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The Agricultural Significance of the Hills

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The Agricultural Significance of the Hills

A measure of the contribution of the hills and uplands in Great Britain to agricultural production with some comments on the relative efficiency of upland and lowland agriculture

Copies of this report may be obtained, price 5/- post free, from the Secretary, Wye College, near Ashford, Kent

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2. THE GARDEN CONTROVERSY
   By R. H. BEST and J. T. WARD. *August, 1956.*

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FOREWORD

THIS is a report in a series concerned with the use being made of the rural land of this country. Each study deals with some aspect where the factual position is not clear or where controversy exists as to the real significance of a major change in land use.

This third report deals with the so called marginal land in Britain's hill areas, about which much has been said and written. It attempts to start at the beginning of the problem by measuring what the agriculture of the higher ground does actually produce. It then goes on to discuss the relative importance of this production in home food supplies and compares it, in total and in efficiency, with the contribution of lowland farms.

The meticulous critic will possibly find much to discuss and to disagree with in this preliminary work. There are always dangers in multiplying up from the results of sample studies. Yet the various checks and revisions which have occurred in the course of the investigation have confirmed the general level of the findings rather than thrown doubts on them. We feel, therefore, that our broad measurements are valid and suggest that they may be of more value than the general statements, without any quantitative basis, which are so often made on the importance of hill farming.

We have benefited greatly from the comments and criticisms of Professor M. M. Cooper, University of Durham, Mr. O. J. Beilby of the Department of Agriculture for Scotland, Dr. O. T. W. Price of the Imperial Chemical Industries and of Mr. James Wyllie, Mr. J. T. Ward and other colleagues at Wye College and in the other University Departments of Agricultural Economics.

CHAPTER 1

THE GENERAL PICTURE

WHENEVER the problems and needs of the large areas of high land in Britain are discussed, be it by Hill Farming Commissions, in Parliamentary debates on financial aid, or amongst thoughtful individuals, the contribution of these areas in actual or potential food supplies to other parts of the country is always brought to the fore. The hill areas are agriculturally important, it is said, because they act as a reservoir of breeding and store sheep and cattle for lowland farms. Therefore their importance, whether in physical or economic terms, cannot be judged solely on their contributions to local food production, but must be looked at nationally.

This point of view is usually put in general terms and left as such. It is made the basis for a considerable degree of special financial help to individuals farming hill land, in the form of subsidies on breeding stock, and husbandry and rehabilitation grants of a comprehensive kind under the 1946 Hill Farming Act and the 1951 Livestock Rearing Act. Yet the potential capacity of the hill country for receiving and absorbing financial and other help is enormous and the community must make judgments from time to time as to the amounts of its resources it can afford to sink in hill farming. It is not that support is being asked for a type of farming that is, basically, strongly viable. Of all the types of farms studied in the National Farm Management Survey in England and Wales, those belonging to the livestock rearing industry are amongst those with the lowest average incomes, and many of them are beyond the margin of profitability.

Any measure of the contribution of the hills and uplands quickly runs into difficulties both of definition and of measurement of the geographical areas concerned. Under the Hill Farming Act of 1946, "hill farming land" was defined as

> ". . . mountain, hill and heath land which is suitable for use for the maintenance of sheep of a hardy kind but not of sheep of other kinds, or which by improvement could be made so suitable" (1).

The Committee on Hill Sheep Farming in England and Wales, which reported in 1944, said in its Introduction:

> "In round figures there are five million acres of hill and upland in England and Wales. In 1939 this area carried between three and four million breeding ewes, on which the greater part of lowland sheep husbandry depended, together with considerable but indeterminate numbers of cattle" (2).

Though this statement has the merit of brevity, the word "indeterminate" correctly describes it if it is used as a statement of the size of the hills and uplands and a measure of their agricultural contribution.

In the main body of their report, this Committee gives a short but succinct picture of the areas of Britain known broadly as "upland".

> "Most farm crops can be grown with reasonable prospects of success up to an altitude of 600/800 feet. Between this altitude and 1,400/1,500 feet, where arable cropping and intensive livestock management become uneconomic, are transitional areas known as 'uplands'. The management of 'uplands' varies from lowland to hill farming according to local conditions. Above 1,400/1,500 feet is the hill farming proper, and we have taken our terms of reference to apply both to this and to uplands worked on similar systems.
>
> "The intermediate zone of uplands is not a fixed area. The boundary of intensively managed uplands changes with agricultural prices and technique. Such areas are a major long-term problem in national agricultural policy, since they

have not the capacity for more intensive forms of husbandry or for rapid adaption to external economic change.

"Where the land rises steeply, as in the Lake and Peak Districts and parts of Wales, the upland belt is narrow and the transition from lowland to hill farming sharp. In contrast, as on the gentler eastern slopes of the Pennines from the Scottish Border to South-West Durham, there are large tracts of rolling moorland where the change is ill-defined. Where river valleys intersect these moorlands, as in North-West Yorkshire, they break up what would otherwise be a sloping, unbroken plateau, into 'dales', in which the valley bottoms provide fertile loams and gravels, whilst the flanking hills give valuable shelter" (3).

If the intermediate zone of upland is not a fixed area, any attempt to measure it on a strict geographical basis must be abandoned at the outset. Yet since this Committee sat and reported, legislation to give financial help to hill and upland areas has been passed and implemented, i.e. the Hill Farming Act of 1946 whose provisions were consolidated in and extended by the Livestock Rearing Act of 1951. Subsidies have been granted on various classes of livestock and farm rehabilitation schemes grant-aided on "livestock rearing land" throughout Great Britain. The definition of this type of land is important and runs thus:

". . . land situated in an area consisting predominantly of mountains, hills or heath, being land which is, or by improvement could be made, suitable for use for the breeding, rearing and maintenance of sheep or cattle but not for the carrying on, to any material extent, of dairy farming, the production, to any material extent, of fat sheep or fat cattle or the production of crops in quantity materially greater than that necessary to feed the number of sheep or cattle capable of being maintained on the land" (4).

In England and Wales, land of this character is found in the counties of Chester, Cornwall, Cumberland, Derby, Devon, Durham, Hereford, Lancaster, Northumberland, Salop, Somerset, Stafford, Westmorland, Worcester, York (North and West Ridings), and all counties in Wales except Anglesey but including Monmouth. In Scotland all counties are concerned.

The actual area of land in Britain used for hill farming and livestock rearing is difficult to calculate, as it includes areas of common grazing. One method is to add the areas occupied by hill and livestock rearing farms as stated in *Types of Farming in Scotland* (5) to the areas in sole occupation on hill and livestock rearing farms in England and Wales as stated in the *National Farm Survey of England and Wales* (6). This gives the total area in sole occupation. To this can be added the estimated 1½ million acres of common rough grazings in England and Wales. This calculation is set out in Table I and gives a total of 13·9 million acres.

Stamp (7) has assessed the area of mountain and moorland in Britain at 16·5 million acres or 14·7 million acres if ungrazed deer forest is excluded; but some of this is woodland. The total forest in all counties containing mountain and moorland is 2·3 million acres. Thus at least 12·4 million acres of mountain and moorland must be used for farming. Details of this method of calculation are shown below.

		Acres
A.	Area of mountain and moorland in Britain	16,518,500
B.	Ungrazed deer forest	1,818,897
C.	Total area of forest in counties with hill and livestock rearing farms (30)	2,320,296
D.	Area of mountain and moorland used for farming (A–B–C)	12,379,307

This figure must be regarded as a minimum as all the forest in counties with hills and uplands has been deducted, even though some of these forests are in the lowlands. The calculation made in Table I is probably the more accurate of the two.

TABLE I

The Area of Land used for Hill Farming and Livestock Rearing in Great Britain

Type of farming	Country	Area of land (acres)	
		Crops and grass	Rough grazing
A. In sole occupation:			
Land of small agricultural value (Type X)*	England and Wales	560,000	810,000
Mainly rearing and sheep grazing (Type E)	England and Wales	850,000	598,400
Hill sheep farms (Type 1)	Scotland	141,750	6,050,700
Stock rearing farms (Type 2A and 2B)	Scotland	502,275	1,439,855
Dairy with hill sheep farms (Type 6)	Scotland	66,785	437,893
Part-time farms—Highlands ..	Scotland	83,200	923,520
Total area in sole occupation ..	Great Britain	2,204,010	10,260,368
B. Other land used for agriculture:			
Common rough grazings	England and Wales	—	1,436,241
Total land used for hill and upland farming in private and common occupation	Great Britain	2,204,010	11,696,609
		13,900,619	

* This category unfortunately includes some areas of lowland heath, but the area of crops and grass on lowlands of this type must be very small.

This area of 14 million acres is 25 per cent. of Britain's land surface of 56 million acres and a rather higher proportion (31 per cent.) of all agricultural land in the country. It is farmed in roughly forty thousand holdings, and these represent something under one in ten of all farms above one acre in size in the country.

Yet no matter how accurate these various measures of livestock rearing land might be, acreage figures give little indication of the agricultural production of the hills and uplands, measured either in physical or economic terms. The measurement must be made from a different angle and two fairly recent sources of information are important in the calculations. These are the details of the Farm Management Survey published as *Farm Incomes* by the Ministry of Agriculture, Fisheries and Food and related publications of University Agricultural Economics Departments (8) and the numbers and types of animals on which subsidies have been paid under the Hill Farming and Livestock Rearing Acts (9). Using these two sources of information, it has been possible to calculate the quantity, type and value of livestock and livestock products coming from the hills and uplands to the lowlands and to assess the importance of these products in Britain's agricultural structure.

CHAPTER 2

THE PHYSICAL CONTRIBUTION OF THE HILLS AND UPLANDS

(*a*) SHEEP

THE calculation of the numbers of sheep leaving the hills and uplands must be based on the number of breeding ewes kept in such areas. This is known fairly accurately, as it is the number of breeding ewes eligible for the hill sheep subsidy. In England and Wales, the subsidy has been paid at two rates: full rate for the breeding ewes kept in self-supporting flocks of pure mountain breeds, and at a reduced rate for breeding ewes in flocks which are not completely self-contained and which may include crossbred ewes. This division is most fortunate and aids this study, as, in practice, it divides breeding ewes into those kept on hill sheep farms and those found on livestock rearing farms. Hill farms keep pure-bred self-contained flocks while livestock rearing farms purchase ewes and often have flocks of crossbred ewes. The numbers of ewes in Britain which received subsidies at full and half rates in recent years are shown in Table II. In the years 1950 to 1953, the annual British total has been about four and a half million animals of which Scotland has provided rather more than one half.

