pm(1)$							
Loans	£	£		£	£	£	£	%	%	%
Lending Institutions ⁽²⁾	47,271	269	8	N.A.	N.A.	34	38	N.A.	15	14
Private ⁽³⁾	45,254	257	7	N.A.	N.A.	27	0	N.A.	11	0
Family ⁽⁴⁾	88,592	503	15	N.A.	N.A.	150	2	N.A.	31	N.C.
Unknown ⁽⁵⁾	18,498	105	3	N.A.	N.A.	N.C.	N.C.	N.A.	N.C.	N.C.
TOTAL LOANS	199,615	1,134 (2.17)	33	186	26	211	40	3	22	3
OVERDRAFTS ⁽⁶⁾	286,507	1,628 (2.15)	47	263	144	204	-30	11	14	-2
CREDITORS	118,260	672 (1.28)	20	65	63	-30	93	11	-5	15
TOTAL BORROWINGS	604,382	3,434 (1.49)	100	386	233	385	103	8	12	3

S.E. = Standard error of mean

() = Coefficient of variation

N.C. = No Change

N.A. = Not Available

(1) Percentage total borrowings

(2) Includes Scottish Agricultural Securities Corporation Ltd., Hire Purchase Loans and other recognised lending institutions.

(3) Loans from sources other than recognised lending institutions except family.

(4) Loans from members of the operator's family.

(5) Source not identified in accounts.

(6) Bank overdrafts and any bank loans.

financial structure of the sample data showed that total borrowings contributed only 21 per cent to total farm assets. Farm operators had borrowed on average up to 27 per cent of their equity (Table 16). This seems a fairly conservative average level and the majority of farms have ratios below this. (Figure 10). Borrowing does not appear to be utilised to the full extent justified, taking account of "accepted" business management standards.⁽¹⁾ The small percentage of borrowings could be due to a shortage of money for investment. Farmers are also known to subject themselves to voluntary capital rationing which could explain some of the low level of borrowings. Alternatively, capital may not be the limiting factor to expansion of output, and there may be an adequate supply.

Since the coefficient of variation is greater than one for all forms of borrowings, some farms will have borrowings greatly in excess of the mean. Some farms will be borrowing large amounts of their capital. A frequency distribution is shown in Table 31.

The proportion of farms which have undertaken borrowings over the 3 year period is shown in Table 30. Most farms have undertaken borrowings of some type during the period. Almost 9 out of 10 farms incurred liability in the form of creditors each year of the period. Overdrafts and loans are also popular with nearly 5 out of 10 and 4 out of 10 farms respectively having recourse to these sources of credit.

With a coefficient of variation greater than 2 for the sample most overdrafts and loans could be expected to be less than their means of £1,628 and £1,134 respectively. (See Table 29). The frequency distribution in Table 31 supports this finding where 41 farms with borrowings of over £5,000 have mean loans greater than £1,200, and a total of 56 farms with borrowings of over £3,000 have mean overdrafts greater than £1,600.

Farm borrowings increased by £721 per farm over the period or by over £150,000 for the sample as a whole - an increase of 3 per cent. The increase has taken place in borrowings from all sources. Borrowings increased on farms of most types, the only exception being a decline on pig and poultry farms. Significant increases occurred on cattle and sheep farms and on dairy farms.

⁽¹⁾ In some circles it is contended, possibly without sound reasoning, that borrowing can safely be undertaken up to a level of 50 per cent of the value of total assets.

Table 30

Frequency and Proportion of Borrowings, 176 Farms in the North of Scotland

1965/66 to 1967/68

Source of Borrowing	Frequency ¹	Proportion ²
<u>Loans</u>		
Lending Institutions	34	0.064
Private	30	0.057
Family	167	0.316
Unknown	15	0.028
TOTAL LOANS	215	0.407
OVERDRAFTS	254	0.481
CREDITORS	465	0.881
TOTAL BORROWINGS	477	0.903

¹Frequency is the total of the number of farms that have recorded borrowings in each of the 3 years.

²Frequency expressed as a proportion of number of possibilities

i.e.
$$\left(\frac{\text{Frequency}}{\text{Number of Farms} \times 3} \right)$$

Table 31

Frequency Distribution of Borrowings per Farm, 176 Farms in the North of Scotland

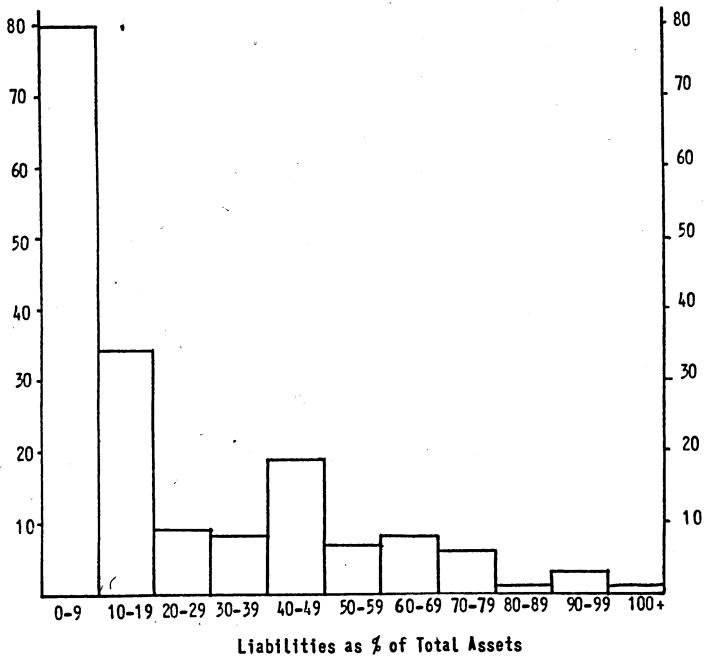
(3 Year Average 1965/66 to 1967/68)

Item	BORROWINGS GROUPS £'s												
	£0	£1-£1,000		£1,001-£2,000		£2,001-£3,000		£3,001-£5,000		£5,001-£8,000		> £8,000	
No. of Farms	8	79		19		14		15		15		26	
Source of Borrowing:	£	£	£	£	£	£	£	£	£	£	£	£	£
Loans	0	38 (3.08)	10	389 (1.14)	27	849 (0.76)	35	985 (1.14)	24	2,875 (0.73)	46	4,595 (0.97)	33
Overdrafts	0	56 (2.27)	15	458 (1.05)	32	967 (0.76)	39	2,283 (0.43)	56	2,413 (0.83)	38	7,285 (0.85)	53
Creditors	0	273 (0.78)	75	576 (0.62)	41	645 (0.46)	26	844 (0.40)	20	1,025 (0.72)	16	1,871 (0.81)	14
Total Borrowings	0	367 (0.75)	100	1,423 (0.17)	100	2,461 (0.12)	100	4,112 (0.13)	100	6,313 (0.15)	100	13,751 (0.40)	100

() = Coefficient of variation.

Figure 10

Frequency Distribution of Farms According to Liabilities
as a Percentage of Total Assets



2. MONEY SUPPLY FROM FARM INCOME

The long term aim of a firm is generally to provide sufficient income over costs to maintain and increase the net worth by increasing the level of assets in the firm. Profits are therefore a primary source of finance for investment by a firm. Finance from profits is the cheapest form of finance available to the firm. Profits are the most accessible finance for the firm, being free from the restrictions imposed by lenders on money obtained by overdrafts, loans or hire purchase. It would be expected therefore that farm income will be the prime and major source of finance available for farms.

Data on money available for investment from farm income are obtainable from the farm accounts (Table 32). The farm accounts make deductions for depreciation on farm machinery, cars and structures in calculating net profit. However, since there is no actual transfer of money out of the business for these deductions, the money is therefore still available for reinvestment. A useful item of data available from the farm account and its supporting schedules is the quantity of money transferred into the business through the personal account from private sources and the amounts of money transferred out of the business via the personal account. Measures of these amounts are given.

One of the characteristic features of finance for agriculture is the family firm basis of most farms. The limitations to obtaining finance by providing public ownership through share subscriptions, make agriculture more reliant on farm incomes as the main source of money for investment. One advantage,

Table 32

Money Supply from Farm Income per Farm, 176 Farms in the North of Scotland

(3 Year Average 1965/66 to 1967/68)

Source of Supply	Average £'s 1965/66 to 1967/68			Time Series £'s per Farm			% Change	
	Sample Total	Per Farm		1965/66	1966/67	1967/68	1965/66 to 1966/67	1966/67 to 1967/68
		Mean	%					
	£	£	%	£	£	£	£	£
Net Profit	246,672	1,402	60	1,308	1,184	1,711	-9	44
Depreciation(1)	96,262	547	24	501	558	583	11	4
Personal Account(2)	64,883	369	16	257	476	373	7	-22
Disposable Income	407,817	2,318	100	2,066	2,218	2,667	7	20
<u>Less Personal Withdrawals</u>								
Personal Account(3)	43,131	245	11	254	218	263	-14	21
Personal Drawings(4)	202,478	1,151	49	1,067	1,197	1,188	12	-1
Total Withdrawals	245,609	1,396	60	1,321	1,415	1,451	7	3
Net Income for Investment	162,208	922	40	745	803	1,216	8	57

(1) Depreciation shown is net of gains on sales of machinery which for the sample as a whole totalled £7,721 or £44 per farm.

