

DEPARTMENT OF AGRICULTURE AND FISHERIES
FOR SCOTLAND

Making
an Upland Farm
Pay

THE GLENLIVET
EXPERIMENT



HER MAJESTY'S STATIONERY OFFICE
1961

Making an Upland Farm Pay

The Glenlivet Experiment

1. INTRODUCTION

THE economy of upland farms in Scotland has long been based primarily on the production of store cattle and sheep. In some areas, particularly in the north-east of Scotland, many of these farms have a substantial proportion of marginal arable land which is cultivated to provide winter keep for the livestock. During the war years these farms were encouraged to intensify production from this land in the interests of maximum food production. Now that the emphasis is on lower costs of production it is important to consider how the resources of these farms can best be utilised, both to meet the nation's current food requirements and also to enable the farmers concerned to secure a reasonable standard of living.

In view of the particular importance of upland farms in Scotland the Department have carried out a number of investigations to obtain more factual information about the present financial position and future prospects for these farms. A general survey of the problem was made in 1945, the results of which were published in a report issued in 1947*. This report indicated that marginal farms at that time contained about one-third of the total acreage of agricultural land in Scotland; they carried 38 per cent. of the sheep and 14 per cent. of the cattle and were estimated to produce about 10 per cent. of the gross value of Scottish agricultural output.

Following on this report and at the suggestion of the Scottish Agricultural Improvement Council, a more detailed survey was made of the Glenlivet area of Banffshire in 1947. This area was typical of the upland areas of the north-east of Scotland and much of the land was owned by the Commissioners of Crown Lands who were willing to co-operate in an investigation to see what could be done to improve the economic position of farming on this estate.

It was clear that most of the farms in Glenlivet were providing only a very meagre income. The family earnings were generally less than the value of the work at current rates of wages for farm workers and there was, on average, a negative return on the farmers' capital

* Scotland's Marginal Farms. General Report. H.M.S.O. 1947.

investment. The general condition of the fixed equipment on the farms was poor and the prospects were not promising for an economic return on the capital expenditure which would have been required to put the equipment in reasonable condition. It was decided that there should be an "economic experiment" to see whether a typical farm could be made sufficiently productive to provide an adequate living for a family.

The farm of Clashnoir, which was at that time unlet, was offered by the Commissioners of Crown Lands as a subject for this experiment. Though this farm was rather above the average size for the district, having 123 acres of crops and grass and 32 acres of rough grazing, it was considered fairly representative of the problems and possibilities of the 100-200 acre size. The aim of the experiment was to see if this farm, with efficient management applying up-to-date techniques and systems of husbandry, could yield a satisfactory economic return. The farm was to be given the normal equipment which an enterprising farmer might be expected to have, but no more. There was to be a strict control of the number of workers employed and the system of farming was to be stock rearing, based on rotational grassland with the emphasis on cattle.

At Martinmas, 1948 the Department became tenants of the three farms of Deskie, Thain and Clashnoir which were then being run by the Commissioners of Crown Lands, who employed a farm manager. The three farms were some distance apart, Deskie being a large farm in lower Glenlivet, Thain a small grazing subject in the Braes area and Clashnoir, as already mentioned, a medium-sized farm in the Braes.

As all three farms had been run more or less as one unit and as some alterations were being made to the buildings at Deskie and Clashnoir it was not possible to separate the stock, equipment and accounts immediately after entry, but from Martinmas, 1949 onwards Deskie and Thain were run together and the economic experiment at Clashnoir began with all accounts kept separately.

2. MANAGEMENT OF THE FARM

It is perhaps inappropriate to describe the running of Clashnoir as an experiment. The system of management undertaken was not experimental or in any way unorthodox. Its whole object was to improve the fertility of the land, to raise the quality and productivity of the grassland for both summer and winter keep and to place the emphasis on cattle rearing rather than on sheep. By keeping more

cattle, more dung would be available for the cropping land. Better crops would enable more stock to be maintained and a progressive cycle of improvement would result.

The farm lies at an altitude of around 1,000 ft. and forms a rather narrow strip from West to East—high at the West and falling through about two-thirds of its length to a small burn which traverses the farm. East of the burn the land again rises towards the boundary. The soil generally is a medium loam, somewhat thin and rocky on the hilly part near the west boundary and peaty in the hollow near the burn. The soil is not inherently infertile, but on entry the farm was in very poor heart.

The initial rental was £70 per annum with an agreement that this would be raised to £100 when the existing byre was gutted and made into a covered court. This was the only alteration made to the steading.

With the farm in such poor condition the first need was to improve the grassland. Soil analyses showed all the land to be very low in lime and the major nutrient elements. During the first two winters, therefore, practically the whole farm was limed at the rate of two tons of ground limestone per acre. Such grassland as had to be temporarily retained was given a dressing of some 7 cwt. per acre of potassic supers supplemented by an application of 1–2 cwt. 'Nitro-Chalk' in the Spring. The land which had been under green crop was re-seeded direct and on all fields from which oats were being taken the crop was undersown with Italian and Perennial Ryegrass, the object being to supplement the grazing and provide something to plough down and improve the organic matter content of the soil.