There are no recorded details of sales and purchases of fat and store sheep in this country from which the contribution of the hills can be easily isolated. The only feasible approach seems to be on a sample basis. The Departments of Agricultural Economics

TABLE II

Numbers of Ewes in Great Britain on which Hill Sheep Subsidy has been paid

Year	Area	Numbers of animals paid		Total ewes
		at full rate	at half rate*	
1950–1	England	863,797	95,149	958,946
	Wales	1,059,315	126,187	1,185,502
	Eastern Scotland	480,589	—	480,589
	Western Scotland	1,112,671	—	1,112,671
	Northern Scotland	788,326	—	788,326
		4,304,698	221,336	4,526,034
1951–2	England	862,112	97,009	959,121
	Wales	1,045,332	131,596	1,176,928
	Eastern Scotland	475,081	—	475,081
	Western Scotland	1,114,276	—	1,114,276
	Northern Scotland	790,616	—	790,616
		4,287,417	228,605	4,516,022
1952–3	England	877,797	104,370	982,167
	Wales	1,034,435	139,690	1,174,125
	Eastern Scotland	469,533	—	469,533
	Western Scotland	1,093,821	—	1,093,821
	Northern Scotland	750,915	—	750,915
		4,226,501	244,060	4,470,561

* In Scotland, all hill and upland ewes have been subsidized at one basic rate. This means that a division between ewes on hill as distinct from livestock rearing farms cannot be made on the English basis. A division is, however, necessary for later calculations, and this has been done from *Types of Farming in Scotland* (10) and with the help of O. J. Beilby of the Department of Agriculture for Scotland.

at the various Universities situated in or close to hill land have, for many years, studied sample groups of hill and livestock rearing farms and have recorded the total sales and purchases of each type of livestock. If the total purchases of each type of sheep are subtracted from the total sales of each type within any one sample, it is possible to obtain the number of sheep of each type sold outside the sample. These "net" sales can be usefully expressed as a certain number of sheep per 100 breeding ewes. If these sample sales are typical of a whole area,* then the net sales of any one type of sheep per breeding ewe multiplied by the total number of ewes in that area should approximate the total "exports" of that type of sheep.

The various samples chosen for different geographical areas of Britain, the number of farms in each sample and the stages in calculating sheep numbers, sales and purchases are given and discussed in Tables A to F in Appendix I. A study of these tables shows the nature of the sheep "exported" from the hills and uplands to the lowlands. It is obvious that the total net sales per 100 breeding ewes vary between samples in any one year by as much as a quarter. Variations between years for any one sample can also be as great. Similarly, the proportion of total net sales formed by any one type of sheep varies from sample to sample, but it is fairly consistent for any one sample over the three-year period. In all samples and in all years, the only adult stock forming a considerable proportion of total net sales are the draft ewes. Few adult animals are sold as stores or fat. On the other hand, fat lambs form a considerable proportion of total sales in many samples on both hill and livestock rearing farms.

In general, the hill areas with a difficult environment such as Wales and Northern Scotland have the lowest net sales per 100 ewes, and fat sheep and lambs play a less significant part in their sales. The opposite is true of Northern England and East Scotland where environmental conditions are generally easier. It is obvious from Appendix I that the hill sheep farms are self-supporting whilst the livestock rearing farms purchase many young ewes. The latter are, of course, included in the sales of store lambs from hill farms.

The final picture of net sales of different classes of sheep from the British hills is shown in Table III where totals and proportions are given for three recent years. The relative proportions of each main class of sheep do not appear to vary greatly from year to year. Over a quarter of the sheep sold are draft ewes. Forty per cent. are store lambs, and almost twenty per cent. are fat lambs. Fat lambs and fat sheep together make up one quarter of sales. The hill and upland areas are therefore not entirely store and breeding ewe suppliers. They also send out significant numbers of fat stock for slaughter.

The only net purchases are those of ewes by livestock rearing farms. As these are young ewes and come from the hills, they are deducted from the total sales of store lambs, thus reducing the total numbers of store lambs sold from the hills to the lowlands. It is thought that the remaining store lambs are mainly wethers. Hill farms must replace their own ewe flocks, and as ewes are usually drafted out after their third or fourth lamb the young ewes retained by the hill farms would be over half the ewe lambs produced. The livestock rearing farms purchase the remainder. Authorities (11) in these areas consider that the only sizable numbers of female sheep leaving the hills are draft ewes.

* It may be thought that major errors could creep into this whole analysis if the individual farms studied and recorded for many years by these Departments were not typical of hill and upland farming in general. Yet the Farm Management Survey provides by far the best objective data on the sales and purchases of livestock and crops on these highland farms and can be compared with records of the same character for lowland farms. A number of checks have also been made by the use of the general agricultural returns, subsidy statistics and partial surveys and estimates made by other investigators, particularly in Wales and Scotland. Bearing in mind that the object is only that of obtaining a broad national assessment, we are confident that our use of the results of the Farm Management Survey has been justified by the way in which the various other analyses have confirmed rather than contradicted the broad results obtained in this work.

TABLE III

Net Sales and Purchases of Sheep from Hill and Livestock Rearing Farms in Great Britain

	Rams	Draft ewes	Store sheep	Fat sheep	Fat lambs	Store lambs	Young ewes	Store lambs less young ewes	Total net sales
1950–1									
Hill farms	27,006	705,226	135,556	384,766	480,980	887,027	—	887,027	2,620,561
Livestock rearing farms	1,524	158,653	−981	77,682	119,995	374,928	−131,811	243,117	599,990
Total ..	28,530	863,879	134,575	462,448	600,975	1,261,955	−131,811	1,130,144	3,220,551
Types of sheep as % of total sheep sold ..	0·8	26·8	4·2	14·4	18·7	*	*	35·1	100·0
1951–2									
Hill farms	15,571	586,323	61,114	169,426	498,779	786,709	—	786,709	2,117,922
Livestock rearing farms	2,706	144,773	−22,629	87,303	92,421	320,053	−98,745	221,308	525,882
Total ..	18,277	731,096	38,485	256,729	591,200	1,106,762	−98,745	1,008,017	2,643,804
Types of sheep as % of total sheep sold ..	0·7	27·7	1·5	9·7	22·4	*	*	38·0	100·0
1952–3									
Hill farms	23,255	572,885	93,409	173,827	500,815	936,430	—	936,430	2,300,621
Livestock rearing farms	672	151,794	−28,943	69,839	151,095	442,638	−168,880	273,758	618,215
Total ..	23,927	724,679	64,466	243,666	651,910	1,379,068	−168,880	1,210,188	2,918,836
Types of sheep as % of total sheep sold ..	0·8	24·8	2·2	8·4	22·3	*	*	41·5	100·0

NOTE: Figures preceded by a minus sign are net purchases. All other figures are net sales. *—Not applicable.

After making an allowance for the ewe lambs purchased by the livestock rearing farms, it appears that between two and a half and three million sheep leave the hills and uplands each year. Three-quarters of a million are draft ewes of four, five or six years of age capable of producing two lambs as ewe mothers in the lowlands. Between three-quarters and one million are fat sheep for immediate slaughter. The remaining one and a quarter million are store lambs, sold for fattening in the lowlands.

(*b*) Wool

The quantity of wool produced by hill sheep can also be estimated, as in each Farm Management Survey sample the total quantity of wool produced is known. From this it is possible to calculate the quantity of wool produced per ewe and followers. By multiplying this figure by the total number of ewes in the area, a rough total of the quantity of wool produced in that area is obtained. This has been done for all areas and the results are shown in Table IV.

TABLE IV

An Estimate of the Quantity of Wool Produced in the British Hills and Uplands

	Wool sold per ewe and followers lb.	Total number of ewes in the area	Total wool sold lb.
1950–1			
Hill Farms			
East Scotland	6·18	360,442	
West Scotland	5·33	968,023	
North Scotland	5·12	504,529	
Wales	2·75	1,059,315	
England	6·23	863,797	
Livestock Rearing Farms			
East Scotland	6·37	120,147	
West Scotland	5·33	144,647	
North Scotland	5·12	283,797	
Wales	2·75	126,187	
England	4·10	95,149	21,991,321
1951–2			
Hill Farms			
East Scotland	4·98	356,311	
West Scotland	5·21	969,419	
North Scotland	5·04	505,994	
Wales	2·75	1,045,332	
England	5·93	862,112	
Livestock Rearing Farms			
East Scotland	6·37	118,990	
West Scotland	5·21	144,856	
North Scotland	5·03	284,622	
Wales	2·75	131,596	
England	4·56	97,009	21,109,462
1952–3			
Hill Farms			
East Scotland	5·60	352,150	
West Scotland	5·46	951,623	
North Scotland	5·23	480,586	
Wales	2·75	1,034,435	
England	5·76	877,289	
Livestock Rearing Farms			
East Scotland	5·72	117,383	
West Scotland	5·46	142,197	
North Scotland	5·22	270,329	
Wales	2·75	139,690	
England	4·51	104,370	21,293,046

(c) Cattle

The measurement of the numbers of cattle moving from the hills is complicated by the presence of dairy cattle on hill and livestock rearing farms. By using the statistics of cattle eligible for the hill cattle subsidy, however, it is possible to make an estimate. In England and Wales, the hill cattle subsidy has been paid at two rates: full for beef breeding cows and at half rate for other beef cattle over one year old. In Scotland only one rate is paid, and this applies to beef breeding cows and dairy cows used for domestic milk production on hill and livestock rearing farms. The numbers of each type so classified are shown in Table V.