(2) Interest on personal investments outwith the farm and any other income obtained outwith the farm.

(3) Sundry expenses and income invested outside the farm.

(4) Includes allowances for car, rent of house, electricity, life assurance, income tax payments, farm produce consumed, national insurance, use of telephone and cash withdrawals for personal living expenses.

however, is that finance may be obtained from private family sources.⁽¹⁾ In this sample 16 per cent of the money supply available for investment was provided from family funds outwith the farm in the form of capital introduced.

However, because farming is a family business the first demand on disposable income from the farm is for the farmer's personal living expenses. The farmer's preference for income for personal living expenses in competition with his preference to invest in the farm can have an important influence on the supply of money to the farm. Farmers faced with a shortage of capital can sacrifice investment in the farm for a high or normal standard of living, or may choose a lower standard of personal living expenses to increase investment in the farm. Farmers might also prefer to reinvest income outside the farm business. Data available from the farm accounts suggest the directions of these cash flows.

Disposable income refers to money available for allocation between the farm and the home. The allocation for the sample is 41 per cent invested in the farm and 59 per cent retained for personal expenses. The percentage allocation varies with the level of disposable income (Appendix Table 11B), but it would appear that personal expenses take preference over farm investment. Personal expenses rise with the level of disposable income, but the balance available for investment also increases.

Net profit is the main source of supply contributing around 60 per cent to disposable income. However, it is interesting to note that for most groups net profit meets personal drawings.

Investment income is mainly provided by depreciation allowances and the balance of inflows over outflows from and to private sources. There has been a net capital inflow of £124 per farm per year for the sample, from private family sources.

(1) Farm businesses benefit from their ability to obtain family loans, as discussed earlier, as well as from capital introductions via the personal account.

Despite the variability in farm incomes over the period, disposable income has increased by £600 per farm, mainly through provision for depreciation and personal capital inflows. However, with the increase in personal drawings the net increase in income for investment has been reduced to £450 per farm.

On the majority of farms in this sample, net profits are providing sufficient income to cover farm living expenses. (Appendix Tables 11a, 11b and 11c). However, since depreciation rates are implied to be just covering losses in value of fixed capital, farm incomes on most farms are just sufficient to maintain existing levels of capital. Therefore it seems that the only surplus available to increase levels of capital on the majority of farms is provided from family sources and farm borrowings.

3. THE SUPPLY OF AND DEMAND FOR CAPITAL FOR INVESTMENT

Data from farm accounts have provided measures of the demand for money for investment, the allocation of the money amongst items of fixed and working capital and the sources of supply of this money. The data are now aggregated to compare the total supply and total demand over the period, (Table 33).

The total supply of money for investment comprises the increase in borrowings within a year, the net income for investment for the year and grants. Demand, measured as effective investment, is net fixed capital investment, plus grants to balance grants supplied, the annual increase in level of working capital, and investment in land, (heritable property).

Care should be taken in interpreting the amount of working capital investment. Part of the increase in the valuations of working capital will be due to price increases, giving an overestimate of the money invested by the farmer. In addition, some investment in working capital can be paid as a current cost, giving a reduction in net profit. Where

investment in working capital is provided from current costs there is no balancing item for this investment in the supply section of the table. Supply in these instances would be under-estimated.

The allocation of investment is 55 per cent to fixed capital and 24 per cent to working capital. A further 16 per cent has been invested in land purchases. 75 per cent of the supply comes from farm income sources with 20 per cent provided by an increase in borrowings and 5 per cent from grants.

Table 33 shows that supply equals demand, in practice as well as in theory. The equality occurs since it must hold with each account for the account to balance. The table therefore, cannot give an answer to the original question: "Is there a shortage of supply of capital to farming?"

However, the components of supply and demand provide information relevant to the question. It could be argued that if farmers are withdrawing money from their farm businesses for investment outside farming (Table 32) they are not experiencing a shortage of capital for their farm requirements. Furthermore, as one would expect, appendix tables 11a, 11b, 11c show that as profits rise, personal drawings increase. In situations where personal drawings are considered to be excessive, then theoretically there can not be a shortage of capital.

A few farms have invested in land (heritable property). The capital requirement for investment in land, was not considered in the estimated requirements for production increases [2] and as discussed previously need not cause an increase in production (pages 16 and 17), unless capital investment on farms has reached the point of "over capitalisation"⁽¹⁾. Farmers who have invested in land should not be experiencing a shortage of capital in relation to their existing holdings.

⁽¹⁾ When further inputs of capital in combination with other fixed resources give a return lower than the cost of the capital.

Table 33

Supply of and Demand for Money for Investment per Farm,
176 Farms in the North of Scotland
(3 Year Average 1965/66 to 1967/68)

Supply of Money	Average £'s 1965/66 to 1967/68			Time Series, Per Farm		
	Sample Total	Per Farm	%	1965/66	1966/67	1967/68
	£	£		£	£	£
Net Increase in Borrowings	42,262	240	20	233	385	103
Net Income for Investment	162,208	922	75	745	803	1,216
Grants	11,162	63	5	54	60	76
Total Supply	215,632	1,225	100	1,032	1,248	1,395
<u>Effective Investment</u>						
Fixed Capital Investment ⁽¹⁾	118,733	675	55	670	625	729
Working Capital Increase	51,916	295	24	188	153	544
Heritable Property	33,821	192	16	120	410	46
Grants	11,162	63	5	54	60	76
Total Demand	215,632	1,225	100	1,032	1,248	1,395

(1) Net investment in fixed capital less repairs.

However, the special situations outlined above probably occur only in a minority of farm situations and it remains to look at capital growth and returns to capital to see the situation on the majority of farms.

4. CHANGES IN NET WORTH

The net effect of investment and of the money supplied for investment, on farm financial structure can now be measured. This is measured by the changes in net worth on the farm. Net worth change can measure the financial "health" of the firm. A viable business would normally, in the long run, be expanding net worth. Table 34 shows the changes in net worth for the sample. The composition of these changes is given in more detail by farm numbers in Figure 11. The majority appear to move with the economic conditions of the farming year. In 1966/67, which was classed as a bad year, 70 farms suffered a decline in net worth. However, as Figure 11 confirms, it is only a minority group of 7 farms that have experienced a continual decline in net worth suggesting that they are not generating their own finance. 52 farms had a continual increase in net worth over the period.

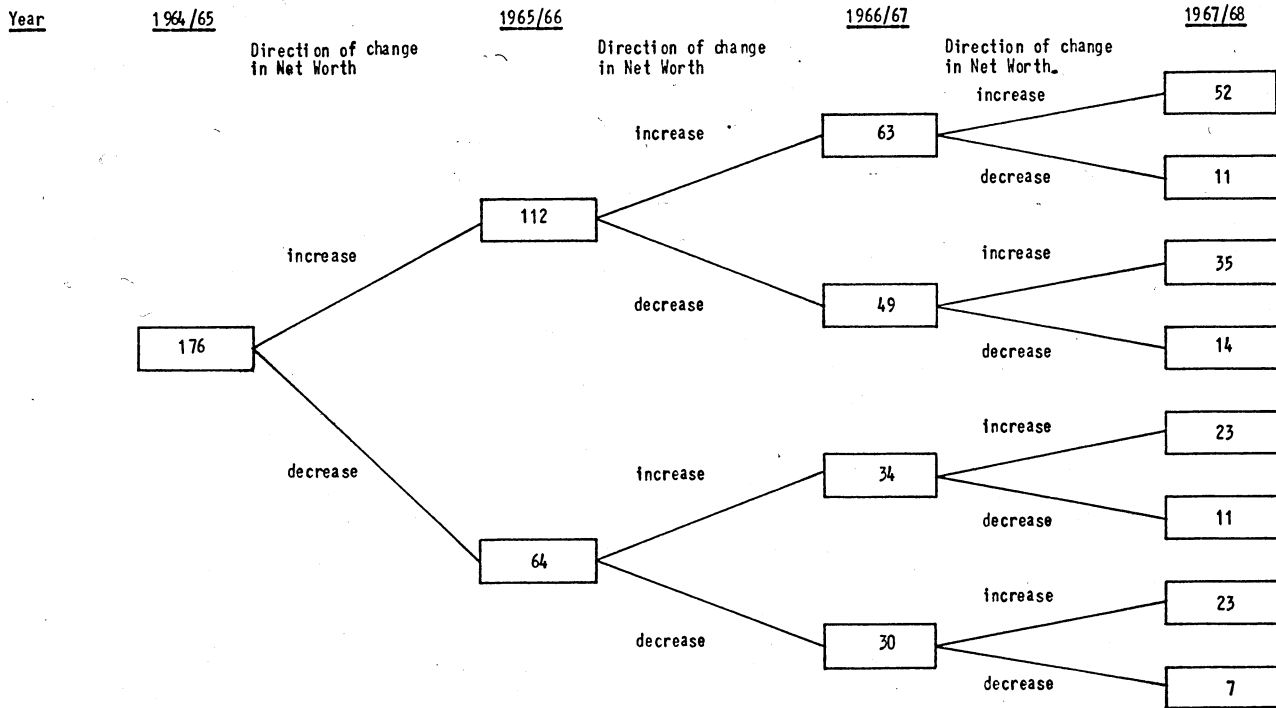
Table 34 Balance Sheet Changes per Farm, 176 Farms in the North of Scotland
1965/66 to 1967/68