Cropping

It should be realised that cropping in this area and at this altitude is no easy matter. The winters are very severe, snow frequently persisting into April, and late spring frosts are common. This holds up spring work badly and retards sowing while heavy autumn rains and early frosts or even snow storms make harvesting equally difficult. The advent of the tractor in enabling more rapid cultivations to be carried through as soon as weather conditions permit has undoubtedly helped to overcome these hazards.

Before it was taken over the cropping system on Clashnoir had been irregular, but by 1949 it was being worked on a regular seven course rotation common in the area. With a regular lea break of around 17 acres the cropping was oats, oats, green crop, oats (sown down) and hay, followed by two years' grazing. As the primary

intention was to base the economy of the farm on high production from the grassland for both summer and winter, what would have been the normal root break was reduced to three acres and the balance sown down to a one year's special mixture for cutting as silage. Later, when the fertility of the farm had been improved and the stocking stabilised, some four acres of rape were regularly grown in addition to the turnips, the former crop being used to finish off the lambs before marketing. The special one year's mixture grown for silage was the usual Perennial, Italian and red clover mixture recommended by the College, while the grass seeds mixtures sown were also based on College experience using combinations of early and late maturing strains of ryegrass and cocksfoot to give continuity of growth for as long a grazing season as possible. In the control of grazing, use was made of the electric fence and surplus grass was cut for silage; about one hundred tons of silage was made annually in an ordinary pit silo.

Most of the oats grown in the early years were consumed by the stock on the farm, but as the farm improved an increasing proportion of the crop was generally sold, frequently for seed purposes. The greater quantity of straw produced was also welcome as the stock increased.

Manuring

While high production from the grassland was the primary aim, the land was not exploited and a balanced system of manuring was practised. In addition to the initial liming a dressing of two tons ground limestone per acre was applied to each field once in the rotation. Depending on the condition of the fields, the oat crops latterly received applications of 3-4 cwt. of a complete concentrated fertiliser combine-drilled and the turnip crop 8-10 cwt. of a regular turnip manure in addition to dung. During the earlier years when fertility was low the dressings were correspondingly heavier. When available, basic slag was applied at 10 cwt. per acre to land which was sown down, after harvesting the nurse crop. In the early stages there was a dearth of farmyard manure, but after the first few years there was ample to give the turnip land and the balance of the normal root break a regular and adequate dressing. Again depending on the condition of the field, its age and the purpose for which it was intended—whether for hay, to be cut for silage or grazed—the grassland was regularly treated with 2-3 cwt. potassic supers supplemented with 1-1½ cwt. 'Nitro-Chalk' or with 3-4 cwt. of a high nitrogen fertiliser.

Stocking

At ingoing, the cattle stock consisted of twelve breeding cows and calves and some 170 Blackface ewes were kept between Clashnoir and Thain. The cattle stock was transferred to Deskie and in 1949, 21 pure bred Aberdeen-Angus in-calf heifers were purchased in the open market at commercial prices. It was anticipated that with the manuring undertaken the farm could carry this number, and it was proposed to breed cross calves which would be suckled and sold off their mothers in the autumn. Using a white Shorthorn bull this became more or less the practice. As the fertility of the land improved, the number of cattle carried was increased until latterly the herd numbered around thirty. This number might have been increased further, but accommodation for handling them during the winter was the limiting factor. With good foundation breeding stock and using good class bulls, the stock sold from Clashnoir soon became well known and commanded very creditable prices in the local market, while several were brought on by purchasers and gained awards at both the Edinburgh Fat Stock Show and at Smithfield. Early calves were regularly sold at the autumn sales, while the odd late calves were kept over their first winter and sold as convenient the following spring or later as six-quarter cattle.

The herd became attested in 1952, but the normal hazards of farming were encountered and the odd calf (and cow) were lost as on any other farm. In 1954 when the stock was being further increased some heifers were purchased in the open market. The following spring ten of the cattle aborted. Fortunately, as a result of prompt precautions being taken, there were no further losses the following year.

When the cattle stock was increased so markedly in 1949 a drastic reduction was made in the sheep stock. The breeding flock was reduced to 30 ewes and remained at this figure until, in the autumn of 1953, it was felt that this could be increased. Forty ewes were kept and twenty gimmers purchased. A stock of around sixty breeding sheep was kept thereafter, being replaced one-third annually by the purchase of a score of Blackface gimmers. The ewes were crossed with the Border Leicester tup and the lambs and cast ewes sold at the autumn sales.

For disease prevention the lambs were regularly treated with the double vaccine for lamb dysentery and pulpy kidney within twenty-four hours of birth. With a small stock on an enclosed area this was not a difficult matter. The only other treatment regularly practised was the dosing of the ewes with phenothiazine in the spring and both ewes and lambs before the autumn sales.

The only other livestock maintained was a flock of some 200 poultry kept on semi-intensive lines. No breeding was undertaken, the stock being kept up by the purchase of 100 three-month-old pullets each spring. Eggs were disposed of through the district packing station and the culls and old hens sold to a local butcher.

While this general picture of the way the farm was run will be of interest to the practical farmer, it is the economic aspect which the experiment was undertaken to test. This aspect is treated in detail in the next section of this report, but in considering it three points should be borne in mind. Firstly, it should be viewed as a whole and not strictly in individual financial years because, when the production of livestock and crops extends over more than a single financial year, profits in any one year are at least partly derived from the farming operations of previous seasons. Secondly, the subsidies credited to the accounts were only those to which an ordinary farm tenant would be entitled. Perhaps the most important point of all is the fact that capital was available for expansion as required. Improvement on similar farms would depend not only on the urge to expand being present but also on credit facilities being available and on farmers being willing to take advantage of these facilities. Even so, as the later sections of this report show, the extra capital required to finance the improvements of Clashnoir was by no means excessive in relation to the increase in profits which ensued.