Table V

Number of Cattle Eligible for Hill Cattle Subsidies in Great Britain

Year	Area	At full rate	At half rate	Total
1950–1	England	12,735	101,562	114,297
	Wales	10,182	66,185	76,367
	Eastern Scotland	20,619	—	20,619
	Western Scotland	26,090	—	26,090
	Northern Scotland	61,244	—	61,244
	Total	130,870	167,747	298,617
1951–2	England	13,038	102,324	115,362
	Wales	9,675	61,141	70,816
	Eastern Scotland	19,917	—	19,917
	Western Scotland	25,518	—	25,518
	Northern Scotland	60,401	—	60,401
	Total	128,549	163,465	292,014
1952–3	England	14,098	97,745	111,843
	Wales	10,585	56,506	67,091
	Eastern Scotland	19,143	—	19,143
	Western Scotland	24,527	—	24,527
	Northern Scotland	54,678	—	54,678
	Total	123,031	154,251	277,282

By calculating the net sales of different types of cattle per breeding cow, for any one Farm Management Survey sample and multiplying these by the total number of breeding cows in the area for which the sample is typical, it is possible to find the approximate number of cattle of each type coming from that upland area to the lowlands. The net sales per beef breeding cow for the various samples are set out in Appendix II, Table B.

In Scotland, it is possible to divide the beef breeding cows into those on hill farms and those on livestock rearing farms. This has been done by the Scottish Department of Agriculture for 1947, and it is assumed that the ratio between the two numbers is still roughly the same. It is impossible to do this in the same way for hill and livestock rearing farms in England and Wales, as there is no available English sample giving net sales per breeding cow. The average figures for the samples of farms classified as "Livestock Rearing Farms (Poor Land and Better Land) Non-Milking, Wales" have had to be applied to both English and Welsh areas.* The net sales and purchases of each type

* The Welsh figures have had to be used as they are the only ones which distinguish clearly between milk selling and non-milk selling herds. Samples from other areas of England are too heavily impregnated with dairy stock to allow their cattle situation to be representative of beef production on the high ground. The error, if any, is not too important as the numbers and significance of beef cattle in the hills are, as is shown later, relatively small in comparison with sheep. Again, the main dairy breeds are now strongly represented in most hill areas—especially the Shorthorn, Ayrshire and Friesian.

of cattle in each hill and upland area has been calculated on this basis (Appendix II, Table C). It is obvious from these calculations that the majority of the stock sold in all hill areas are stores but that in some districts a substantial number of calves are sold off.

Yet beef breeding cows are not the only producers of animals used for beef in these upland areas. The dairy cows present also produce animals used for beef purposes but, as no subsidy is paid on upland dairy cows in England and Wales, their number has to be estimated as follows :

The number of beef breeding cows in the hills and uplands is known from the subsidy statistics, and in the sample of Welsh non-milking farms it was possible to calculate the number of other cattle over one year old per breeding cow. By assuming that all breeding cows in the hill and upland areas of England and Wales have a similar number of other cattle over one year old associated with them as in this sample, the total of other beef cattle, over one year, associated with beef breeding cows can be found. The remaining beef cattle over one year old must be associated with dairy cows. These detailed calculations are shown in Appendix II, Tables E to I. These tables show the various stages necessary in the calculation of the contribution of the hills and uplands in cattle both from the beef and dairy cows kept thereon. Table VI shows the final totals.

TABLE VI

An Estimate of the total Cattle Produced by the British Hills and Uplands

	Cows	Calves	Stores	Fats	Others	Total
1950–1						
Non-milking cows ..	12,173	42,659	54,953	5,615	2,340	117,740
Milking cows	19,200	11,243	131,179	13,229	710	175,561
Total	31,373	53,902	186,132	18,844	3,050	293,301
Total less cows from milking mothers	12,173	53,902	186,132	18,844	3,050	274,101
1951–2						
Non-milking cows ..	13,900	35,277	41,130	15,067	— 375	104,999
Milking cows	7,697	7,966	99,665	13,477	—1,112	127,693
Total	21,597	43,243	140,795	28,544	—1,487	232,692
Total less cows from milking mothers	13,900	43,243	140,795	28,544	—1,487	224,995
1952–3						
Non-milking cows ..	13,078	21,511	50,370	8,753	—1,876	91,836
Milking cows	7,805	8,551	73,203	7,804	— 128	97,235
Total	20,883	30,062	123,573	16,557	—2,004	189,071
Total less cows from milking mothers	13,078	30,062	123,573	16,557	—2,004	181,266

NOTE: The numbers prefixed by a minus sign are net purchases.

Over 60 per cent. of the cattle sold from these areas appear to be stores. Cows form only about 5 per cent. and fat cattle 10 per cent. The remaining quarter are calves. It is also significant that the cows kept for dairy purposes in these areas produce more beef animals than the beef breeding cows.

(*d*) Milk

The number of dairy cows has already been given for the hill areas of Scotland, and comparable figures, with average yields, can be obtained for England and Wales, using the results of sample studies in Wales and Northern England. Applying these figures over all, a rough total has been obtained (Table VII) of a dairy cow population of about 90,000 on the hills and uplands of Britain with an annual production of between 40 and 50 million gallons of milk.

Table VII

Estimated Quantity of Milk Sold from the Hills and Uplands of Great Britain

Country	Number of cows	Gallons sold per cow	Total milk sold (gallons)
1950–1			
England	52,367	500	26,183,500
Wales	32,258	473	15,258,034
Scotland	12,274	500	6,137,000
	96,899		47,578,534
1951–2			
England	52,533	500	26,276,500
Wales	29,533	473	13,369,105
Scotland	12,274	500	6,137,000
	94,340		45,782,605
1952–3			
England	48,572	500	24,286,000
Wales	25,663	473	12,138,599
Scotland	12,274	500	6,137,000
	86,509		42,561,599

(*e*) Crops

It is generally assumed that cropping is of minor importance in the hills and uplands and that crops are grown on hill and livestock rearing farms as winter fodder for animals, and not for export to the lowlands. It was felt, however, that the position of crops in the uplands should be investigated, as all of the farms in the Farm Management Survey sample groups studied did sell crops and in one sample, i.e. "East Scotland Livestock Rearing Farms", the sales of crop products actually exceeded the value of feeding stuffs purchased.

Cropping in the hills and uplands of this country is almost entirely limited to the production of fodder crops. The green crops, such as rape and kale, are consumed on the farm, but quantities of cereal and grass crops may be sold off. Potatoes are also grown, mainly for consumption by the farm family, but, in some cases, small quantities are sold. On most upland farms, the home production of crops for livestock fodder is supplemented by the purchase of feeding stuffs. The total value of sales of crops from upland farms can be calculated from the samples of hill and livestock rearing farms by applying their net sales per acre to the total area of crops and grass in the region. Details of this calculation are given in Tables A and B in Appendix IV, from which it is obvious that crop production is much more important on livestock rearing farms than on hill farms. Any money received for the summer agistment of lowland stock in upland areas is included in crop sales, as this is a form of selling a crop off the farm.

The value of crops sold by upland farms must now be balanced against the amount of money spent in these areas on purchased feeding stuffs. As almost all bought-in

feeding stuffs are fed to cattle, the amounts used should be proportional to the number of cows in each area. The total value of feeding stuffs consumed in any one area can be estimated by finding the average amount consumed per cow and followers in the Farm Management Survey sample and multiplying this by the number of cows in the area. This calculation is carried out in Appendix IV (Tables A and C). It is noticeable that the hill farms have higher feeding costs per cow than adjacent livestock rearing farms, as the latter, with their larger areas of crops and grass, can produce a greater proportion of their feeding stuff needs on the farm. A study of the Welsh dairying group also reveals, as expected, that the feeding costs per cow are much higher for milking cows than for beef cows.

An additional feeding cost must also be considered, that is, the cost of wintering upland sheep in the lowlands. Normally the ewe lambs of high land flocks are the only hill sheep wintered. The actual number of ewe lambs wintered is unknown, but it should be proportional to the number of ewes in upland flocks as the ewe lambs are the replacements for these flocks. The average cost of wintering has been obtained and applied to the total number of ewes in each region. This calculation is made in Appendix IV, Tables A and D.

The value of crops sold and the amount of money spent on feeding stuffs and wintering have been collected together in Table VIII.

TABLE VIII

Sales and Purchases of Crops and Feeding Stuffs on Hill and Upland Farms in Great Britain

	1950–1 £'000	1951–2 £'000	1952–3 £'000
Value of crop sales (including agistment) ..	2,437	2,199	2,116
Cost of purchased feed stuffs	6,433	6,223	4,959
Cost of wintering ewe lambs	828	1,133	1,124
Total cost of purchased feed and wintering	7,261	7,356	6,083

The total cost of wintering and feeding far exceeds the value of crops sold (which includes summer grazing) in all years. The hills and uplands are, therefore, net importers of food for livestock to the tune of about £5 million a year.

(*f*) The Total Contribution

All in all, then, the annual physical agricultural contribution of the hills and uplands of this country is of the order of

(*a*) 2½ to 3 million sheep, of which
- ¾ million are draft ewes
- ¾ to 1 million are fat sheep and fat lambs
- 1 to 1¼ million are store lambs and store sheep;

(*b*) about 20 million pounds of wool;

(*c*) between 175,000 and 275,000 head of cattle, of which
- 60 per cent. are stores
- 5 per cent. are cows
- 10 per cent. are fat cattle
- 25 per cent. are calves;

(*d*) 40 to 50 million gallons of milk;

(*e*) crop sales of about £2 million's worth each year which must be set against an "import" of £7 million's worth of animal feeding stuffs and wintering costs.

CHAPTER 3

THE MONETARY VALUE OF THIS CONTRIBUTION

In order to measure the overall proportion of national agricultural produce coming from the hills and uplands, all of these different kinds of farm products must be converted to a common unit. The use of money value as a unit of measurement allows food and non-food products to be combined and estimates can be made of the value of a product at any particular stage of production. This is important in the hills and uplands where the bulk of the farm output is in the form of store animals. The selling price of these is their value as a type of agricultural raw material. The difference between this value and their final value when they are sold as fat stock must be credited to the lowland areas where the animals are fattened.