Capital Type	Time Series £'s per Farm				Annual Change £'s		
	1964/65	1965/66	1966/67	1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
Working Capital	6,754	6,942	7,095	7,639	188	153	544
Fixed Capital	2,430	2,593	2,666	2,801	163	73	135
Heritable Property	6,006	6,126	6,536	6,582	120	410	46
TOTAL ASSETS	15,190	15,661	16,297	17,022	471	636	725
LIABILITIES	2,910	3,143	3,528	3,631	233	385	103
NET WORTH	12,280	12,518	12,769	13,391	238	251	622

Figure 11

CHANGES IN NET WORTH

Number of Farms and Direction of Change in Net Worth, 1964/65 to 1967/68



D. RELATIONSHIP OF PHYSICAL AND FINANCIAL
FACTORS TO NET FIXED CAPITAL INVESTMENT

Features associated with the allocation and sources of money for investment have now been analysed. Finally the farm physical and financial features associated with fixed capital investment can be examined. The financial features investigated are net profit, borrowings, levels of capital, balance sheet ratios and returns to capital. (Table 35). Physical inputs of land, crops, livestock and labour together with certain costs related to fixed capital are given. (Table 36).

The data show that the level of fixed capital investment is associated with the size of the firm, irrespective of whether size is measured by standard man days, area of land or level of capital. As farm size increases, net profit increases and so does net income for investment and the level of borrowings. The larger firms have higher levels of fixed capital to maintain, and higher total net profits with which to provide money for investment in fixed capital. High levels of capital investment occur on farms with bigger acreages and larger areas of crops (Table 36). Large capital investment is associated with dairy cows. Despite the increase in acreage, capital employed per acre also increases with higher levels of investment.

The second important feature is that as the level of investment increases the return on total assets decreases. Returns ranged from 17.9 per cent on farms which have had no investment in fixed capital in the period to 7 per cent for farms with an annual investment of over £2,000 per year. The return to operator's net worth, measured as net profit (Table 35), is marginally greater than the return to total assets measured as net profit plus interest.⁽¹⁾ 35 farms investing over £1,000 per year had an average return to total assets of less than 10 per cent.

⁽¹⁾ Net profit is calculated having deducted interest charges on borrowed capital as a cost item.

Table 35

Net Fixed Capital Investment per Farm and Financial Factors,
176 Farms in the North of Scotland
(3 Year Average 1965/66 to 1967/68)

Item	Net Fixed Capital Investment Group £'s						All Farms
	< £1	£1-£100	£101-£400	£401-£1,000	£1,001-£2,000	> £2,000	
No. of Farms	10	22	58	51	24	11	176
<u>Financial Factors</u>							
Net Fixed Capital Investment	£ -1	44	241	693	1,477	3,004	675
Net Profit	£ 711	715	971	1,661	2,080	2,996	1,402
Net Income for Investment	£ -26	139	363	1,070	1,758	3,773	922
Borrowings	£ 55	1,756	1,595	4,402	6,982	7,328	3,434
Fixed Capital	£ 193	671	1,358	2,998	5,377	8,689	2,687
Working Capital	£ 2,918	3,673	4,880	8,641	11,679	14,327	7,225
Capital Employed	£ 3,115	4,344	6,238	11,639	17,056	23,016	9,912
Heritable Property	£ 875	701	2,417	8,202	10,972	25,726	6,415
Total Assets as a ratio of Borrowings (1)	72.4	2.9	5.4	4.5	4.0	6.7	4.8
Net Worth as a percentage of Total Assets (2)	99	65	82	78	75	85	79
Return on Net Worth % (3)	18	21.7	13.8	10.8	9.9	7.2	10.9
Return on Total Assets % (4)	17.9	15.5	13.2	10.1	8.6	7.0	9.5

(1) Total Assets/Borrowings.

(2) Net Worth or Farm Capital/Total Assets - percentage of the business which belongs to the owner.

(3) Net Profit as a percentage of Net Worth.

(4) Net Profit plus interest as a percentage of Total Assets.

The third important financial feature is the high balance sheet ratio of capital to borrowings for most investment groups. It could be argued that farms are not borrowing to the full potential allowed by their asset backing, especially when viewed against the high return to capital on farms with less than £400 annual investment. The farmer's limit to borrowing should be determined by the return on the additional capital, not the asset backing covering the borrowed money, especially where there is above average return on investment.

Finally a measure of cost per unit of output, including imputed cost of operator's labour and an estimated opportunity cost of 8 per cent on operator's capital, excluding land, shows that only farms with over £2,000 per annum fixed capital investment are showing a margin over normal costs.⁽¹⁾ A measure of less than 1 shows that output measured as total revenue is greater than total costs. Farms with investment of £1,000 to £2,000 are making nominal profits, i. e. just covering total costs. At the same time these farms showed a return to total assets of less than 10 per cent, which may have limited additional investment.

Farms that invested less than £1,000 per year, showed a return to capital of over 10 per cent, but the measure of cost per unit output indicates they do not cover the cost of operators labour which may be restricting further investment.⁽²⁾

(1) The opportunity cost taken at 8 per cent was equivalent to the bank rate at the time.

The return to heritable property was taken as an estimated rent.

The deficiency between return on total assets - cost per unit output for these farms would be due to the inclusion of heritable property in total assets.

(2) The deficiency between cost per unit output and return on capital from these farms would be due to the inclusion of operators labour in cost per unit output.

Table 36

Net Fixed Capital Investment per Farm and Physical Factors
176 Farms in the North of Scotland
(3 Year Average 1965/66 to 1967/68)

Item	Net Fixed Capital Investment Group £'s						All Farms
	< £0	£0-£100	£101-£400	£401-£1,000	£1,001-£2,000	> £2,000	
No. of Farms	10	22	58	51	24	11	176
<u>Area</u>							
Farm - acres(adjusted)	104	97	108	188	262	302	162
Crops - acres	5	31	35	68	116	151	61
<u>Livestock Units</u>							
Total - no.	63	46	44	81	100	123	69
Beef Cows - no.	3	5	10	13	16	8	10
Dairy Cows - no.	-	1	1	5	3	42	5
Pigs and Poultry - no.	1	3	4	7	7	9	5
Size SMD's	305	412	447	786	1,039	1,498	679
Capital Employed per Acre £	41	51	65	70	76	90	66
Wages Cost* £	648	1,234	1,226	1,967	2,898	3,852	1,801
Fuel £	20	72	90	223	336	588	187
Contract £	12	71	76	120	112	169	95
Cost* per Unit of Output £	1.15	1.10	1.14	1.03	1.01	0.97	1.07

* Including family wages and 8 per cent return on capital

SECTION 4
CONCLUSIONS

1. Gross domestic fixed capital formation in agriculture has declined as a proportion of total investment in the United Kingdom. Demand for investment by agriculture has declined in relation to other sectors of the economy. Investment by agriculture is less than 3 per cent of total United Kingdom investment. This low percentage means that relatively large increases in capital for agriculture would have little significant effect on total investment.
2. There has been an annual increase in investment in agriculture since 1956 of £7.8M at current prices, which is below the estimated requirement for the proposed expansion of agriculture. Around 50 per cent of investment is in machinery, but the proportion of investment in buildings has increased since 1956.
3. Machinery investment on the sample farms was mainly in tractors (27 per cent) and other general farm equipment (20 per cent). However, for the United Kingdom and Scotland there have been increases in the numbers of machines for cereal growing and in the quantity of certain hay making equipment. Together with the sample farm data these figures suggest that additional machinery investment is being allocated to corn and livestock production. Owing to the need for fairly routine replacement, demand for capital for machinery investment seems to be more constant than total demand by agriculture.
4. Cars appear to be an essential form of investment on farms. Investment in vehicles has remained a constant proportion of total investment by agriculture.
5. Investment in structures is the most variable element of total agricultural investment. This feature appears to be due to the large quantities of capital involved in individual structures and the less obvious return on the investment. Most structures are of a general purpose nature. On the sample farms the greatest quantity of investment on specialised buildings has been spent on beef cattle housing. Tenants have invested almost the same amount per farm on buildings as owner operators. Dairy farms have the highest investment per farm in buildings.
6. There is a larger proportion of capital in working capital than in fixed capital, excluding heritable property. The average increase in working capital has been £295 which is £171 more than the increase in fixed capital. The most important component of working capital is livestock, the value of which increased by £121 per year compared with a £67 per year increase in machinery. Since most capital is allocated to working capital much of the capital requirements for agriculture could be obtained on a short term basis from merchants, through bank overdrafts, from livestock dealers and through contract rearing or cropping with suppliers or processors.