3. PRODUCTION

There was a fairly steady upward trend in the value of output throughout the period of the experiment. In the Appendix, Table IV, figures are given of net output* per acre which rose from £10 8s. in 1949/50 to £19 2s. in 1954/55. After a temporary set-back in 1955/56 there was a further rise to £19 6s. in 1956/57. After the breeding herds and laying flocks were established, about 1950/51, the pattern of output did not greatly change. The cattle enterprise generally accounted for around one-third of the output, sheep and wool for about one-sixth, crop sales for about a quarter and eggs for about one-seventh.

Rising prices, of course, played a considerable part in the doubling of the value of output between the beginning and end of the experiment. The increase in the physical volume of production was less marked but was nevertheless quite significant, particularly for sheep, wool and eggs, as is shown in Table 1.

* Defined in the footnote † on page 14.

Table 1. Quantities of main products sold

		£								
	Unit	1949/ 50	1950/ 51	1951/ 52	1952/ 53	1953/ 54	1954/ 55	1955/ 56	1956/ 57	1957/ 58
<i>Cattle</i>										
Calves	head	21	24	25	15	24	25	21	25	25
Bullocks and heifers	head	3	6	6	9	7	2	2	1	3
Other cattle	head	3	2	3	3	2	3	2	3	2
<i>Sheep</i>										
Lambs	head	64	60	50	79	92	87	89	69	70
Others	head	20	15	7	12	10	15	17	18	17
Eggs	dozens	295	1,367	1,860	2,400	2,040	2,338	1,890	2,147	2,107
Wool	lbs.	286	239	296	393	410	353	326	394	359
Oats	cwts.	495	408	276	588	240	597	375	603	873

Most of the cattle were sold as weaned calves in the autumn and these realised very satisfactory prices which generally averaged over £40 in the later years of the experiment, except for 1955/56 (Appendix, Table V). This was a reflection of the high quality and good reputation of the breeding cattle stock. A calving rate of about 95 per cent. was maintained over the nine years, with the exception of the 1955 season when, following the outbreak of contagious abortion, fewer than two-thirds of the cows calved successfully.

The increased number of ewes carried on the farm from 1952 onwards, together with an improvement in the lambing rate from about 130 per cent. in the early years to about 145 per cent. latterly, led to an increase of nearly 50 per cent. in numbers of lambs sold. The prices realised for these lambs were generally rather above the average market levels for Greyfaces (Appendix, Table V).

While the laying flock made a significant contribution to the output of the farm, there was no attempt to make poultry more than a subsidiary enterprise; many farms similar to Clashnoir in other respects carried much larger poultry enterprises. Once the poultry flock was established, egg sales averaged about 2,000 dozens annually though with some variation from year to year. This represented an annual yield, after allowing for some eggs used in the farmhouse, of about 180 eggs per laying bird.

Crop sales consisted almost entirely of oats and in most years a large part of the crop was sold for seed at attractive prices (Appendix, Table VI). With the improvement in fertility, increased yields per acre made it possible to maintain and to some extent to increase the surplus of oats for sale, even though consumption on the farm also rose.

4. FINANCIAL RESULTS

This section discusses economic aspects of the policy followed at Clashnoir as shown by the farm accounts for 1949/50 to 1957/58, and it includes a comparison with similar data for some other stock-rearing farms in the north of Scotland.

The financial results for Clashnoir are shown as they would appear for a tenant farmer occupying the place. The grievance has been treated as the farmer, and expenditure excludes his wages and emoluments, which would normally be part of the total return to the farmer. Details of the farm expenses, receipts and net income are given in the appendix tables of this report, and only some of the more important points are mentioned here.

There is a fairly clear distinction between the first three years of this experiment at Clashnoir from 1949/50 to 1951/52, and the last six years from 1952/53 to 1957/58. The policy described in the earlier sections of this report—to build up fertility and thereby to expand stock and crop output—required at the outset a high rate of expenditure, especially on manures and seeds, as well as extra outlay on implements and poultry equipment. The returns on expenditure in the first three years of reorganisation did not accrue in full until the later period from 1952/53 onwards when the fertility and higher productivity of the farm had become established. But while it was not expected that net returns in the first three years would be commensurate with the current expenditure, in fact net income per acre was, on average, not less than that of similar farms at that time (Appendix, Table IV).

Net Income

Table 2 shows that net income at Clashnoir rose from an average of about £500 a year in 1949/50 to 1951/52 to roughly three times as much in later years. In 1955/56 when, following the outbreak of contagious abortion, there was a decline in both numbers and prices of weaned calves, and when oats, which threshed out at poorer quality than usual after the wet harvest, made low prices, income shown in the accounts fell below normal expectations. On the other hand the net income shown for the closing year is inflated, partly because all oats and livestock were sold off and partly because there were no purchases of sheep and pullets in view of the impending disposal of stock.