The money value of produce moving from the hills and uplands to the lowlands can be calculated in the same manner as the numbers of livestock were obtained. By subtracting the total value of livestock purchased from that of livestock sold in each sample of farms in the Farm Management Survey, the value of livestock sold from the samples to farms outside the samples is obtained. This value, called the "net sales value", can be expressed as a sum of money per 100 ewes for sheep and per breeding cow for cattle. As the total number of ewes and cows in each geographical area of Britain is known, it is possible to calculate the total value of livestock produced by the hills and uplands. The various stages in this calculation are shown in Appendix IV and the broad results given in Tables IX, X and XI.

TABLE IX

Annual Money Value of the Agricultural Production of the Hills and Uplands of Great Britain

	1950–1 £'000	1951–2 £'000	1952–3 £'000
Sheep	10,563	9,905	11,009
Wool	2,474	6,597	4,968
Cattle	5,726	5,226	6,232
Milk	7,732	7,783	7,342
Crops	2,441	2,199	2,327
Miscellaneous production*	4,106	6,814	10,299
Miscellaneous and crop production of Scottish crofts†	836	1,150	1,611
Direct subsidies	3,200	3,400	3,200
Gross Output	37,078	43,074	46,988
Value of purchased feeding stuffs (hill and livestock rearing farms)	7,261	7,356	6,083
Value of purchased feeding stuffs on Scottish crofts	664	672	556
Net agricultural output	29,153	35,046	40,349

* This includes the returns from pigs and poultry, the value of produce consumed in the farmhouse and increases in valuation of live and dead stock on the farm; all of which increased sharply during this period because of increased emphasis on pigs and poultry on hill and upland farms, and the effect of inflation on livestock values.

† See Appendix VI.

TABLE X

A Comparison of the Money Value of the Agricultural Production of the Hills and Uplands with that of the United Kingdom and Great Britain

	United Kingdom			Great Britain		
	1951 %	1952 %	1953 %	1951 %	1952 %	1953 %
Value of sheep produced by hills and uplands as a proportion of the value of fat sheep sold	29·0	20·3	21·6	30·0	21·9	23·6
Value of cattle produced by the hills and uplands as a proportion of the value of all fat cattle sold	3·8	3·4	3·7	7·1	6·4	6·8
Value of the milk produced on the hills and uplands as a proportion of the value of all milk sold off farms ..	2·6	2·5	2·2	3·0	2·9	2·5
Value of wool produced by the hills and uplands as a proportion of the value of all wool sold from U.K. farms	*	33·2	24·5	*	*	*
Value of the sheep and cattle produced by the hills and uplands as a proportion of the value of the total fat stock slaughtered	7·5	5·8	5·3	*	*	*
Value of the gross agricultural output of the hills and uplands as a proportion of the gross agricultural output (both corrected for inter farm sales)	3·6	3·8	3·9	*	*	*

* Not available.

NOTE: The value of sheep and cattle slaughtered in the United Kingdom was calculated from the total weights of meat produced in the United Kingdom and from the prices paid for fat stock as stated by K. E. Hunt (12). The value of sheep and cattle slaughtered in Great Britain was calculated from the United Kingdom figures obtained by assuming that value of meat was proportioned to the numbers of fat sheep and cattle slaughtered in both regions.

The numbers of sheep and cattle slaughtered in Great Britain were taken from a table by K. R. Clark and K. E. Hunt (13).

The value of milk and wool sold from farms for the United Kingdom was obtained from the quantities given in the Agricultural Statistics(14) and from prices paid for milk and wool and quoted by Hunt (12).

The value of milk sold in Great Britain was obtained by adding the quantities sold in Scotland as stated in *Agriculture in Scotland* (15) to the quantities sold in England and Wales as stated in the Report of the Production Division of the Milk Marketing Board (16).

TABLE XI

Productivity of Agricultural Land in the Lowlands and Uplands of the United Kingdom

		1950–1 £	1951–2 £	1952–3 £
Hill and Uplands	Gross output per acre	2·7	3·1	3·4
Lowlands	ditto	29·9	31·4	33·8
Hills and Uplands	Gross output per acre of crops and grass	16·8	19·5	21·3
Lowlands	ditto	34·3	37·2	39·9

In terms of money value, sheep are the most important product of the high country, but it is surprising to see that the value of milk produced in the hills and uplands is greater than that of cattle. The most striking figures are those for livestock. The value of sheep and cattle produced by the hills and uplands form 23 and 4 per cent., respectively, of the total money value of all sheep and cattle sales in the United Kingdom.

It will be shown later (Chapter 4) that the numbers of sheep produced on and sold off farms on the hills and uplands are a high proportion of total sheep slaughterings in the United Kingdom, i.e. between 34 and 48 per cent. in the three years studied. Again,

hill cattle are 5 to 7 per cent. of the total numbers of cattle slaughtered in the United Kingdom. The apparent discrepancy between slaughterings and money value arises because the bulk of the livestock sold from the high land are sold as store animals at about two-thirds the price they finally fetch as fat stock after being "finished" in the lowlands. For example, in 1952, the average market price of store cattle was only 58 per cent. of the average price of fat cattle in that year. Of course, some of the hill animals make higher relative prices. These are the appreciable numbers sold as fat and for breeding purposes rather than as stores. The only real danger of making such a calculation lies in the possibility that the quality, and therefore the price, of the livestock sold by the farms in the Farm Management Survey samples, is markedly inferior or superior to the average quality of sales of upland livestock. It is doubtful if such a disparity exists in practice, but no really effective test can be made.

The gross agricultural output of the hills and uplands also includes the value of other miscellaneous items such as horses, pigs, poultry and eggs that are sold from the farms, plus the changes in valuation of crops and livestock and the value of farm produce consumed by the farmer and his family. Unlike the major items of production, these cannot be calculated from a known quantity on which they depend. The total numbers of pigs, fowls and horses are not stated in the Farm Management Survey samples. It was necessary to calculate their value for each sample of farms, express it as a percentage of the value of net sheep sales of that sample and then calculate the value of such sales from the total value of sheep sold from the area for which that sample was typical. The details of this calculation, together with another based on the production per acre of miscellaneous items, are given Appendix IV. The mean of these two has been used in Table IX.

Direct subsidies paid to hill and livestock rearing farms have also been included in the gross output of the hills and uplands to make it comparable with the "Departmental" calculation of gross output for the whole nation. The exact nature of these subsidies and their method of calculation are fully described in Chapter 5.

The best available measure of the contribution made by the hills and uplands to the food supply of the nation is in terms of the gross agricultural output, i.e. farm production adjusted for inter-farm sales. In each of the years studied the contribution was close to 4 per cent. of national output (Table X). The gross output of each acre of land devoted to agriculture in the lowlands appears to be at least ten times as high as that in the hills and uplands. Even if all farm production is credited to the area of crops and grass in both regions, the lowland enclosed land is still almost twice as productive as that of the high land (Table XI).

Although the value of farm output from the hills is such a small proportion of the total agricultural production of the country and even its livestock output only about a twentieth of the value of all fat stock slaughtered in the United Kingdom, it should not be assumed that the cessation of agricultural production on the hills and uplands would reduce British agricultural output by only this amount. The removal of agriculture from the hills would have some long-term repercussions on lowland livestock farming, and in any assessment these effects must be taken into account in addition to the immediate effects on lowland livestock numbers.

CHAPTER 4

ITS SIGNIFICANCE

THIS can perhaps best be shown by trying to assess the likely effect on lowland farms and on meat, milk and wool supplies in general if the contribution of the hills and uplands were to cease. If this theoretical situation occurred, one of the major effects would be the reduction of Britain's sheep population from around 20 millions to 10 or 11* millions. The annual flow of considerable numbers of sheep of different classes from the uplands to the lowlands would cease, thus:

Draft ewes—loss of 720,000 to 860,000
Store sheep—loss of 1,000,000 to 1,400,000
Fat sheep—loss of 800,000 to 1,100,000

All of these sheep, with the exception of some casualties in the lowlands, are finally slaughtered and so form part of Britain's meat supply. On the assumption that 10 per cent. of the draft ewes and 1 per cent. of the store sheep become casualties in the lowlands, then the estimated numbers of sheep leaving the uplands in the years 1951, 1952 and 1953, which would be finally slaughtered, are shown in Table XII.

TABLE XII

The Contribution of the Hills and Uplands to Total Sheep Slaughtered

Year	Sheep leaving the hills and uplands (less casualties)	Total sheep slaughtered in the United Kingdom	Hill and upland sheep as % of U.K. slaughterings	Total sheep slaughtered in Great Britain	Hill and upland sheep as % of G.B. slaughterings
1951	2,851,000	5,863,000	48·6	5,668,000	50·3
1952	2,341,000	7,330,000	31·9	6,810,000	34·3
1953	2,583,000	7,524,000	34·3	6,894,000	37·5

NOTE: Numbers of sheep slaughtered in the United Kingdom were obtained from Hunt (12) and in Great Britain from K. R. Clark and K. E. Hunt (13).

Thus, sheep from the high lands form between one-third and one-half of the total sheep slaughtered in Great Britain. Whilst few young ewes leave the hills for the lowlands, the draft ewes are sold at five or six years of age, normally producing two lambs in the lowlands before being fattened for slaughter. There are approximately 8 million ewes in Britain. 4·3 million of these are in the hills and uplands and 3·7 million in the lowlands. Of these lowland ewes, 1·6 million originated in the hills (2×800,000, as 800,000 draft ewes come from the hills each year). Thus the overall effect of removing all sheep from the uplands would be to reduce the mutton and lamb supply of Britain to approximately 40 per cent. of its former quantity and to reduce the number of lowland ewes from 3·7 to 2·1 millions.

If this happened there would be a surplus of fodder supplies in the lowlands and it should be possible to increase the number of lowland ewes. The 1·6 million ewes previously in the lowlands could, say, be replaced with 1·2 million lowland ewes and 0·4 million ewe lambs (these ewe lambs would act as replacement for the 1·2 million

* On all Scottish hill and livestock rearing farms, hill ewes are half the total sheep. Thus, as there are four and a half million upland ewes, total upland sheep must be about nine million as compared with a total of 20 million sheep in Great Britain in 1952.

additional ewes, giving the same total ewes as previously came from the uplands). This would give a total lowland breeding ewe population of 3·3 million ewes.