7. Total agricultural investment is significantly related to farm income at current or constant prices. This relationship also holds for the sample farms. Since 1956 Net Farm Income has increased by £155M while fixed capital investment increased by £117M, implying that 75 per cent of the increase in farm incomes could be allocated to the increase in investment. The important indicator, total investment as a proportion of net farm income, has increased from 27 per cent in 1956 to 41 per cent in 1968 (Table 3A). For the sample, investment in fixed capital is around 50 per cent of net profit. However, most of net profit is used for personal drawings and additional income available for reinvestment is provided by allowances for depreciation, and from private sources. (Table 32 and 33).
8. Additional capital for use in agriculture is mainly obtained from banks, relatives and merchants. Borrowings from banks have increased by £100M since 1963. Only a small proportion of farm borrowings are provided by the specialised agricultural lending institutions. Farmers tend to be conservative in relation to their borrowing and only 20 per cent of farm capital in the sample is obtained from outside borrowings. Most farm borrowings for the sample are within the limit of £1,600.
9. Government grants and resale value of fixed capital are an additional source of capital for investment and reduce the total cost of investment. The effect on the sample farms was that capital was required for only 73 per cent of the total cost of the capital goods.
10. Returns on capital employed in agriculture vary with the size and type of farm. Some farms give returns comparable with industrial firms and would be competitive in their demand for capital. When the capital in land is included, however, returns are reduced to less competitive levels. Land values are estimated to give a current return of around 2 per cent and obviously incorporate an element of expected capital growth in value.
11. 55 per cent is allocated to fixed capital (excluding heritable property 16 per cent), and 24 per cent to working capital. 75 per cent of money for investment comes from farm income sources and 20 per cent from an increase in borrowings. The level of investment is related to farm size. Farms with less than £1,000 per year average investment have a return on capital over 10 per cent. Despite this high return on capital a large proportion of this return would be the return to operators labour. Farms investing over £1,000 per year have a return on capital of less than 10 per cent. This would appear to be the position for the total demand by agriculture. The supply of capital to agriculture is that for which it can pay the market cost. Most farms would show low return to capital after deducting a return to operators labour and therefore, might have borrowed to their limit.

APPENDIX

Table 1 Sample Distribution by Farm Size, Farm Type and Farm Tenure

Farm Type		Tenure Type	Farm Size in Standard Man Days					Total
			0-250	251-600	601-900	901-1,200	> 1,200	
Mixed	Cattle and Sheep	Tenants	2	30	12	2	3	49
		Owners	1	11	8	3	4	27
		Mixed	-	5	1	2	1	9
		Total	3	46	21	7	8	85
	Arable	Tenants	-	5	1	2	2	10
		Owners	-	3	3	1	2	9
		Mixed	-	-	2	1	-	3
		Total	-	8	6	4	4	22
	Pigs and Poultry	Tenants	1	5	2	-	-	8
		Owners	-	6	2	2	-	10
		Mixed	-	1	1	1	-	3
		Total	1	12	5	3	-	21
Dairy	Tenants	-	-	2	-	-	2	
	Owners	-	-	3	-	3	6	
	Mixed	-	-	-	1	3	4	
	Total	-	-	5	1	6	12	
Upland Rearing		Tenants	-	10	-	1	2	13
Hill Farms		Tenants	2	9	4	-	-	15
Crofts	Tenants	4	-	-	-	-	4	
	Owners	2	2	-	-	-	4	
	Total	6	2	-	-	-	8	
All Farms	Tenants	9	59	21	5	7	101	
	Owners	3	22	16	6	9	56	
	Mixed	-	6	4	5	4	19	
	Total	12	87	41	16	20	176	

APPENDIX

Table 2 Percentage Distribution of the Sample by Farm Type:
Farm Size and Farm Tenure

Farm Type

Farm Type	MIXED			Dairy	Upland Rearing	Hill Farms	Crofts
	Cattle and Sheep	Arable	Pigs and Poultry				
100%	48	13	12	7	7	8	5

Farm Size

Farm Size SMD's	0-250	251-600	601-900	901-1,200	>1,200
100%	7	50	23	9	11

Farm Tenure

Farm Tenure	Tenants	Owners	Mixed
100%	57	32	11

APPENDIX

Table 3a

Physical Features per Farm by Farm Tenure

(3 Year Average 1965/66 to 1967/68)

Physical Item	Unit	Tenants	Owners	Mixed	All Farms
<u>AREA</u> Farm	Adjusted acres	148	179	193	162
Crops	Acres	48	75	85	61
<u>LIVESTOCK</u>					
Total	Livestock Units	65	70	86	69
Beef Cows	"	11	10	8	10
Pigs & Poultry	"	4	6	10	5
<u>SIZE</u>	Standard man days	587	741	990	679

APPENDIX

Table 3b

Physical Features per Farm by Farm Type

(3 Year Average 1965/66 to 1967/68)

Physical Item	Unit	Mixed			Dairy	Upland Rearing	Hill Farms	Crofts	All Farms
		Cattle and Sheep	Arable	Pigs and Poultry					
<u>AREA</u> Farm	Adjusted acres	153	224	102	226	212	171	59	162
Crops	Acres	60	119	50	98	38	9	14	61
<u>LIVESTOCK</u>									
Total	Livestock units	65	60	56	102	84	109	21	69
Beef Cows	"	12	5	5	4	27	8	8	10
Pigs and Poultry	"	4	3	21	4	2	-	-	5
<u>SIZE</u>	Standard man days	654	852	591	1,321	632	483	192	679

APPENDIX

Table 3c

Physical Features per Farm by Farm Size

(3 Year Average 1965/66 to 1967/68)

Physical Item	Unit	Farm Size in SMD's					All Farms
		0-250	251-600	601-900	901-1,200	>1,200	
<u>AREA</u> Farm	Adjusted acres	51	103	163	268	401	162
Crops	Acres	10	32	59	113	175	61
<u>LIVESTOCK</u>							
Total	Livestock Units	22	46	77	103	152	69
Beef Cows	"	5	8	10	14	20	10
Pigs and Poultry	"	1	4	8	10	5	5
<u>SIZE</u>	Standard man days	175	415	729	1,081	1,707	679

APPENDIX

Table 4a

Capital Structure per Farm by Farm Tenure

(3 Year Average 1965/66 to 1967/68)

Capital Item	Tenants		Owners		Mixed		All Farms	
	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets
<u>ASSETS</u>	£		£		£		£	
Cash	712	9	619	2	1,360	6	752	5
Debtors	290	3	423	2	481	2	353	2
Stock Valuation	5,322	64	6,759	24	8,477	38	6,120	37
Cars and Machinery	1,567	19	2,621	9	2,837	13	2,039	13
Structures	358	4	981	3	1,208	5	648	4
Heritable Property	88	1	17,205	60	8,238	36	6,415	39
TOTAL ASSETS	8,337	100	28,608	100	22,601	100	16,327	100
<u>BORROWINGS</u>								
Overdrafts	823	10	2,544	9	3,208	14	1,628	10
Creditors	609	7	733	3	827	4	672	4
Loans	474	6	2,102	7	1,788	8	1,134	7
TOTAL BORROWINGS	1,906	23	5,379	19	5,823	26	3,434	21
FARM CAPITAL	6,431	77	23,229	81	16,778	74	12,893	79
FARM CAPITAL OPENING VALUE	6,297	76	22,677	79	15,637	69	12,518	77
Capital ⁽¹⁾ Growth	134	1	552	2	1,141	5	375	2
FARM CAPITAL CLOSING VALUE	6,431	77	23,229	81	16,778	74	12,893	79

(1) Balance of net profit ± balance from Personal Account.

Table 4b

APPENDIX

Capital Structure per Farm by Farm Type
(3 Year Average 1965/66 to 1967/68)

Capital Item	MIXED						Dairy		Upland Rearing		Hill Farms		Crofts		All Farms	
	Cattle & Sheep		Arable		Pigs & Poultry											
	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets
<u>ASSETS</u>	£		£		£		£		£		£		£		£	
Cash	824	5	959	4	538	3	1,155	4	584	6	454	8	221	5	752	5
Debtors	228	1	970	4	372	2	737	2	236	3	58	1	95	2	353	2
Stock Valuation	6,387	40	6,977	28	5,532	34	9,009	28	6,362	72	4,126	78	1,467	34	6,120	37
Cars and Machinery	1,907	12	3,367	13	1,989	12	4,206	13	1,379	16	462	9	709	16	2,039	13
Structures	561	4	565	2	950	6	2,280	7	270	3	172	3	62	2	648	4
Heritable Property	6,160	38	12,182	49	6,984	43	14,651	46	-	-	45	1	1,781	41	6,415	39
TOTAL ASSETS	16,067	100	25,020	100	16,365	100	32,038	100	8,831	100	5,317	100	4,335	100	16,327	100
<u>BORROWINGS</u>																
Overdrafts	1,792	11	2,096	8	1,816	11	2,865	9	984	11	184	4	4		1,628	10
Creditors	666	4	1,041	4	688	4	770	2	814	9	168	3	241	6	672	4
Loans	1,207	8	2,480	10	1,267	8	1,126	4	83	1	56	1	56	1	1,134	7
TOTAL BORROWINGS	3,665	23	5,617	22	3,771	23	4,761	15	1,881	21	408	8	301	7	3,434	21
FARM CAPITAL	12,402	77	19,403	78	12,594	77	27,277	85	6,950	79	4,909	92	4,034	93	12,893	79
FARM CAPITAL OPENING VALUE	12,166	76	18,787	75	11,764	72	26,060	81	7,002	79	4,927	92	3,856	89	12,518	77
Capital Growth(1)	236	1	616	3	830	5	1,217	4	-52	0	-18	-	178	4	375	2
FARM CAPITAL CLOSING VALUE	12,402	77	19,403	78	12,594	77	27,277	85	6,950	79	4,909	92	4,034	93	12,893	79

(1) Balance of net profit: balance from Revenue Account

(1) Balance of net profit \pm balance from Personal Account.