It is necessary, therefore, largely to discount the figures for 1957/58 in order to view the financial returns for the farm as a continuing business. But balancing the results of one year with another for the

five-year period 1952/53 to 1956/57 the level of net income was very satisfactory for an upland family farm of moderate size.

Table 2. Receipts, Expenses and Net Income

	£								
	1949 / 50	1950 / 51	1951 / 52	1952 / 53	1953 / 54	1954 / 55	1955 / 56	1956 / 57	1957 / 58
Receipts . . .	2,359	2,955	3,230	4,255	4,276	4,486	3,716	4,684	5,279
Expenses . . .	2,969	2,555	2,592	2,603	3,280	2,348	2,434	2,875	2,235
Cash Margin . .	-610	400	638	1,652	996	2,138	1,282	1,809	3,044
Changes in Stocks and work in hand	+769	+382	-67	+28	+426	-135	-221	-3	-633
Net Income . . .	159	782	571	1,680	1,422	2,003	1,061	1,806	2,411(a)

(a) This is 'trading profit' only. A further profit of £2,189 was made on the sale of breeding stock and tenant's equipment at the end of the year.

While net income is the best measure of the return from the farm business each year, it does not all represent ready cash since part of net income arises out of the change in value of crops and stock on the farm, as shown in Table 2. The cash return at the end of the year's working is the difference between total receipts and total expenditure during the year, shown as "cash margin" in Table 2. This is the money from which the farmer must first meet his private household expenses and taxation, and secondly finance any extra capital investment in his farm.

In fact total receipts went up by about half, from an average of £2,800 before 1952/53 to over £4,200 a year in the later years—this, of course, included the effect of rising prices. Average expenditure at about £2,700 a year left insufficient cash margin during the initial period of the scheme to meet a farmer's living expenses. But despite the general rise in prices, total expenditure remained virtually the same in the later period and thus a cash deficit of £600 in 1949/50 became a cash margin of £400 in 1950/51 and this subsequently rose to an average of over £1,500 from 1952/53 onward.

Subsidies

It is evident that the system at Clashnoir derived considerable support from the various schemes of government assistance. Table 3 shows the main direct subsidies, that is, excluding those paid as part

Table 3. Direct Subsidies and Grants—Clashnoir

	1949/50	1950/51	1951/52	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58
(Net Income)	(159)	(782)	(571)	(1,680)	(1,422)	(2,003)	(1,061)	(1,806)	(2,411)
Subsidies—Total	375	569	698	1,134	1,090	1,133	1,184	1,332	1,319
Hill Cattle	114	161	196	334	280	300	290	290	300
Calf	55	22	30	125	140	163	173	239	245
Attestation Bonus	—	—	—	131	105	106	82	52	31
Lime and Fertilisers (a)	97	176	313	232	248	161	193	257	238
Marginal Agricultural Production Grants	103	201	156	259	202	313	319	385	407
Ploughing up	—	—	—	52	115	82	119	109	99
Others (b)	6	9	3	1	—	8	8	—	—

(a) Including grassland fertiliser subsidy.

(b) Hill sheep subsidy, special ewe subsidy and petrol engine grants.

of the price guarantees which can be regarded as part of output value.

As would be expected, the subsidies on cattle and calves, including attestation bonus from 1952 onwards, formed a high proportion (roughly half) of the total; of this the hill cattle subsidy was the major amount. The remainder were those paid mainly on cropping and reseeded operations, namely the Marginal Agricultural Production grants, lime and fertiliser subsidies and ploughing grants. Of the total direct subsidies at Clashnoir, about half represented those which were available to all types of farms and half, principally the hill cattle and Marginal Agricultural Production grants, were those paid specifically on upland and hill farms.

In the later years, the total direct subsidies were equivalent to about two-thirds of net income on this farm. The subsidies such as hill cattle and hill sheep and Marginal Agricultural Production grants, which can be regarded as specific assistance for this class of upland farm, represented as much as one-third of the total net income.

A good deal of the "improvement" expenditure on cultivations and manuring qualified for M.A.P. grants and these would, of course, have been available to any farmer who carried out these operations on the same class of farm.

Expenses

The policy of raising grassland and crop productivity involved relatively large purchases of lime, manures and grass seed from the start of the programme. In most years these purchases accounted for more than a quarter of total expenses (Appendix, Table IV).

The cost of labour was principally the wages of one full-time worker, and this was about one-sixth of total expenditure in most years. This would have been the minimum labour needed, in addition to the farmer himself, on a farm of this size, even if a system of less intensive cultivation had been carried on. This system made full use of available labour, an important consideration for a small farm of this sort.

Cattle replacements accounted for a high expenditure at the outset of the scheme, when the breeding herd was being established, and again in 1953/54 when heifers were bought in to replace most of the older cows. Over the period about one-tenth of expenditure was on cattle replacements. Breeding sheep replacements incurred about two-thirds of this amount. Much of the cost of renewing the laying flock was in rearing cost, including bought feeding-stuffs.

Fuel and implement repairs together comprised a fairly constant proportion of total cost, about one-ninth in most years. There was

a fairly heavy outlay on new implements, including a new Fordson Major rowcrop tractor, and on poultry equipment (included in "other expenses" in the table) in the early years.