The average number of sheep produced for slaughter by lowland ewes in the three years studied can be calculated by deducting the sheep produced for slaughter by the uplands from the total sheep slaughtered in Great Britain. It is then possible to estimate the number of sheep produced for slaughter by each lowland ewe. The annual average over the three-year period is 1·068. Thus the estimated potential population of lowland ewes of 3·3 million would produce 3·3×1·068 or 3,524,000 sheep for annual slaughter. The average number slaughtered per annum in the three years studied was 6,457,000 (Table XIII) and 3,521,000 is only 55 per cent. of this figure.

TABLE XIII

Sheep Produced for Slaughter by Lowland Ewes

	1951 '000	1952 '000	1953 '000
Ewes for breeding in Great Britain	7,813	8,183	8,375
Number of ewes on which hill subsidy is paid	4,526	4,516	4,470
Total lowland ewes	3,287	3,667	3,905
Total sheep slaughtered in Great Britain	5,668	6,810	6,894
Number of sheep produced for slaughter by the hills ..	2,851	2,341	2,583
Total sheep produced for slaughter by the lowlands ..	2,817	4,469	4,311

It is likely that this would be the size of the British sheep industry if the supplies of stores, ewes and fat sheep from the hills and uplands were cut off unless very high sheep prices stimulated a further expansion in the lowlands. Of course, the fodder previously eaten by over one million stores would still be available. It is difficult, however, to see how this surplus feed could be utilized without altering lowland farming systems. The stores are sold from the hills in late summer and early autumn, fattened in the lowlands in late autumn and early winter and then sold for slaughter. The animals are not on lowland farms in late winter or early spring which is the period of shortest keep. Thus, unless farming systems were adjusted to supply feed for extra ewes in this period, it is difficult to see how the sheep produced in the lowlands could be raised above the level of 50 per cent. of existing overall sheep numbers. The most obvious arrangement which could be made to provide feed in the late winter and early spring would be to sow half the land previously devoted to fattening sheep stores in early winter to a later winter crop such as rape or late varieties of kale; or to use this land to conserve fodder in the form of hay, silage or roots for winter feeding of ewes. It might then be possible to carry a number of ewes and replacements equal to about half the number of store sheep previously purchased from the hills and uplands.

The average number of store sheep arriving from the hills and uplands in the three years studied was 1·2 millions. On the system postulated above, half this number, i.e. 600,000 extra ewes, could be supported and three-quarters of these or 450,000 would be effective breeding ewes, the remainder being ewe replacements. Total lowland breeding ewes would then amount to 3·7 millions and should produce about (3·7×1·068) 3,952,000 sheep for slaughter each year. This is 59 per cent. of the total slaughterings of 6·7 million animals. On this basis, it would seem that a sheep industry nearly 60 per cent. of its present size would be possible in this country without any contribution from the hills and uplands.

Doubts have been expressed in some quarters as to whether a suitable lowland ewe could be found to replace the half-bred breeding ewe which originates in the hills and uplands and forms the backbone of the lowland breeding flocks. It is, however, difficult to see any fundamental objection to the development of a fixed half-breed ewe in Britain. In New Zealand, this problem was met by creating a new breed, the Corridale, a fixed cross between the Merino and the Lincoln. In Australia, the problem of the three-quarter bred Merino sheep was overcome by the development of a fixed three-quarter bred Merino-Lincoln cross, the Polworth.

TABLE XIV

Wool Produced by Upland and Lowland Sheep

Year	(1) Total wool produced in the United Kingdom million lb.	(2) Lowland and skin wool million lb.	(3) Hill and upland wool million lb.	Proportion (3) of (1) %
1951	81	59	22	27
1952	90	69	21	23
1953	92	71	21	23

Upland wool is shown, in Table XIV, to be approximately one-quarter of the total weight of wool supplied. If all sheep were removed from the hills and uplands, there would be a direct loss of about 21 million pounds of wool, plus the skin wool of 3 million slaughtered sheep which originated in the hills. If this total of 3 million sheep average 3 pounds of wool per head, there would be a reduction of a further 9 million pounds from lowland and skin wool which averaged 66 million pounds for the three years studied. This reduces the total lowland clip to 57 million pounds produced by 3,617,000 lowland ewes, an average of 15·5 pounds per ewe and followers. Any rearranged stocking system for increased numbers of sheep on lowland farms, on lines previously discussed where 3·7 million ewes were postulated, will produce a wool clip from the lowlands of 57·4 million pounds. Therefore, the overall effect on national home wool supplies of removing all sheep from the hills and uplands would be to reduce them to about 65 per cent. of the present quantity. The range of qualities would also be altered.

The total number of beef cattle coming from the hills and uplands falls into three groups. First, there are female animals which come down to the lowlands to serve a period as breeding cows and are then slaughtered. The second group are store cattle which are fattened in the lowlands and slaughtered, and thirdly there are some fat cattle which are slaughtered immediately on leaving the hills. If it is postulated that cattle from the hills suffer 1 per cent. in casualties before reaching the butcher, then it can be seen from Table XV that hill cattle form approximately 6 per cent. of the total cattle slaughtered in the United Kingdom and 11 per cent. of British slaughterings.

Thus upland cattle are of less importance in national production than upland sheep. The number of cattle coming from the high lands is, in fact, relatively too small to justify any calculation of necessary adjustments in Britain's agricultural economy if the hill supply ceased. It is impossible to show the part played by breeding cows from the hills in providing beef mothers for the lowlands, as cows in the lowlands are not recorded separately in the agricultural returns as dairy cows or beef cows. From the small numbers of hill cattle involved, it is likely that the lowlands could relatively easily adjust themselves to a situation where no cattle were obtainable from the hills and uplands.

Milk from the hills is also a small proportion of the total milk sold in Britain. The average annual amount of milk produced by farms on the high land is around 43 million

TABLE XV

A Comparison of the Slaughterings of Cattle from the Hills and Uplands with the National Totals

Year	Total upland cattle sold to the lowlands and finally slaughtered	Total cattle slaughtered in the United Kingdom	Hill and upland cattle slaughtered as a proportion of U.K. slaughterings	Total cattle slaughtered in Great Britain	Hill and upland cattle slaughtered as a proportion of British slaughterings
1951	246,691	3,753,000	6·6	1,992,000	12·4
1952	202,496	3,348,000	6·0	1,809,000	11·2
1953	163,140	3,200,000	5·1	1,740,000	9·4

NOTE: Total cattle slaughtered in the United Kingdom were taken from Hunt (12) and for Great Britain were calculated from K. R. Clark and K. E. Hunt (13).

gallons, which is less than 3 per cent. of the national annual supply in Britain. In any case, Britain's milk supplies are already at a high level in relation to the effective demand for liquid milk, and dairy farmers on the hills have fairly high levels of costs in milk production. Milk production, therefore, on hill and upland farms, though vitally important to individual farmers and their chances of making reasonable livelihoods, is not vital to the national agricultural economy.

CHAPTER 5

AGRICULTURAL SUBSIDIES IN THE HILLS AND UPLANDS

IT might be thought that upland and hill farms are more heavily subsidized than other British farms, and that the amount of subsidy paid is large in proportion to the value of produce obtained from these areas. This is true only in relation to the direct type of Government grant* (Table XVI). In all areas, these make up a higher proportion of the income and revenue of the upland samples than they do of the national. Such a comparison is, however, incomplete, as it does not cover the price subsidies, which make up the bulk of the total State help received by British farmers.

TABLE XVI

The Importance of Direct Government Grants

	Direct Govt. grants as a proportion of gross farm revenue			Direct Govt. grants as a proportion of net farm income		
	1950–1 %	1951–2 %	1952–3 %	1950–1 %	1951–2 %	1952–3 %
Hill and upland areas						
Wales (poor land) non-milk selling ..	10·3	11·2	9·4	66·9	46·1	29·5
Wales (poor land) milk selling ..	4·4	8·3	5·7	34·6	32·9	19·6
Wales (better land) non-milk selling ..	3·8	4·4	4·9	19·4	18·0	16·1
Wales (better land) milk selling ..	2·4	3·7	2·6	13·2	19·9	10·2
North Central Pennines	4·3	4·0	2·9	16·5	15·0	10·3
East Scotland, hill farms	8·5	8·6	7·3	116·5	82·6	35·4
East Scotland, livestock rearing ..	9·1	8·0	10·5	169·3	171·4	51·6
All English and Welsh livestock rearing farms	3·1	3·3	3·2	16·6	14·8	12·6
All English and Welsh farms	1·2	1·1	1·2	6·4	5·9	6·1

It is possible to make a reasonable analysis of the total subsidy received by the upland farmers from the total Government financial contribution to British farms (17). Some subsidies are paid solely to farms in the upland and hill areas. These are the hill sheep and hill cattle subsidies and the Hill Farming and Livestock Rearing Act grants. The value of these for the three years studied are shown in Table XVII. All other Government grants are available to both upland and lowland farmers. It is therefore necessary to estimate the proportion of these subsidies paid to upland farmers. The amounts paid for lime and fertilizer subsidy, the ploughing-up grant, and grants for drainage and water schemes are likely to be in rough proportion to the area of arable land in any one region. There is no completely satisfactory basis for this calculation. The area of arable land has been used rather than that of crops and grass as it would be incorrect to assume that all permanent grass has benefited from these grants. Even so, both methods give closely similar results because the sum involved is relatively small. The area of arable land in the upland regions is 868,900 acres—4·8 per cent. of the 18,104,000 acres of arable land in the United Kingdom. This proportion of the subsidies listed above has been

* Direct Grants include hill sheep and cattle payments, agreed schemes under the Hill Farming and Livestock Rearing Acts and the Marginal Production Scheme, ploughing up, drainage and water grants, the calf subsidy, and the Capitation bonus.

attributed to the hill and upland areas. This calculation is shown in Table XVIII. Similarly, it was assumed that the amount of the milk grant received by the uplands would be of the same proportion of the national subsidies paid for this item as the milk supply from the uplands is to the national milk supply. The results of this assumption and following calculations are shown in Table XIX.