APPENDIX

Table 4c

Capital Structure per Farm by Farm Size
(3 Year Average 1965/66 to 1967/68)

Capital Item	Farm Size in SMD's										All Farms	
	0-250		251-600		601-900		901-1,200		> 1,200			
	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets	Per Farm	% Total Assets
ASSETS	£		£		£		£		£		£	
Cash	268	10	825	10	796	4	660	2	711	2	752	5
Debtors	46	2	154	2	376	2	483	2	1,252	3	353	2
Stock Valuation	1,275	50	3,794	44	6,716	37	10,458	37	14,445	32	6,120	37
Cars & Machinery	332	13	1,152	13	2,436	13	3,141	11	5,232	12	2,039	13
Structures	117	5	246	3	909	5	1,082	4	1,838	4	648	4
Heritable Property	521	20	2,408	28	7,164	39	12,382	44	21,070	47	6,415	39
TOTAL ASSETS	2,559	100	8,579	100	18,397	100	28,206	100	44,548	100	16,327	100
BORROWINGS												
Overdraft	111	4	551	6	1,569	8	5,637	20	4,138	9	1,628	10
Creditors	166	7	424	5	546	3	1,466	5	1,676	4	672	4
Loans	101	4	736	9	1,660	9	1,956	7	1,751	4	1,134	7
TOTAL BORROWINGS	378	15	1,711	20	3,775	20	9,059	32	7,565	17	3,434	21
FARM CAPITAL	2,181	85	6,868	80	14,622	80	19,147	68	36,983	83	12,893	79
FARM CAPITAL OPENING VALUE	2,126	83	6,650	77	14,131	77	18,502	66	36,184	81	12,518	77
Capital Growth ⁽¹⁾	55	2	218	3	491	3	645	2	799	2	375	2
FARM CAPITAL CLOSING VALUE	2,181	85	6,868	80	14,622	80	19,147	68	36,983	83	12,893	79

(1) Balance of net profit ± balance from Personal Account.

APPENDIX

Table 5a

Net Fixed Capital Investment per Farm by Farm Tenure
(3 Year Average 1965/66 to 1967/68)

Capital Type	Tenants		Owners		Mixed		ALL Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Structures	£ 80 (2.20)	18	£ 186 (1.39)	21	£ 469 (1.81)	36	£ 156 (2.28)	23
Machinery	308 (1.19)	70	601 (1.03)	68	702 (0.99)	55	444 (1.18)	66
Cars	54 (1.54)	12	98 (1.26)	11	118 (1.19)	9	75 (1.41)	11
Total Fixed Capital Investment	442 (1.14)	100	885 (0.89)	100	1,289 (1.14)	100	675 (1.18)	100
Repairs	266 (1.05)		482 (0.88)		603 (0.95)		371 (1.05)	
Total Expenditure on Fixed Capital	708		1,367		1,892		1,046	

() - Coefficient of variation

APPENDIX

Table 5b

Net Fixed Capital Investment per Farm by Farm Type
(3 Year Average 1965/66 to 1967/68)

Capital Type	MIXED						Dairy		Upland Rearing		Hill Farms		Crofts		All Farms	
	Cattle & Sheep		Arable		Pigs & Poultry											
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Structures	£ 133 (2.74)	22	£ 136 (1.16)	14	£ 261 (1.48)	38	£ 478 (1.43)	27	£ 73 (1.82)	19	£ 66 (2.02)	42	£ - (2.02)	-	£ 156 (2.28)	23
Machinery	£ 405 (1.01)	65	£ 712 (1.00)	76	£ 363 (0.79)	53	£ 1,144 (0.73)	65	£ 276 (1.24)	72	£ 66 (1.85)	42	£ 252 (2.02)	82	£ 444 (1.18)	66
Cars	£ 80 (1.29)	13	£ 90 (1.23)	10	£ 66 (1.29)	9	£ 151 (1.21)	8	£ 34 (1.56)	9	£ 25 (3.12)	16	£ 55 (1.47)	18	£ 75 (1.41)	11
Total Fixed Capital Investment	£ 618 (1.11)	100	£ 938 (0.89)	100	£ 690 (0.85)	100	£ 1,773 (0.81)	100	£ 383 (1.14)	100	£ 157 (1.38)	100	£ 307 (1.85)	100	£ 675 (1.18)	100
Repairs	£ 312 (0.81)		£ 665 (0.79)		£ 353 (0.62)		£ 902 (0.74)		£ 279 (1.39)		£ 101 (1.45)		£ 105 (0.73)		£ 371 (1.05)	
Total Expenditure on Fixed Capital	£ 930		£ 1,603		£ 1,043		£ 2,675		£ 662		£ 258		£ 412		£ 1,046	

() Coefficient of variation

APPENDIX

Table 5c

Net Fixed Capital Investment per Farm by Farm Size (SMD's)
(3 Year Average 1965/66 to 1967/68)

Capital Type	Farm Size in SMD's										All Farms	
	0-250		251-600		601-900		901-1,200		> 1,200			
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Structures	£ 6 (3.67)	7	£ 64 (2.05)	20	£ 183 (1.47)	21	£ 222 (1.41)	23	£ 537 (1.50)	28	£ 156 (2.28)	23
Machinery	50 (1.72)	63	212 (1.18)	65	605 (0.78)	69	617 (0.55)	63	1,218 (0.65)	64	444 (1.18)	66
Cars	24 (2.04)	30	50 (1.48)	15	88 (1.25)	10	132 (0.89)	14	144 (1.18)	8	75 (1.41)	11
Total Fixed Capital Investment	80 (1.36)	100	326 (1.03)	100	876 (0.67)	100	971 (0.50)	100	1,899 (0.73)	100	675 (1.18)	100
Repairs	76 (0.80)		188 (0.64)		398 (0.79)		628 (0.47)		1,085 (0.46)		371 (1.05)	
Total Expenditure on Fixed Capital	156		514		1,274		1,599		2,984		1,046	

() - Coefficient of variation

APPENDIX

Table 6a

Investment in Machinery per Farm by Farm Tenure

(3 Year Average 1965/66 to 1967/68)

Machine Type	Tenants		Owners		Mixed		All Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Tractors	£ 95	31	£ 140	23	£ 147	21	£ 115	26
Tillage Equipment	12	4	20	3	44	6	19	4
Grain Harvesting	40	13	102	17	106	15	67	15
Driers	31	10	101	17	78	11	58	13
Baling Equipment	22	7	48	8	47	7	32	7
Silage Equipment ⁽¹⁾	15	5	24	4	25	4	19	4
F.Y.M. Equipment	12	4	18	3	27	4	15	3
Potatoes	12	4	13	2	36	5	15	4
Dairy	7	2	21	4	52	7	17	4
General	62	20	114	19	140	20	87	20
TOTAL	308	100	601	100	702	100	444	100

(1) includes mowing machines

APPENDIX

Table 6b

Investment in Machinery per Farm by Farm Type

(3 Year Average (1965/66 to 1967/68))

Machinery Type	MIXED						Dairy		Upland Rearing		Hill Farms		Crofts		All Farms	
	Cattle & Sheep		Arable		Pigs & Poultry											
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Tractors	£ 113	28	£ 194	27	£ 68	19	£ 250	22	£ 103	37	£ 15	23	£ 55	22	£ 115	26
Tillage Equipment	19	5	28	4	20	5	31	3	13	5	2	3	15	6	19	4
Grain Harvesting	70	17	102	14	16	4	180	16	-	-	-	-	125	50	67	15
Driers	62	15	129	18	39	11	105	9	-	-	-	3	-	-	58	13
Baling Equipment	35	9	41	6	44	12	34	3	10	4	2	3	21	8	32	7
Silage Equipment ⁽¹⁾	14	3	20	3	23	6	43	4	36	13	2	2	28	11	19	4
F.Y.M. Equipment	20	5	1	-	13	4	50	4	3	1	1	-	2	1	15	3
Potatoes	2	-	87	12	3	1	30	3	13	5	-	-	3	1	15	4
Dairy	3	1	-	-	-	-	222	19	-	-	-	-	-	-	17	4
General	67	17	110	16	137	38	199	17	98	35	44	66	3	1	87	20
TOTAL	405	100	712	100	363	100	1,144	100	276	100	66	100	252	100	444	100