Comparison with other Stock-rearing Farms

Although any detailed comparison with other farms would have little value, it is useful to contrast the main financial aspects of Clashnoir with those of some other fairly typical stock-rearing farms. The Department have access to a number of accounts for such farms* provided each year by the North of Scotland College of Agriculture. These are farms which fit the general definition of stock-rearing farms and are of roughly comparable size. Appendix, Table IV gives the average net output, net income, receipts and expenses per acre for these farms and for Clashnoir in each year, 1949/50 to 1957/58. It is necessary to emphasise that the sample of stock-rearing farms changes from year to year and does not show the trend of incomes, for example, on this class of farm; also the accounts year for Clashnoir ended in November and for most of the sample farms in May and thus too much should not be made of the contrasts for particular years. But nevertheless the comparison illustrates the characteristic features of the economy at Clashnoir, particularly as they developed during the later period of the experiment.

Net income and net output† per acre at Clashnoir during the period of reorganisation up to 1951/52 were similar to those of other stock-rearing farms at this time. Despite this being a period of investment, total expenditure per acre was no greater than on the other farms, largely because of a much lower labour cost per acre. The wage bill shown for Clashnoir may be understated to some extent, because, while the grieve was treated as the farmer, he did not in fact carry the full responsibility for managing the farm; had he done so, his labour input might have been somewhat less and some additional labour might have been needed. Nevertheless, even if allowance is made for this, there is evidence of restraint in expenditure and especially in the cost of labour at Clashnoir, compared with the other farms.

From 1952/53 onwards the effect of higher productivity at Clashnoir was apparent. Income per acre rose between two and five times the average on the sample farms. There was a similar contrast, although less marked, in net output per acre, which was about a

* Part of a sample of accounts representing all the main farming types in Scotland provided by the three Scottish Colleges.

† Net output is the value of total output after deducting store livestock, seeds and feeding stuffs purchased.

quarter higher at Clashnoir. High net output per acre occurs on other upland farms, of course, but it is usually dependent upon much larger poultry (or pig) enterprises. By this comparison, in fact, Clashnoir achieved relatively high productivity per acre mainly based on the traditional products of this type of farming—cattle sheep and oats.

Total receipts per acre rose to roughly one-third above those of the other farms, over the later years. In particular the output of cattle was roughly one-third greater. Receipts from grants and subsidies were much more than on other stock-rearing farms.

In short, Clashnoir produced a high output per acre at moderate cost; the basis of this was, in particular, more intensive grassland production, with a greater input of manures and seed.

5. CAPITAL INVESTMENT

By comparison with other stock-rearing farms, capital investment at Clashnoir was perhaps relatively high. Appendix, Table IV suggests that tenant's capital per acre was about a quarter above average. This was due to the better class of breeding stock, particularly cattle, better equipment and more working capital to finance the higher input of manures and seeds. Even so, on average the extra capital at Clashnoir did not amount to more than £10 an acre, which was a modest investment when related to a net income £5-10 an acre more than on the sample farms.

Before starting an improvement programme of this kind in the ordinary way a farmer would have to assess the amount of additional capital required, how it could be raised and whether it could be repaid within a reasonable period. Repayment would depend on how far the profits from the farm left a cash surplus after meeting the farmer's ordinary living expenses and income tax.

Table 4 provides estimates of the extra capital outlay which a tenant would have required to undertake the improvements carried out at Clashnoir in 1949/50 and 1950/51—i.e., the additional sum to be invested over and above the capital existing in the farm at the beginning of the experiment. It also shows the repayments that would have been possible out of profits in the following years, assuming that the farmer was a tenant depending entirely on the farm for a living.*

* For this purpose living expenses have been assessed as the grieve's wages, plus interest on tenant's capital at 4 per cent. up to 1953/54, 5 per cent. in 1954/55 and 5½ per cent. from 1955/56 onwards. Income tax has been charged as if the farmer had a wife and two children.

Table 4. Estimates of Tenant's Capital Requirements

	£									
	1949/50	1950/51	1951/52	1952/53	1953/54	1954/55	1955/56	1956/57	On the year's trading	On disposal sales (d)
Cash margin on year's operations	-610	400	638	1,652	996	2,138	1,282	1,809	3,044	1,556
Estimate for living expenses and taxation	520	560	610	620	1,070	1,030	1,290	950	1,520	780
Additional capital outlay	1,130(a)	160(b)	Nil	Nil	74	Nil	8	Nil	Nil	Nil
Capital loan outstanding	1,130	1,290	1,262(c)	230	304	Nil	Nil	Nil	Nil	Nil
Capital reserve accumulated out of profits	Nil	Nil	Nil	Nil	Nil	804	796	1,655	3,179	3,955

(a) Loss on year's operations plus living etc. expenses.

(b) Amount by which estimated living etc. expenses exceeded the cash margin.

(c) Loan outstanding in the previous year (£1,290) less amount by which cash margin exceeded the estimated living etc. expenses.

(d) The difference between valuation and sale prices of breeding stock, crops and tenant's equipment at the end of the year.

It would have been necessary to raise about £1,300 or about £10 per acre to finance the initial improvements in 1949/50 and 1950/51. After the first three years the increase in profits was enough to allow substantial repayments of this capital and indeed to redeem it entirely within the next three years. From then onwards, there would have been some surplus cash returns to accumulate for further investment.