TABLE XVII

Total Hill Sheep and Cattle Subsidies

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Hill sheep subsidy	1·1	1·3	0·6
Hill cattle subsidy	1·5	1·5	1·4
Hill Farming and Livestock Rearing Acts ..	0·3	0·5	0·8
Total	2·9	3·3	2·8

TABLE XVIII

Subsidies Related to the Area of Arable Crops

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Total subsidy paid for fertilizer	11·0	8·4	11·0
,, ,, ,, ,, lime	5·6	4·2	4·7
,, ,, ,, ,, ploughing	3·1	—	6·1
,, ,, ,, ,, drainage and water..	2·1	2·3	2·5
National total for United Kingdom ..	21·8	14·9	24·3
Upland arable as a proportion of U.K. arable=4·8%			
Estimated amount of subsidies paid to the uplands(=4·8% of national total) ..	1·0	0·7	1·2

TABLE XIX

*Subsidies Related to Milk Production**

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Total milk subsidy	139·9	102·9	67·6
Milk produced in the hills as a proportion of total milk supply	2·7%	2·5%	2·2%
Subsidy on milk paid to hills and uplands ..	3·8	2·6	1·5

* Total national milk subsidy is the sum of the deficits shown in the Ministry of Food's trading accounts for milk and milk products. The deficits of the National Milk Scheme and the Milk in Schools Scheme are not included, as these are considered to be consumer subsidies (16).

The price subsidy on meat is a more difficult Government support to allocate, as it is necessary to decide how much is received by livestock rearers and how much by livestock fatteners. Dr. O. T. W. Price (18), in a study of changes in store prices and fat stock prices, found these changed in direct proportion to each other. This suggests that the Government aid should be shared between the fatteners and store raisers, in proportion to the value of what each produces. This calculation is shown in Table XX.

TABLE XX

Subsidies on Beef and Mutton

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Total meat subsidy for the United Kingdom	33·2	46·9	24·4
Value of meat produced in hills and uplands as a proportion of the value of total U.K. supplies of beef and mutton	8·8%	7·5%	7·9%
Estimated meat subsidy received by the hills and uplands	2·9	3·5	1·9

The calf subsidy received by the uplands can likewise be estimated by assuming that the hills and uplands receive a share of the subsidy proportionate to the number of breeding cows in those areas (Table XXI). This probably reduces the calf subsidy received by the hills and uplands to less than its true amount as the ratio between beef cows and dairy cows is higher in those areas than in the lowlands, and the quantity of subsidy received for beef cows is much higher than for dairy cows. The total amount received as calf subsidy is, however, small in relation to the other subsidies received by the hills and uplands and, therefore, any errors in its estimation will not seriously distort the grand total of all subsidies received.

TABLE XXI

Subsidies on Calves

	1950–1	1951–2	1952–3
Total calf subsidy paid in the United Kingdom	£6·2 mil.	£4·9 mil.	£3·8 mil.
Numbers of cows in the hills and uplands as a proportion of total cows in the U.K. ..	6·2%	6·2%	5·4%
Estimated calf subsidy paid to hill and upland farms	£0·4 mil.	£0·3 mil.	£0·2 mil.

Other subsidies received by farmers in the hill and upland areas during this period were the price subsidies on bacon and ham, the potato acreage payment, the wheat acreage payment and the egg subsidy. Yet these products have been shown to form such a small proportion of the upland agricultural production that the subsidy on them can be disregarded in these broad calculations. Again, as the total national subsidy on animal feeding stuffs was less than £3·3 million in the Ministries' trading accounts in any one of the years studied, the amount received by upland farmers would not exceed £100,000 and can be neglected in a calculation of this type.

The final sum of the subsidies (direct and indirect) received by the hills and uplands is given in Table XXIII, where it is also expressed as a proportion of the total subsidies paid to British Agriculture. It can be seen that both the value of production from the hills and uplands and the subsidies and grants they receive are below 4 per cent. of national agricultural production and of the national subsidy bill.

The upland and hill farming areas appear to receive a proportion of the national subsidy bill which is less than their physical production warrants. The amount of Government aid received by each hill and upland farm, as calculated in Table XXIII, is only one-third as large as that received by each lowland farm.

Table XXII

Total Subsidies received by the Hills and Uplands

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Milk	3·8	2·6	1·5
Calf	0·4	0·3	0·2
Meat	2·9	3·5	1·9
Lime, fertilizer, ploughing, drainage and water grants	1·0	0·7	1·2
Hill cattle, hill sheep and hill "rehabilitation" subsidies	2·9	3·3	2·8
	11·0	10·4	7·6

The subsidy to farms on the high land has not been directly proportionate to their physical agricultural production because farm products have been subsidized at different rates. Milk and cereals were much more heavily subsidized than other products such as meat. This resulted in the lowland farms receiving a disproportionate share of total national subsidies. The additional help to farms on the high land in the form of direct grants was not quite sufficient to make up the difference.

Table XXIII

Hill and Upland Subsidies compared with National Grants to Agriculture

	1950–1	1951–2	1952–3
Total national subsidies paid to agriculture in the United Kingdom	£384·5 mil.	£384·7 mil.	£312·3 mil.
Total subsidies paid to the hills and uplands	£11·0 mil.	£10·4 mil.	£7·6 mil.
Total subsidies paid to "lowland" agriculture	£373·5 mil.	£374·3 mil.	£304·7 mil.
Hill and upland subsidies as a proportion of national subsidies	2·9%	2·7%	2·4%
Hill and upland production as a proportion of U.K. production	3·6%	3·8%	3·9%
The average amount of subsidies and grants received by each farm* in the hills and uplands	£275	£260	£190
The average value of subsidies and grants on each "lowland" farm*	£754	£753	£616

* See Appendix V. Includes full and part time farms.

CHAPTER 6

THE RELATIVE EFFICIENCY OF HIGH LAND AND LOW LAND FARMS*

It appears, then, that the farmers of the high land of Britain receive a proportion of national help slightly less than the level of their production warrants and that this is a much smaller amount per farm than that received by their fellow farmers on the lowlands. Yet these broad conclusions, though revealing and interesting, do not throw much light on the question of efficiency in agricultural production. Efficiency is concerned with the degree of success achieved either in maximizing the return from a given quantity of resources or in minimizing the quantity of resources needed to reach a set objective. The important question here is—do the farmers of the hills and uplands use their resources more or less efficiently than those on the lower ground?

The answering of this question has involved the estimation of costs of production of upland and lowland farming. These have had to be built up from the structure of costs shown by the records of the Farm Management Survey. Some of these costs, like those of livestock purchases, bought-in feeding stuffs and the cost of winter grazing, have previously been estimated in order to arrive at the net agricultural output of the uplands. Other items such as purchases of seeds and fertilizers, rent, machinery and miscellaneous costs do vary directly with the acreages of crops and grass involved so that area totals can be obtained. Rents have been fairly constant throughout the samples studied, averaging just over £1 per acre of crops and grass, with the livestock rearing farms having slightly higher rents than the adjacent hill farms. Broadly speaking, livestock rearing farms have higher seed and fertilizer costs than the hill farms, as their arable land is relatively larger and is worked more intensively. Machinery costs vary greatly, as would be expected, though, measured per acre of crops and grass, they are relatively higher on the hill farms because the area of crops and grass on hill farms is smaller than on the livestock rearing farms, but a similar quantity of machinery is, in practice, needed to work the land (see Appendix V).

The overall cost of farm labour was obtained by using the crops and grass proportionate method and cross checked by using the distribution of paid workers on hill and upland farms given by the National Farm Survey (19) and *Types of Farming in Scotland* (20), priced at the farm worker wage rates operating in the three years studied, 1950–3 (see Appendix V).

The results of this work are given in Table XXIV.

This structure of farm costs is compared with that for the "national farm" in Table XXV. The distribution is very similar. It might be expected, for example, that the hill and upland farms would have relatively lower machinery costs and higher feeding costs than the lowland farms where crop production is more important. The area of arable land is however, so small that the cost of machinery is relatively high. The costs of bought-in feeding stuffs do not appear to be out of line with those of the whole industry.

Labour costs form a similar proportion of total costs on hill and upland farms as on the national farm if the labour of the farmer is excluded. When, however, an allow-

* During the remainder of this report, the term "lowlands" refers to the agricultural area of the United Kingdom remaining after the deduction of the area covered by the hills and uplands of Great Britain. It therefore includes Northern Ireland and the small area therein covered by hill and livestock rearing farms. Even if all the 600,000 acres of land above 650 feet in height in Northern Ireland were used for sheep and cattle rearing purposes it represents less than 1½ per cent. of the "lowland" area of the United Kingdom and is certainly well below the "lowland" average in its productivity. We have been unable to separate Northern Ireland from the national calculations in a satisfactory manner because so much of the data available on agricultural subsidies, farm output and farm expenses are on a United Kingdom basis.

TABLE XXIV

The Structure of Total Farm Costs in the Hills and Uplands of Great Britain

	1950–1 £'000	1951–2 £'000	1952–3 £'000
Expenditure on:—			
Seeds	1,271	1,476	1,321
Fertilizer and lime	2,733	3,250	2,959
Rent	3,108	3,067	2,982
Machinery and fuel	5,673	6,479	5,441
Purchased feed and wintering	7,261	7,356	6,083
Labour	10,127	10,214	10,567
Miscellaneous	5,108	5,633	6,152
Total (excluding Scottish crofts)	35,281	37,475	35,505
Total (including Scottish crofts*)	37,332	39,651	37,568

* The calculation of costs on the Scottish crofts is made in Appendix VI.