(1) includes mowing machines

APPENDIX

Table 6c

INVESTMENT IN MACHINERY PER FARM BY FARM SIZE

(3 Year Average 1965/66 to 1967/68)

Machinery Type	Farm Size in SMD's										All Farms	
	0-250		251-600		601-900		901-1,200		>1,200			
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
	£		£		£		£		£		£	
Tractors	21	44	70	33	155	26	168	27	243	20	115	26
Tillage Equipment	2	4	11	5	22	4	22	4	51	4	19	4
Grain Harvesting	4	8	20	9	106	17	82	13	213	17	67	15
Driers	4	8	13	6	113	19	110	18	129	10	58	13
Baling Equipment	7	14	21	10	45	7	57	9	46	4	32	7
Silage Equipment ⁽¹⁾	10	20	11	5	22	4	32	5	46	4	19	4
F.Y.M.	1	1	10	5	18	3	26	4	34	3	15	3
Potatoes	-	-	2	1	1	-	23	4	106	9	15	4
Dairy	-	-	-	-	29	5	12	2	74	6	17	4
General	1	1	54	26	94	15	85	14	276	23	87	20
TOTAL	50	100	212	100	605	100	617	100	1,218	100	444	100

⁽¹⁾ Includes mowing machines

APPENDIX

Table 7a Investment in Structure per Farm by Farm Tenure
(3 Year Average 1965/66 to 1967/68)

Structure Type	Tenants		Owners		Mixed		All Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Dairy	£ 7	9	£ 8	5	£ 158	34	£ 24	15
Beef	22	28	47	25	18	4	29	19
Pigs	9	11	32	17	-	-	15	10
Poultry	-	-	-	-	5	1	1	-
General	42	52	99	53	288	61	87	56
TOTAL	80	100	186	100	469	100	156	100

* APPENDIX

Table 7b

Investment in Structures per Farm by Farm Type

(3 Year Average 1965/66 to 1967/68)

Structure Type	MIXED						Dairy		Upland Rearing		Hill Sheep		Crofts		All Farms	
	Cattle & Sheep		Arable		Pigs & Poultry											
	Per Farm	£	Per Farm	£	Per Farm	£	Per Farm	£	Per Farm	£	Per Farm	£	Per Farm	£	Per Farm	£
Dairy	£ 5	4	£ 1	1	£ -	-	£ 314	66	£ -	-	£ -	-	£ -	-	£ 24	15
Beef	26	19	33	24	76	29	-	-	39	54	7	11	-	-	29	19
Pigs	-	-	-	-	127	49	-	-	-	-	-	-	-	-	15	10
Poultry	-	-	-	-	-	-	7	1	1	1	-	-	-	-	1	-
General	102	77	102	75	58	22	157	33	33	45	59	89	-	-	87	56
TOTAL	133	100	136	100	261	100	478	100	73	100	66	100	-	-	156	100

APPENDIX

Table 7c

Investment in Structures per Farm by Farm Size
(3 Year Average 1965/66 to 1967/68)

Structure Type	Farm Size in SMD's										All Farms	
	0-250		251-600		601-900		901-1,200		>1,200			
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Dairy	£ -	-	£ -	-	£ 17	9	£ 7	3	£ 169	32	£ 24	15
Beef	-	-	27	43	16	9	94	43	31	6	29	19
Pigs	-	-	11	17	36	20	15	7	4	-	15	10
Poultry	-	-	-	-	-	-	2	-	1	-	1	-
General	6	100	26	40	114	62	104	47	332	62	87	56
TOTAL	6	100	64	100	183	100	222	100	537	100	156	100

APPENDIX

Table 8a Total Cost of Fixed Capital Investment, Sales and Grants by Farm Tenure

(3 Year Average 1965/66 to 1967/68)

Farm Tenure	No. of Farms	Total Cost	Deductions			Net Cost
			Sales	Grants	Total	
		£	£	£	£	£
Tenants %	101	62,531 (100)	14,802 (24)	3,049 (5)	17,851 (29)	44,680 (71)
Owners %	56	67,418 (100)	12,728 (19)	5,122 (8)	17,850 (27)	49,568 (73)
Mixed %	19	32,276 (100)	4,800 (15)	2,991 (9)	7,791 (24)	24,485 (76)
TOTAL %	176	162,225 (100)	32,330 (20)	11,162 (7)	43,492 (27)	118,733 (73)

() = %

Table 8b Total Cost of Fixed Capital Investment, Sales and Grants by Farm Type

(3 Year Average 1965/66 to 1967/68)

Farm Type		No. of Farms	Total Cost	Deductions			Net Cost
				Sales	Grants	Total	
			£	£	£	£	£
MIXED	Cattle and Sheep %	85	71,445 (100)	15,438 (21)	3,454 (5)	18,892 (26)	52,553 (74)
	Arable %	22	29,558 (100)	6,691 (23)	2,237 (7)	8,928 (30)	20,630 (70)
	Pigs and Poultry %	21	19,197 (100)	2,945 (16)	1,764 (9)	4,709 (25)	14,488 (75)
	Dairy %	12	28,911 (100)	4,741 (16)	2,896 (10)	7,637 (26)	21,274 (74)
	Upland Rearing %	13	6,637 (100)	1,092 (16)	564 (9)	1,656 (25)	4,981 (75)
	Hill Farms %	15	2,745 (100)	322 (12)	69 (3)	391 (15)	2,354 (85)
	Crofts %	8	3,732 (100)	1,101 (29)	178 (5)	1,279 (34)	2,453 (66)
	ALL FARMS %	176	162,225 (100)	32,330 (20)	11,162 (7)	43,492 (27)	118,733 (73)

() = %

APPENDIX

Table 8c

Total Cost of Fixed Capital Investment, Sales and Grants by Farm Size

(3 Year Average 1965/66 to 1967/68)

Farm Size in SHD's	No. of Farms	Total Cost	Deductions			Net Cost
			Sales	Grants	Total	
0-250 %	12	£ 1,281 (100)	£ 300 (23)	£ 16 (1)	£ 316 (24)	£ 965 (76)
251-600 %	87	40,149 (100)	10,039 (25)	1,768 (4)	11,807 (29)	28,342 (71)
601-900 %	41	49,223 (100)	8,995 (18)	4,328 (9)	13,323 (27)	35,900 (73)
901-1,200 %	16	20,844 (100)	3,731 (18)	1,576 (7)	5,307 (25)	15,537 (75)
> 1,200 %	20	50,728 (100)	9,265 (18)	3,474 (7)	12,739 (25)	37,989 (75)
ALL FARMS %	176	162,225 (100)	32,330 (20)	11,162 (7)	43,492 (27)	118,733 (73)

APPENDIX

Table 9a Allocation of Capital per Farm by Farm Tenure
(3 Year Average 1965/66 to 1967/68)

Capital Type	Tenants		Owners		Mixed		All Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Cash	£ 712	9	£ 619	5	£ 1,360	10	£ 752	7
Debtors	290	4	423	4	481	3	353	4
Produce Unsold	350	4	442	4	302	2	374	4
Cultivations and Crops	722	9	1,284	11	1,657	12	1,002	10
Livestock	4,157	50	4,948	43	6,467	45	4,658	47
Stores	93	1	85	1	51	-	86	1
WORKING CAPITAL	6,324	77	7,801	68	10,318	72	7,225	73
Machinery	1,356	16	2,312	20	2,510	18	1,785	18
Cars	211	3	309	3	327	2	254	3
Structures	358	4	981	9	1,208	8	648	6
FIXED CAPITAL	1,925	23	3,602	32	4,045	28	2,687	27
CAPITAL EMPLOYED	8,249	100	11,403	100	14,363	100	9,912	100
HERITABLE PROPERTY	88	-	17,205	-	8,238	-	6,415	-
TOTAL ASSETS	8,337	-	28,608	-	22,601	-	16,327	-

APPENDIX

Table 9b

Allocation of Capital per Farm by Farm Type
(3 Year Average 1965/66 to 1967/68)