At Martinmas, 1958, the capital accumulated out of profits would have exceeded £3,000. As the tenancy of the farm was in fact given up at this date, an additional profit was realised on the disposal of the breeding stock and equipment. After paying tax on this additional profit, a further £800 could have been added to capital reserves making a total of almost £4,000.

Return on total tenant's capital

The previous section has shown how much extra capital a farmer might have spent—but to assess the profitability of the farm as a whole it is necessary to relate the returns to all the tenant's capital, that is, including the existing capital in 1949 as well as the extra capital invested in stock and equipment in later years. Table 5 shows an estimate of the return on tenant's capital invested at Clashnoir, taking this as the average of the opening and closing valuations each year, with an estimated addition for working capital.

Table 5. Estimated Return on Tenant's Capital

	£								
	1949 / 50	1950 / 51	1951 / 52	1952 / 53	1953 / 54	1954 / 55	1955 / 56	1956 / 57	1957/58 (On the year's trading)
Net Income	159	782	571	1,680	1,422	2,003	1,061	1,806	2,411
Deduct for farmer's labour . . .	367	377	410	439	575	632	674	660	708
Net return on investment .	-208	405	161	1,241	847	1,371	387	1,146	1,703
Tenant's Capital (a)	3,910	4,560	4,740	4,590	5,210	4,960	4,920	4,840	4,510
Per cent. return on investment .	-5	9	3½	27	16½	27½	8	23½	38

(a) Opening valuation plus estimated working capital.

It should be emphasised that the capital needed to stock and equip a farm at market prices would probably be from one-third to one-half higher than the conservative accounting value used as the basis for Table 5. These conventional figures correspond with those used in most farm valuations for accounting purposes.

The percentage return on capital, after deducting the value of the farmer's labour from total net income, fluctuated considerably from year to year, but taking the total period, the capital invested earned about 17 per cent. per annum. This represents the average rate of return on the farm business as a continuing enterprise. With the termination of the tenancy, however, an additional capital profit of £2,189 was realised on disposal of the breeding stock and tenant's equipment. In considering the rate of return over the whole period of the experiment it is probably best to average this capital appreciation over the 9 years, giving an annual average of £243 or 5 per cent. Thus, including the capital gains realised on disposal of the capital invested, the rate of return averaged 22 per cent. per annum. Reckoning capital at current replacement cost instead of accounting values used for Table 5, the percentage return would be correspondingly less—as a rough estimate it might be taken at 15 per cent.

CONCLUDING COMMENTS

Although termed an experiment, the improvement scheme carried out at Clashnoir was not experimental in the scientific sense. The only restrictions set upon the management of the farm were that the system of farming should remain essentially stock-rearing in character, employing no more than the usual labour force for a farm of this size, and that there should be no excessive capital expenditure. Within these limitations the object was to run the farm as profitably as possible. While the farm was not specially selected for the purpose it was reasonably typical of the smaller upland farms of north-east Scotland, and it offered an opportunity to find some practicable means of raising the profitability of a farm of this type to an economic level.

The ten years of the Department's tenancy showed that a reasonably good return on capital and labour was possible and that profits repaid the initial capital outlay on extra seeds, manures, equipment and livestock within the relatively short period of five or six seasons. The main benefits were derived from better grassland production. The inherent nature of the land must always limit the extent of improvement which is possible on upland farms of this type and it

may have been the case that the land at Clashnoir was more easily worked and responded better to manuring than could have been expected of average stock-rearing land. Even so, there must be a number of farms where the conditions of soil and layout would be at least as amenable to improvement as they were at Clashnoir, and where the limitations imposed by climatic conditions are less severe.

The Department's management of this farm followed closely the orthodox recommendations of the College Advisory Service, and similar standards of management would be well within the capabilities of an able farmer who was willing to work in close liaison with his County Adviser.

Many of the smaller upland farmers might lack the capital resources to start an improvement scheme of this kind. It would indeed be necessary under present conditions to budget for a relatively larger capital outlay on a place of comparable size than is shown in Table 4 above if only to allow for higher price levels now than in 1948-54. In addition it might be advisable to have some further margin, to cover possible risks of poor seasons and because the economic conditions which affect the profitability of stock-rearing cannot be foreseen with certainty. But given the need for some additional reserves of capital, it is still true to say that the capital outlay at Clashnoir was modest in relation to the increases in profits earned.

The relatively high profits achieved during the term of the Department's lease cannot be regarded as contributing solely to a rise in the long term level of tenants' income. Over the longer period part at least of these higher profits would accrue to the landlord through increases in rent. In fact the Department took this farm in 1948 at a rent less than £1 an acre. After the improvement of the land a following tenant would be expected to pay an appreciably higher rent.*

It would be fair to conclude that over the longer term the scheme of improvement at Clashnoir laid the foundations on which a tenant could expect a reasonable livelihood and the landlord a more economic return on his capital.

* The farm has subsequently been let to the North of Scotland College of Agriculture, as one of their demonstration farms, at a rent of £480 per annum.