TABLE XXV

Individual Farm Costs as a Proportion of Total Costs

Cost item	Hill and upland farms			The national farm— United Kingdom		
	1950–1	1951–2	1952–3	1950–1	1951–2	1952–3
	%	%	%	%	%	%
Miscellaneous costs	18·1	18·9	21·0	18·2	17·9	17·8
Lime and fertilizer	7·7	8·7	8·3	6·8	6·0	7·3
Rent	8·8	8·2	8·4	8·0	7·9	7·7
Machinery costs	16·1	17·3	15·4	15·4	16·3	16·9
Purchased feeding stuffs	20·6	19·6	17·1	19·1	21·3	20·8
Labour	28·7	27·3	29·8	32·5	30·6	29·5
Total	100·0	100·0	100·0	100·0	100·0	100·0

NOTE: Crofting costs are excluded from this table.

ance is made for his manual work, the labour charge on the high land is considerably higher than the national average.

The important question for the individual farmer and for the nation is the net income left on hill and livestock rearing farms when their costs have been met. This is, in effect, the amount available to the farmer as wages for his own work on the farm, as interest on the personal capital he has invested and as profit for running the business. It is, of course, a residual amount—the difference between the gross output of the farm and the farmer's total expenses. The general picture given in Table XXVI excludes the Scottish crofts, as their farm production and costs, both "real" and money, are rather unusual and may distort the picture on more orthodox farms on high ground.

TABLE XXVI

Net Income on Hill and Upland Farms (excluding Crofts) (31,683 *Farms*)

	1950–1 £'000	1951–2 £'000	1952–3 £'000
Gross farm output	34,108	39,677	43,252
Farm costs	35,281	37,475	35,505
Net farm income	−1,173	2,202	7,747
Net income per farm	−£37	+£69	+£245

The average income realized during these years has been low. In no year has it exceeded the minimum wage rate of an agricultural worker. In actual fact, the amount of cash available in the farmhouse has been larger than the figures shown, as family labour has been charged as an expense in the calculations whereas in practice it is often not paid. Again, many farmers in the hills and uplands are owner occupiers and therefore do not pay rent, as is assumed in all calculations of farm income. Yet rents, in practice, are so low that even where not paid they leave little extra after necessary repairs to farm buildings and equipment have been made.

During the same years the net incomes of the farms on the lower and better lands have been around the £600 level. This means that even in the best year for the farms on the higher ground—1952–3—their average net income was only one-third that of the more fortunate farmers on the lower land. If an allowance is made for the value of manual work done by farmers and their wives on both lowland and high land farms, a reasonably close estimate can be made of the efficiency with which all the resources are used on these farms—their land, their capital and the people employed or living on them. The relevant figures are given in Table XXVII.

TABLE XXVII

The Relative Efficiency of Farming on Upland and Lowland Farms (including Crofts)

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Hills and uplands			
Gross output	37	43	47
Total costs	37	40	37
Value of work done by farmer and wife	11	12	13
Value of total resources used	48	52	50
Gross ouput per unit of resources used	0·77	0·83	0·94
Lowlands			
Gross output	993	1,078	1,155
Total costs	699	787	846
Value of work done by farmer and wife	139	150	156
Value of total resources used	838	937	1,002
Gross output per unit of resources used	1·18	1·15	1·15
Efficiency on hill and upland farms in comparison with those of the lowlands (100)	65	72	82

Broad calculations of this sort always involve a degree of hidden error. Yet, as far as possible, assumptions made have been consistent with both groups of farms so as to isolate the relative differences. In none of the three years studied does the value of the farm output produced in the hills and uplands exceed the value of all the resources—human and material—used. On lowland farms, however, the resources used have been rewarded by an output greater than "real" cost.

The trend is, however, somewhat different from that of any one year. Whilst the efficiency of farm production remained relatively constant in the lowlands during the three years studied, it improved quite rapidly in the hills and uplands. Thus the ratio between the efficiencies of the two areas of farming moved in favour of high land farms. This improvement should, however, be treated with caution. Variations in farm output and in the resources used are normally much greater in areas with difficult physical conditions than in others. Looking back to the structure of costs (Table XXIV) it will be seen that farm costs changed very little in the hills and uplands during these three years, such variation as there was being chiefly due to changes in the quantities of feeding

stuffs used. The general improvement in efficiency in use of farm resources really arose from an increase in the value of the output, especially in the price of wool in 1952, rather than an increase in the physical quantities produced. The period was also one of rapid inflation which caused changes in farm valuations, particularly of livestock, which were not proportionate to changes in the actual numbers of livestock.

In trying to measure all the resources used in lowland and upland farming, it should not be forgotten that part of the output of both consists of direct and indirect Government grants and subsidies. It has been shown in Chapter 5 that these subsidies were a smaller proportion of the gross agricultural output of the hills and uplands than they were of the lowlands. Therefore an adjustment for subsidies received should improve the relative position of the high ground. This is seen in Table XXVIII. The table shows what is well known—that without Government price supports and grants, the output of British agriculture during these three years was less than the real costs of its production. The only new factor from the table is evidence that this economic weakness has occurred both on the lowlands as a whole and on the hills. Yet the relative position, stripped of the cloak of subsidies, suggests that the relative efficiencies of lowland and high land agriculture are closer together than was first thought—the index of relative efficiency of hill and upland farms having risen to 92 by 1952–3 in comparison with the 100 of lowland farms. Put another way, this means that the output in relation to inputs rose relatively more on high land farms during these three years than it did on lowland farms, even though the figures in both areas and in all years were below parity.

TABLE XXVIII

The Efficiency of Farming on Upland and Lowland Farms with an adjustment for Government Subsidies and Grants
(including Crofts)

	1950–1 £ million	1951–2 £ million	1952–3 £ million
Hills and uplands			
Gross output	37	43	47
Subsidies paid	11	10	8
Gross output less subsidies	26	33	39
Value of total resources used	48	52	50
Gross output (less subsidy) per unit of resources used	0·54	0·63	0·78
Lowlands			
Gross output	993	1,078	1,155
Subsidies paid	374	374	305
Gross output less subsidies	619	704	850
Value of total resources used	838	937	1,002
Gross output (less subsidy) per unit of resources used	0·74	0·75	0·85
Efficiency of hill and upland farms, without subsidies, in comparison with the lowlands (100)	73	84	92

It is probable that the agriculture of the hills and uplands has improved its relative position even further since 1953, due to the advent of the free market. The market prices of mutton, lamb and beef have been close to or above guaranteed prices for these products for most of the time until recently, so that hill and upland farmers, to whom these products are important, have been drawing on Government funds to a much smaller extent than lowland farmers with their emphasis on cereals, milk and pigs which have continued to receive high subsidies in recent years.

CHAPTER 7

SUMMARY AND COMMENT

In arguments about the hills and uplands of Britain, there are broadly two schools of thought. There are those who think that upland agriculture is vital to the economy of lowland farming and that it supplies large quantities of meat, animals and wool; others believe that the value of hill agriculture is very low, that Britain could manage without its contribution and that too great an amount of State help is being given to these poor areas. This study has tried to sort out the broad factual position so that arguments as to what it is worth doing with hill and upland areas can proceed on a more rational basis.

The major contribution of hill sheep and wool to national home supplies is strongly brought out by the study. The breeding flock in the hills and uplands of about $4\frac{1}{2}$ million head provide each year, in addition to their own replacements, a flow of some $2\frac{1}{2}$ to 3 million sheep to the lowlands. These make up between one-third and one-half of the total number of sheep slaughtered each year in this country though their value is only about 25 per cent. of the total because of the small size of hill sheep and the large proportion of store animals in the contribution. Again, the hills and uplands are responsible for about one-third of the annual value of the home-produced wool clip of this country.

The magnitude of this contribution comes clearly into focus in the discussion of the theoretical effects of a cessation of hill and upland sheep farming; admittedly a hypothetical concept, but used to emphasize the significance of the contribution in sheep and the difficulty of replacing it. Cessation would force the total sheep population of the country down from its present level of 20 million to between 10 and 11 million head. Even with rearrangements of land uses on lowland farms the lowland sheep industry would probably settle down at about two-thirds of the size of the present national sheep flock and present annual sheep slaughterings would probably fall to the same proportion. It might, however, be able to get to within three-quarters of the size of the existing industry in terms of weight of mutton and lamb produced and in the money value of its sheep and lamb sales.

This study has therefore confirmed the importance of the hills and uplands to the national economy in relation to sheep and lambs. The position in relation to cattle and beef is very different. Only 100,000 beasts leave the high country each year from truly beef breeding herds. Another 150,000 join them from the dairy herds now scattered throughout the hills and uplands. The total runs at only between 5 and 7 per cent. of the United Kingdom production of cattle and calves for slaughter and, because so many are calves and store animals, the money value of the contribution is below 4 per cent. of the national figure.

Despite the inaccuracies which are bound to exist in broad estimates of this character, the smallness of the contribution in cattle and beef by Britain's hill country is very evident. The output is low enough to suggest that Britain would not have insuperable difficulty in maintaining her cattle supplies if the present contribution from the high ground were cut off unless severe difficulties arose in the Irish cattle trade.

It is well known that milk production has crept into farming systems through much of the hills and uplands of this country. From the 14 million acres of hills and uplands flow 43 million gallons of milk. Although this is only 3 per cent. of the total national milk sales its value (about £7 millions) is close to the value of sheep (£9 to £11 millions), and greater than the value of cattle (£6 millions) sold from Britain's high land. This quantity of milk could probably be replaced in the lowlands without too severe difficulties but the loss of the milk cheque would be severe on the many small upland farms.

It would take away nearly a fifth of the total agricultural income of the high ground, and this the most dependable part.

The overall agricultural output of the hill country is relatively low: The 14 million acres of hills and uplands devoted to agriculture in Great Britain, forming a quarter of the total land surface, provide only 4 per cent. of the total agricultural output. Even its contribution of livestock, measured as a proportion of all fat stock slaughtered in this country, is only 5 to 7 per cent. (its large contribution to sheep slaughterings being heavily overweighted by its low contribution to the total home supplies of cattle, calves and pigs).