Asset Type	MIXED						Dairy		Upland Rearing		Hill Farms		Crofts		All Farms	
	Cattle & Sheep		Arable		Pigs & Poultry											
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Cash	£ 824	8	£ 959	7	£ 538	6	£ 1,155	7	£ 584	6	£ 454	9	£ 221	9	£ 752	7
Debtors	228	2	970	7	372	4	737	4	236	3	58	1	95	4	353	4
Produce Unsold	423	4	728	6	311	3	275	2	183	2	45	1	117	4	374	4
Cultivations and Crops	1,022	10	1,806	14	824	9	1,834	11	524	6	150	3	161	6	1,002	10
Livestock	4,896	50	4,360	34	4,081	44	6,845	39	5,578	63	3,864	73	1,174	46	4,658	47
Stores	46	1	83	1	316	3	55	-	77	1	67	1	15	1	86	1
WORKING CAPITAL	7,439	75	8,906	69	6,442	69	10,901	63	7,182	81	4,638	88	1,783	70	7,225	73
Machinery	1,644	16	2,985	24	1,747	19	3,822	22	1,193	14	379	7	622	24	1,785	18
Cars	263	3	382	3	242	2	384	2	186	2	83	2	87	3	254	3
Structures	561	6	565	4	950	10	2,280	13	270	3	172	3	62	3	648	6
FIXED CAPITAL	2,468	25	3,932	31	2,939	31	6,486	37	1,649	19	634	12	771	30	2,687	27
CAPITAL EMPLOYED	9,907	100	12,838	100	9,381	100	17,387	100	8,831	100	5,272	100	2,554	100	9,912	100
HERITABLE PROPERTY	6,160		12,182		6,984		14,651		-		45		1,781		6,415	
TOTAL ASSETS	16,067		25,020		16,365		32,038		8,831		5,317		4,335		16,327	

APPENDIX

Table 9c

Allocation of Capital per Farm by Farm Size

(3 Year Average 1965/66 to 1967/68)

Capital Item	Farm Size in SMD's										All Farms	
	0-250		251-600		601-900		901-1,200		>1,200			
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Cash	£ 268	13	£ 825	13	£ 796	7	£ 660	4	£ 711	3	£ 752	7
Debtors	46	2	154	3	376	3	483	3	1,252	5	353	4
Produce Unsold	80	4	203	3	380	3	799	5	942	4	374	4
Cultivations and Crops	141	7	565	9	1,085	10	1,849	12	2,568	11	1,002	10
Livestock	1,052	52	2,989	48	5,082	45	7,673	48	10,796	46	4,658	47
Stores	2	-	37	1	169	2	137	1	139	1	86	1
WORKING CAPITAL	1,589	78	4,773	77	7,888	70	11,601	73	16,408	70	7 225	73
Machinery	288	14	977	16	2,151	19	2,704	17	4,712	20	1,785	18
Cars	44	2	175	3	285	3	437	3	520	2	254	3
Structures	117	6	246	4	909	8	1,082	7	1,838	8	648	6
FIXED CAPITAL	449	22	1,398	23	3,345	30	4,223	27	7,070	30	2,687	27
CAPITAL EMPLOYMENT	2,038	100	6,171	100	11,233	100	15,824	100	23,478	100	9,912	100
HERITABLE PROPERTY	521	-	2,408		7,164		12,382		21,070		6,415	
TOTAL ASSETS	2,559	-	8,579		18,397		28,206		44,548		16,327	

APPENDIX

Table 10a

Borrowings per Farm by Farm Tenure

(3 Year Average 1965/66 to 1967/68)

Borrowings Source	Tenants		Owners		Mixed		All Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Loans from Lending Institutions	£ 22	1	£ 749	14	£ 167	3	£ 269	8
Private	93	5	316	6	947	16	257	7
Family	341	18	811	15	454	8	503	15
Unknown	18	1	226	4	220	4	105	3
TOTAL LOANS	474 (2.54)	25	2,102 (1.64)	39	1,788 (1.66)	31	1,134 (2.17)	33
OVERDRAFTS	823 (1.96)	43	2,544 (1.59)	47	3,208 (2.10)	55	1,628 (2.15)	47
CREDITORS	609 (1.44)	32	733 (1.08)	14	827 (1.17)	14	672 (1.28)	20
TOTAL BORROWINGS	1,906 (1.43)	100	5,379 (1.14)	100	5,823 (1.41)	100	3,434 (1.49)	100

() - Coefficient of variation

APPENDIX

Table 10b

Borrowings per Farm by Farm Type
(3 Year Average 1965/66 to 1967/68)

Borrowings Source	MIXED						Dairy		Upland Rearing		Hill Farms		Crofts		All Farms	
	Cattle & Sheep		Arable		Pigs & Poultry											
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Loans from Lending Institutions	£		£		£		£		£		£		£		£	
	385	10	536	9	119	3	-	-	-	-	-	-	35	12	269	8
Private	275	8	717	13	-	-	489	10	-	-	-	-	21	7	257	7
Family	547	15	661	12	900	24	637	14	26	2	50	12	-	-	503	15
Unknown	-	-	566	10	248	7	-	-	57	3	6	2	-	-	105	3
TOTAL LOANS	1,207 (2.10)	33	2,480 (1.57)	44	1,267 (1.61)	34	1,126 (1.68)	24	83 (2.53)	5	56 (3.45)	14	56 (1.91)	19	1,134 (2.17)	33
OVERDRAFTS	1,792 (1.88)	49	2,096 (1.30)	37	1,816 (1.80)	48	2,865 (2.73)	60	984 (2.17)	52	184 (3.35)	41	4 (3.0)	1	1,628 (2.15)	47
CREDITORS	666 (1.37)	18	1,041 (0.70)	19	688 (0.78)	18	770 (1.22)	16	814 (1.67)	43	168 (1.21)	45	241 (1.76)	80	672 (1.28)	20
TOTAL BORROWINGS	3,665 (1.39)	100	5,617 (1.04)	100	3,771 (1.04)	100	4,761 (1.55)	100	1,881 (1.88)	100	408 (1.73)	100	301 (1.56)	100	3,434 (1.49)	100

() - Coefficient of variation

APPENDIX

Table 10c

Borrowings per Farm by Farm Size

(3 Year Average 1965/66 to 1967/68)

Borrowings Source	Farm Size in SHD's										All Farms	
	0-250		251-600		601-900		901-1,200		> 1,200			
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Loans from Lending Institutions	£		£		£		£		£		£	
	24	6	80	4	201	5	1,570	18	333	4	269	8
Private	-	-	216	13	473	16	189	2	200	3	257	7
Family	77	21	371	22	986	23	197	2	595	8	503	15
Unknown	-	-	69	4	-	-	-	-	623	8	105	3
TOTAL LOANS	101 (1.88)	27	736 (2.08)	43	1,660 (1.89)	44	1,956 (1.71)	22	1,751 (1.82)	23	1,134 (2.17)	33
OVERDRAFTS	111 (1.56)	29	551 (1.61)	32	1,569 (2.22)	42	5,637 (0.88)	62	4,138 (1.47)	55	1,628 (2.15)	47
CREDITORS	166 (1.44)	44	424 (0.85)	25	546 (0.79)	14	1,466 (1.09)	16	1,676 (0.78)	22	672 (1.28)	20
TOTAL BORROWINGS	378 (1.13)	100	1,711 (1.31)	100	3,775 (1.43)	100	9,059 (0.72)	100	7,565 (0.94)	100	3,434 (1.49)	100

() - Coefficient of variation

Table 11a Money Supply from Farm Income per Farm by Farm Tenure
(3 Year Average 1965/66 to 1967/68)

Source of Supply	Tenants		Owners		Mixed		All Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
	£		£		£		£	
Net Profit	1,135	63	1,622	55	2,170	61	1,402	60
Depreciation ⁽¹⁾	384	22	745	27	823	25	547	24
Personal Account ⁽²⁾	266	15	517	18	485	14	369	16
Disposable Income	1,785	100	2,884	100	3,478	100	2,318	100
Personal Account ⁽³⁾	243	14	291	10	126	4	245	11
Personal Drawings ⁽⁴⁾	1,024	56	1,296	44	1,388	39	1,151	49
Total Withdrawals	1,267	70	1,587	54	1,514	43	1,396	60
Net Income for Investment	518	30	1,297	46	1,964	57	922	40

(1) Depreciation shown is net of gain on sale of machinery.

(2) Interest on personal investments outwith the farm and any other income obtained outwith the farm.

(3) Sundry expenses and income invested outside the farm.

(4) Includes allowances for car, rent of house, electricity, life assurance, income tax payments, farm produce consumed, national insurance, use of telephone and cash withdrawals for personal living expenses.

APPENDIX

Table 11b

Money Supply from Farm Income per Farm by Farm Type

(3 Year Average 1965/66 to 1967/68)

Source of Supply	Cattle & Sheep		Arable		Pigs & Poultry		Dairy		Upland Rearing		Hill Farms		Crofts		All Farms	
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Net Profit	£ 1,230	58	£ 1,759	52	£ 1,745	66	£ 2,951	58	£ 884	61	£ 922	84	£ 760	74	£ 1,402	60
Depreciation(1)	503	25	804	27	582	24	1,345	28	366	26	108	10	170	18	547	24
Personal Account(2)	370	17	693	21	250	10	732	14	185	13	72	6	78	8	369	16
Disposable Income	2,103	100	3,256	100	2,577	100	5,028	100	1,435	100	1,102	100	1,008	100	2,318	100
Personal Account(3)	221	10	400	12	182	7	584	11	203	14	130	12	-	-	245	11
Personal Drawings(4)	1,144	54	1,436	43	983	38	1,882	37	918	64	882	79	660	64	1,151	49
Total Withdrawals	1,365	64	1,836	55	1,165	45	2,466	48	1,121	78	1,012	91	660	64	1,396	60
Net Income for Investment	738	36	1,420	45	1,412	55	2,562	52	314	22	90	9	348	36	922	40

(1) Depreciation shown is net of gain on sale of machinery.