APPENDIX

Table II. *Livestock Numbers—Clashmoir*
(as at November valuation)

Head

	1949	1950	1951	1952	1953	1954	1955	1956	1957
Cattle: Total	29	31	37	34	36	42	40	41	36
Dairy Cows	4	3	2	2	2	2	2	2	2
Breeding Cows	—	20	27	25	24	26	27	26	26
Heifers	22	—	—	—	2	7	2	3	3
Farrow Cows	—	1	1	2	2	2	2	2	1
Bulls	—	1	1	—	1	1	1	1	1
Calves	3	6	6	5	5	4	6	7	3
Sheep: Total	53	49	43	61	64	67	69	66	85
Ewes	42	31	30	31	42	49	46	44	44
Gimmers	10	10	12	25	20	15	17	20	20
Rams	1	2	1	2	2	2	3	2	2
Wethers	—	—	—	—	—	—	1	—	—
Lambs	—	6	—	3	—	1	2	—	19
Poultry: Total	—	94	165	165	208	192	200	198	200
Pullets	—	94	85	115	108	108	115	118	110
Hens	—	—	80	50	100	84	85	80	90
Horses: Total	1	1	1	1	1	1	1	1	1

APPENDIX
Table III. Analysis of Receipts and Expenses—Clatsinoir

£

RECEIPTS AND EXPENSES	1949/50	1950/51	1951/52	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58
<i>Receipts</i>									
Total	2,358·5	2,955	3,229·5	4,255	4,276	4,486	3,716	4,683·5	5,278·5
Cattle	661·5	874·5	1,161	1,072·5	1,534·5	1,416·5	893	1,162	1,496
Sheep	364	452·5	360	577	654	532	592·5	588·5	825
Wool	32	73·5	73·5	89·5	94	81·5	74	89·5	77·5
Poultry	—	—	33·5	24·5	31	16·5	21·5	27	36·5
Eggs	72·5	302	417	545·5	462	422·5	367	427·5	377·5
Oats	544	506·5	386	685·5	273	766·5	443·5	901	1,043·5
Potatoes	8·5	22	2	—	—	—	—	12	—
Other Crops	26	12	71	71	71	71	71	71	71
Produce to Farmhouse	64	71	8·5	8·5	8·5	8·5	8·5	8·5	8·5
Value of farmhouse	8	8·5	—	—	—	—	—	—	—
Miscellaneous (including rents, dis- counts, etc.)	203	63·5	19	47·5	58·5	38·5	61·5	65	24
<i>Subsidies and Grants</i>									
Total	(375)	(569)	(698)	(1,133·5)	(1,089·5)	(1,132·5)	(1,183·5)	(1,331·5)	(1,319)
Hill Sheep	6·5	7·5	3	—	—	—	—	—	—
Special ewe subsidy	—	—	196	334	280	300	290	290	300
Hill Cattle	114	161	30	125	140	162·5	172·5	239	245·5
Calf	55	22	—	131	105	106	82·5	52	31
Attestation	—	—	—	35	83·5	102	—	44	49
Lime	96·5	43·5	44·5	259	201·5	313	319	385	406·5
M.A.P.	103	201	155·5	—	—	—	—	—	—
Grassland Fertiliser	—	132	154·5	—	—	—	—	—	—
Petrol Engine Grant	—	2	114·5	—	—	—	—	—	—
Fertiliser	—	—	—	197	164·5	58·5	192·5	213	189
Plough up	—	—	—	52·5	115	82·5	119	108·5	98

Expenses	2,968-5	2,554-5	2,591-5	2,602-5	3,279-5	2,348	2,434	2,874-5	2,234-5
Total									
Cattle	317	443-5	81-5	209-5	735	186	95	15	75
Sheep	120	120	258	212-5	166	208	180	248	—
Poultry	31-5	30	45	54	41	45	45	45	—
Feeding Stuffs	58	134-5	317-5	174-5	182-5	206	326	363-5	237
Seeds	146-5	214	134	87	126	239	134-5	98	77
Manures	585	464-5	716-5	576	915-5	450	606	913	644
Wages	338	377	386	457-5	485	442-5	387-5	531	521
Rent and rates	101-5	101-5	101-5	101-5	101-5	101-5	101-5	101-5	103-5
Implement Repairs	184	50	125-5	219-5	145-5	112	219	127	83-5
New Implements	521-5	110-5	17-5	147	—	—	—	19	—
Power Hired	79-5	8	42-5	28	87	66-5	46	62	155-5
Fuel, Light and Power	118-5	149-5	167-5	136-5	144	147	153-5	199-5	113
Vet Expenses, Dips, etc.	75	21-5	47-5	27	46	49	62	41-5	34
Carriage	6-5	47	61-5	26	29	35-5	10-5	19	42
Market dues, Commission, etc.	39-5	11	14-5	14	26-5	23-5	18	20	48
Miscellaneous	246-5	272	75	132	48-5	36-5	49-5	71-5	101
Cash Margin	- 610	400-5	638	1,652-5	996-5	2,138	1,282	1,809	3,044
Changes in stocks and work in hand	+ 769-5	+ 381-5	- 67	+ 27-5	+ 425-5	- 135-5	- 221	- 3	- 633
Net Income	159-5	782	571	1,680	1,422	2,002-5	1,061	1,806	2,411 (a)

(a) This is 'trading profit' only. A further profit of £2,189 was made on the sale of breeding stock and tenant's equipment at the end of the year.

APPENDIX

Table IV. Net Output, Net Income, Capital Investment, Receipts and Expenses on Clashnoir and Other Stock-rearing Farms (a)

	£ per acre (b)																	
	1949/50		1950/51		1951/52		1952/53		1953/54		1954/55		1955/56		1956/57		1957/58	
	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms	Clash- noir	Other Farms
Net Output	10.4	13.0	13.1	12.8	12.9	14.1	19.0	15.3	18.3	11.8	19.1	14.8	12.3	13.1	19.8	14.4	24.5	13.8
Net Income	1.3	4.1	6.2	2.7	4.5	3.3	13.3	4.4	11.3	2.4	15.9	3.3	8.4	3.0	14.3	6.6	19.1	7.1
Tenant's Capital	26.4	26.4	32.5	32.7	35.5	23.4	35.0	27.1	35.2	25.3	38.6	31.8	37.5	29.2	35.7	31.0	35.7	30.4
Receipts																		
Total	18.7	22.4	22.4	24.5	23.5	22.3	32.1	25.3	32.6	21.5	35.1	26.1	28.0	24.2	35.4	25.3	40.3	25.0
Cattle	5.2	6.3	6.9	6.9	9.2	6.9	8.5	6.3	12.2	6.3	11.2	8.9	7.1	7.1	9.2	6.8	11.9	7.1
Sheep and Wool	3.1	5.5	4.2	6.5	3.4	4.3	5.3	7.0	5.9	5.4	4.9	5.1	5.3	5.5	5.4	6.4	7.1	6.9
Pigs, eggs and poultry	0.6	2.8	2.4	3.0	3.6	3.3	4.5	4.0	3.9	3.5	3.5	4.2	3.1	3.1	3.6	2.7	3.3	1.7
Crops	4.6	5.1	4.4	5.9	3.1	5.3	5.4	4.7	2.2	3.3	6.1	4.1	3.5	3.7	7.2	4.0	8.3	3.2
Subsidies (c)	3.0	1.8	3.5	1.1	3.4	1.3	7.4	2.4	7.3	2.0	8.5	2.3	7.9	3.0	8.8	4.0	8.9	5.0
Other receipts	2.2	0.9	1.0	0.8	0.8	1.2	1.0	0.9	1.1	1.0	0.9	1.5	1.1	1.8	1.2	1.4	0.8	1.1
Expenses																		
Total	23.5	20.3	19.2	23.9	18.4	20.1	19.0	21.1	24.7	20.3	18.1	22.8	17.8	22.0	22.8	18.7	17.7	18.3
Cattle	2.5	2.2	3.5	2.6	0.6	2.3	1.7	1.2	5.8	5.1	1.5	2.8	0.7	1.5	0.1	1.5	0.6	1.4
Seeds and manures (d)	5.8	2.2	4.4	2.8	4.6	3.0	3.6	2.8	7.0	2.1	5.0	2.3	4.4	2.4	8.0	1.9	5.7	2.1
Labour	2.7	4.8	3.0	5.0	3.1	5.0	3.6	5.4	3.8	4.4	3.5	5.6	3.1	5.2	4.2	4.7	4.1	4.9
Feeding stuffs	0.4	1.6	1.0	2.1	2.5	1.6	1.4	1.8	1.5	2.1	1.6	2.9	2.6	2.2	2.9	1.5	1.9	1.3
Other Expenses	12.1	9.5	7.3	11.4	7.6	8.2	8.7	9.9	6.6	6.6	6.5	9.2	7.0	10.7	7.6	9.1	5.4	8.6
Number of farms	—	13	—	8	—	12	—	12	—	17	—	18	—	17	—	12	—	11

(a) June/May years for the sample farms, December/November years for Clashnoir.

(b) An "adjusted" acreage has been used for this comparison, by taking the total acreage of crops and grass plus one-tenth of the acreage of rough grazing.

(c) Excluding fertiliser and lime subsidies, fatstock and cereals deficiency payments.

(d) Net after deducting fertiliser and lime subsidies.

APPENDIX

Table V. Weaned Calf and Lamb Prices at Clashnoir and Average Market Prices 1949/50 to 1957/58

	1949/50	1950/51	1951/52	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58
Weaned calf prices	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Clashnoir	19 18 -	26 4 -	32 10 -	41 11 -	45 6 -	43 1 -	34 12 -	41 19 -	49 14 -
Market price (a)	not available	20 4 -	30 5 -	33 13 -	29 15 -	32 13 -	29 2 -	39 2 -	41 12 -
Lamb prices (Greyface)									
Clashnoir	4 10 -	5 18 -	6 9 -	6 5 -	6 14 -	5 9 -	5 9 -	6 14 -	6 10 -
Market price (a)	4 1 -	4 6 -	4 12 -	5 - -	4 17 -	5 - -	5 5 -	6 2 -	5 14 -

(a) Average at main Scottish Markets.

APPENDIX
Table VI. Oats Prices at Clashnoir 1949/50 to 1957/58

	1949/50		1950/51		1951/52		1952/53		1953/54		1954/55		1955/56		1956/57		1957/58			
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.		
Seed oats	1	2 4	1	6 5	1	8 -	1	5 -	1	5 4	1	9 3	-	- -	-	1	5 -	1	6 8	
Other oats	1	1 4	1	2 9	-	- -	1	2 4	1	2 8	1	5 4	-	19	11	1	- 2	-	17	10

Printed in Scotland under the authority of Her Majesty's Stationery Office
 by Hugh Paton & Sons Ltd. Wt. 71354. Kk.