(2) Interest on personal investments outwith the farm and any other income obtained outwith the farm.

(3) Sundry expenses and income invested outside the farm.

(4) Includes allowances for car, rent of house, electricity, life assurance, income tax payments, farm produce consumed, national insurance, use of telephone and cash withdrawals for personal living expenses.

APPENDIX

Table 11c

Money Supply from Farm Income per Farm by Farm Size
(3 Year Average 1965/66 to 1967/68)

Source of Supply	Farm Size in SMD's										All Farms	
	0-250		251-600		601-900		901-1,200		> 1,200			
	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%	Per Farm	%
Net Profit	£ 480	67	£ 1,026	66	£ 1,513	57	£ 1,747	53	£ 3,087	57	£ 1,402	60
Depreciation ⁽¹⁾	86	11	284	19	656	27	822	27	1,535	30	547	24
Personal Account ⁽²⁾	159	22	249	15	411	16	663	20	696	13	369	16
Disposable Income	725	100	1,559	100	2,580	100	3,232	100	5,318	100	2,318	100
Personal Account	8	1	200	13	207	8	146	4	740	14	245	11
Personal Drawings ⁽³⁾	576	80	856	54	1,226	46	1,619	49	2,244	42	1,151	49
Total Withdrawals ⁽⁴⁾	584	81	1,056	67	1,433	54	1,765	53	2,984	56	1,396	60
Net Income for Investment	141	19	503	33	1,147	46	1,467	47	2,334	44	922	40

(1) Depreciation shown is net of gain on sale of machinery.

(2) Interest on personal investments outwith the farm and any other income obtained outwith the farm.

(3) Sundry expenses and income outside the farm.

(4) Includes allowances for car, rent of house, electricity, life assurance, income tax payments, farm produce consumed, national insurance, use of telephone and cash withdrawals for personal living expenses.

APPENDIX

Table 12a

Net Worth Changes per Farm by Farm Tenure, 176 Farms in the North of Scotland

1964/65 to 1967/68

Farm Tenure	No. of Farms	Net Worth at Year End				Change		
		1964/65	1965/66	1966/67	1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
Tenants	101	£ 6,256	£ 6,362	£ 6,291	£ 6,639	£ 106	£ -71	£ 348
Owners	56	22,299	22,687	23,057	23,944	388	370	887
Mixed	19	14,768	15,268	16,884	18,181	500	1,616	1,297
ALL Farms	176	12,280	12,518	12,769	13,391	238	251	622

APPENDIX

Table 12b

Net Worth Changes per Farm by Farm Type, 176 Farms in the North of Scotland
1964/65 to 1967/68

Farm Type		No. of Farms	Net Worth at Year End				Change		
			1964/65	1965/66	1966/67	1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
MIXED	Cattle and Sheep	85	£	£	£	£	£	£	£
			12,058	12,205	12,262	12,740	147	57	478
	Arable	22	18,568	18,754	19,090	20,366	186	336	1,276
	Pigs & Poultry	21	11,158	11,602	12,536	13,643	444	934	1,107
	Dairy	12	24,892	25,510	27,680	28,637	618	2,170	957
	Upland Rearing	13	6,988	7,259	6,760	6,829	271	-499	69
	Hill Farms	15	4,967	5,197	4,645	4,884	230	-552	239
	Crofts	8	3,685	3,879	4,006	4,217	194	127	211
All Farms		176	12,280	12,518	12,769	13,391	238	251	622

APPENDIX

Table 12c

Net Worth Changes per Farm by Farm Size, 176 Farms in the North of Scotland

1964/65 to 1967/68

Farm Size SMD's	No. of Farms	Net Worth at Year End				Change		
		1964/65	1965/66	1966/67	1967/68	1964/65 to 1965/66	1965/66 to 1966/67	1966/67 to 1967/68
		£	£	£	£	£	£	£
0-250	12	2,108	2,080	2,162	2,282	-28	+82	+120
251-600	87	6,475	6,688	6,787	7,128	+213	+99	+341
601-900	41	13,806	14,036	14,523	15,294	+230	+487	+771
901-1,200	16	18,491	18,612	18,464	20,378	+121	-148	+1,914
>1,200	20	35,555	36,159	37,009	37,818	+604	+850	+809
ALL Farms	176	12,280	12,518	12,769	13,391	+238	+251	+622

DEFINITION OF FARM TYPES

Mixed Farms (Cattle & Sheep)

On these farms the gross output from cattle and sheep together must contribute at least 50 per cent of total gross output. Rough grazing, which is of minor importance in most cases, must not exceed 30 per cent of the total land area.

Mixed Farms (Arable)

Management on these farms is still based mainly on livestock, but greater emphasis is placed on the sale of crop products than in the case of the previous group. Crop enterprises contribute at least 35 per cent of gross output.

Mixed Farms (Intensive Pigs and Poultry)

Basically mixed farms, the gross output from pigs and poultry contributes at least 25 per cent of total gross output.

Dairy Farms

The major source of income on these farms is the sale of milk.

Upland Rearing Farms

The farms in this group tend to occupy land at lower elevations than the "hill farm" type. Cattle tend to occupy the dominant position in their economy, and sheep are of subsidiary importance. Extensive rough grazings are important, amounting to not less than 30 per cent of the total farm area. These farms are eligible to receive the hill sheep and hill cattle subsidies.

Hill Farms

These are high lying farms with 95 per cent or more of their land classed as rough grazing. They depend mainly on the breeding ewe for their income. Breeding cows may also be carried, but these tend to be of secondary importance relative to sheep. All farms in this group are eligible to receive the hill sheep and hill cattle subsidies.

Crofts

Crofts are distinguished from other farms only by certain land tenure rights and because of a rather special system of Government support. They can be based on any of the preceding six different types of farming system.

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GLOSSARY OF TERMS

Borrowings

Money borrowed by the farm business. Includes bank overdrafts, creditors and loans from lending institutions and private sources.

Capital

Refers to money and is synonymous with the term money.

Capital Goods

Goods used in the process of production other than land and labour.

Capital Stock

The aggregate gross fixed capital formation in machinery and equipment over a given period less the value of machinery and equipment sold over the same period, at constant prices.

Fixed Capital

Capital goods which do not undergo a transformation themselves in the production process and are subject to wear and depreciation. Includes buildings, machinery, cars.

Working Capital

All items of capital goods as used by a farm business shown on a balance sheet excluding land and items classed as fixed capital.

Farm Capital

The value of capital goods plus land that belongs to the farm business, i.e. it is the value of total assets less borrowings and is equivalent to net worth.

Coefficient of Variation

A measure used to express the relative variation in a group of farms about the mean. Two groups with different mean values but the same coefficient of variation have the same relative variation about their means.

Expenditure on Fixed Capital

Total fixed capital investment plus expenses recorded in the farm accounts as repairs, which includes cost of repairs to machinery, buildings, fences and improvements to land such as drainage, farm roads etc.

Fixed Capital Formation

Expenditure on the replacement additions and major improvements to fixed capital assets located in the United Kingdom.

Fixed Capital Investment

Investment in machines, cars and structures net of sales and grants.

Farm Size

Refers to the size of farm, measured in standard man days, except when referring to table 8 which measures farm size by area.

General Farm Equipment

Equipment which serves more than one enterprise such as tractors, trailers, and some tillage equipment.

Heritable Property

Means the farm houses, land and improvements belonging to the farm business and includes houses associated with the farm owned by tenant farmers.

Investment

The process of transforming capital into some form of capital goods.

Income for Investment

The money available for investment in fixed capital and heritable property. It is the balance from disposable income after deducting personal living expenses and any money paid out to private sources such as buying in shares.

Disposable Income

The money available for allocation between the farm business and personal living expenses. It is derived from net profit,

depreciation allowances and income from private sources such as share dividends.

Money Market

Any organised facility which undertakes to transfer money from savers to investors.

Net Profit

Is profit as defined in "Terms and Definitions Used in Farm and Horticultural Management" Ministry of Agriculture, Fisheries and Food 1970.

Rate of Income

This has been used to draw a distinction between the term rate of return. It refers to the return on capital when the value of heritable property (land) is included. The distinction is drawn since a return to land implies expected future returns from appreciation in land values and rewards for the utility values associated with land ownership.

Real Farmers

Farmers whose main source of income is from farming and whose occupation is farming as opposed to farm owners with alternative sources of income or who invest in land primarily as a form of security of investment.

Stocks and Work in Progress

Items of capital held for future production or goods awaiting sale e.g. stocks includes feedingstuffs, fertilisers, seeds. Work in progress includes livestock, breeding livestock, growing crops, grass, cultivations and stocks of finished goods like hay or potatoes valued at purchase price less cost of production or estimated cost of production.

Structures

These are permanent improvements, mainly buildings, and are an item of fixed capital.