The significant question is the cost to the country of getting this output from its high ground. The estimates made in Chapter 6 suggest that the value of the resources used are greater than the value of the gross output obtained in these areas, and that such a position is maintained by a group of farmers accepting a standard of living lower than that of the rest of the community. All that can be concluded at this stage of our investigations is that the *existing* system of upland farming as a whole is less efficient than the lowland system and that the returns from it are less than the value of the resources employed. The estimates made are based on average figures and little is in fact known as to the marginal returns obtained on land, labour and capital used. It is, of course, important to realize that the return to these resources, or to an even greater quantity, might be much larger if they were employed in a different system of farming in the same areas or new husbandry techniques were adopted.

Apart from the sacrifice made by the upland farmer in accepting a lower standard of living, there is no evidence to suggest that the rest of the nation is paying more in the way of subsidies to support agriculture in the hills and uplands than is paid to support lowland agriculture. The proportion of the national agricultural subsidy bill paid to the hills and uplands is, in fact, slightly lower than their proportionate contribution to the national agricultural output in money terms. In addition to there being no undue emphasis in subsidies to the high land in total, each of the farmers in these areas receives, on average a very much lower sum of Government assistance than does his counterpart in the lowlands. In the years which have followed the three studied in this report, subsidies to the hills and uplands have been further reduced. The hill sheep subsidy on upland ewes has either not been paid or only partially paid. The transition from controlled to free marketing of sheep and cattle has greatly reduced the meat subsidy received by hill and upland farmers. Thus the proportion of subsidies now received by the hills and uplands is certainly less than that received during the period studied.

If it is the purpose of the State to pay the greatest subsidy to the most efficient producers, then that object is being achieved, as our study shows that the more efficient lowland farmers receive a proportion of total subsidies greater than their production would appear to warrant. If the object is to pay subsidy according to the amount and value of farm production, then the hills and uplands have been rather under-subsidized. If the aim is to equalize net farm incomes, then this is not being achieved, as the proportion of subsidies paid to the lowland and upland areas is such that it actually widens the gap between them. It is, of course, for the community, through its elected representatives and Government, to decide on the purpose of any help given from the public purse and then to make sure that this objective is realized.

APPENDICES

TABLES AND EXPLANATIONS OF METHODS USED

APPENDIX I

SHEEP

THE numbers of ewes on which hill sheep subsidy is paid during the three years under study were divided into five groups on a geographical basis. Each of these groups was subdivided according to whether the ewes kept were on hill or livestock rearing farms. The numbers in each sub group were obtained by assuming that, in England and Wales, ewes on which the subsidy is paid at the full rate are found mainly on hill farms, while ewes paid at the half rate are on livestock rearing farms. In Scotland, where only one rate of subsidy on hill sheep is paid, the ewes were divided into those on hill farms, as against those on livestock rearing farms, by assuming that the proportion on each type of farm has remained the same as it was in 1947 when the latest survey of types of farms in Scotland was carried out. That survey divided Scotland into geographical areas and breeding ewes in these areas were grouped by the Department of Agriculture of Scotland into those on hill and those on livestock rearing farms. The proportion of ewes on each type of farm in each area in Scotland in 1947 is shown in Table A.

The geographical areas, applicable to the Farm Management Survey samples, are shown in Table B. The next step is to calculate the numbers of each type of sheep sold from each sample of farms. This is done by deducting the numbers of each type purchased from the numbers of that type sold to obtain the net sales of each type. These are then expressed as net sales per 100 breeding ewes.

The division into types of sheep for the Welsh samples is limited to a division into rams, ewes, stores and fat sheep (except for the year 1951–2 when stores and fat sheep are subdivided into lambs and adult sheep). It has been assumed that the proportion of adults to lambs was broadly the same in the years 1950–1 and 1952–3 as in 1951–2.

In Western Scotland, no group of livestock rearing farms has been available for study. The net sales of the Northern Scottish group were, therefore, used for ewes on livestock rearing farms in Western Scotland. In Northern Scotland, hill farms were not studied until 1952–3 in the Farm Management Survey. An assumption therefore had to be made that the total net sales of all types would vary in 1950–1 and 1951–2 as compared with the 1952–3 totals in the same way as those of the West Scotland hill sheep farm group for which three years' records are available. It was also thought that the net sales of each type of sheep would be approximately the same proportion of total net sales as in 1952–3.

In Wales there are two samples of farm management records which apply to hill farms. The net sales of these two samples were averaged. In England and East Scotland, one complete sample for each area is available for the three years studied and these

were applied directly to the areas without any adjustments. The net sales of each type of sheep in each area, expressed as net sales per 100 ewes, are set out in Tables C and D. The total net sales of sheep from each area, calculated by multiplying the net sales of each type of sheep per ewe by the total ewes in the area, are shown in Tables E and F.

TABLE A

The Proportion of Ewes on Hill and Livestock Rearing Farms in 1947

Geographical areas of Farm Management Survey sample farms	Proportion of ewes on farms	
	Hill	Livestock
	%	%
North Scotland	64	36
Western Scotland	87	13
Eastern Scotland	75	25

TABLE B

Choice of Areas for Analysis Purposes

Farm Management Survey sample	Geographical area	No. of farms
1950–1 *For sheep on hill farms*		
East Scotland—Hill Farms (8c)	East Scotland	31
West Scotland—Hill Farms (8d)	West Scotland	46
Wales, Predominantly Livestock, Poor Land (8a) ..	Wales	55
Wales, Livestock with Dairying, Poor Land (8a)	,,	66
Northern England, Upland (with fell grazing) (8b) ..	England	29
For sheep on livestock rearing farms		
East Scotland, Upland (8c)	East Scotland	22
Northern Scotland, Upland (8e)	North and West Scotland	23
Wales, Predominantly Livestock, Better Land (8a) ..	Wales	61
Northern England, Upland (without fell grazing) (8b) ..	England	10
1951–2 *For sheep on hill farms*		
East Scotland, Hill	East Scotland	33
West Scotland, Hill	West Scotland	49
Wales, Predominantly Livestock, Poor Land	Wales	55
Wales, Livestock with Dairying, Poor Land	,,	56
Northern England, Upland (with fell grazing)	England	29
For sheep on livestock rearing farms		
East Scotland, Upland	East Scotland	24
Northern Scotland, Upland	North and West Scotland	26
Wales, Predominantly Livestock, Better Land	Wales	59
Northern England (without fell grazing)	England	10
1952–3 *For sheep on hill farms*		
East Scotland, Hill	East Scotland	34
West Scotland, Hill	West Scotland	34
Northern Scotland, Hill	North Scotland	17
Wales, Predominantly Livestock, Poor Land	Wales	56
Wales, Livestock with Dairying, Poor Land	,,	66
Northern England (with fell grazing)	England	31
For sheep on livestock rearing farms		
East Scotland, Upland	East Scotland	24
Northern Scotland, Upland	North Scotland	20
Wales, Predominantly Livestock, Better Land	Wales	61
Northern England (without fell grazing)	England	10

TABLE C

Average Net Sales and Purchases per 100 *Ewes for particular samples of Hill Farms*

	Rams	Draft ewes	Store sheep	Store lambs	Fat sheep	Fat lambs	Total
1950–1							
Northern England ..	2·26	25·59	1·20	20·08	7·48	27·67	84·28
Wales	—	19·38	14·67		24·67		58·72
East Scotland	1·22	17·65	—	47·05	4·08	14·09	84·09
West Scotland	0·32	12·88	—	31·73	9·15	11·04	65·12
North Scotland			No	sample			
1951–2							
Northern England ..	1·20	21·02	—	25·92	6·02	22·65	76·81
Wales	0·08	18·76	12·62		20·08		51·54
East Scotland	1·24	13·17	—	27·78	3·00	7·87	53·06
West Scotland	—	10·19	0·05	25·66	7·34	7·57	50·81
North Scotland			No	sample			
1952–3							
Northern England ..	2·03	16·86	1·16	31·63	4·71	16·63	73·02
Wales	0·17	18·59	13·99		24·77		57·52
East Scotland	1·04	16·37	—	41·09	3·02	13·45	74·97
West Scotland	—	10·18	1·53	27·34	8·23	6·36	53·64
North Scotland	—	16·26	4·05	32·99	—	7·16	60·46

NOTE: Net sales are shown as a plain figure and net purchases are preceded by a negative sign (e.g. −3·70). This procedure is adopted in all the following tables.

TABLE D

Average Net Sales and Purchases per 100 *Ewes on Livestock Rearing Farms in Farm Management Survey Samples*

	Rams	Draft ewes	Store sheep	Store lambs	Fat sheep	Fat lambs	Young ewes	Total
1950–1								
Northern England	—	24·71	−7·94	54·12	23·24	51·18	−37·35	107·96
Wales	0·38	29·97	7·62		80·84		−20·58	98·23
East Scotland ..	0·87	18·60	5·47	81·10	9·30	11·39	−17·15	109·58
West Scotland ..			No sample					
North Scotland ..	—	17·50	—	54·42	—	—	−11·60	60·32
1951–2								
Northern England	−0·31	14·06	−31·57	34·70	35·31	39·06	−15·31	75·94
Wales	0·61	29·88	12·77		67·98		−19·27	91·97
East Scotland ..	1·35	14·91	6·77	75·61	9·48	5·69	−20·05	93·76
West Scotland ..			No sample					
North Scotland ..	—	17·25	—	41·85	—	—	−8·08	51·02
1952–3								
Northern England	−0·94	15·62	−31·87	38·12	26·56	56·56	−43·10	60·95
Wales	0·52	31·95	15·37		66·01		−17·00	96·85
East Scotland ..	0·79	12·11	3·68	69·48	10·78	3·68	−14·47	86·05
West Scotland ..			No sample					
North Scotland ..	—	18·58	—	72·68	—	6·06	−20·16	77·16

NOTE: Net purchases are prefaced with a minus sign.

TABLE E

The Calculation of Net Sales of Sheep of various types from British Hill Farms

	Total ewes subsidized	Rams	Draft ewes	Store sheep	Store lambs	Fat sheep	Fat lambs	Total sheep sold	Percentage of total from each area
1950–1									
England	863,797	19,511	221,023	10,338	173,484	64,647	239,005	728,008	27·8
Wales	1,059,315	—	205,270	102,635	52,872	216,839	44,413	622,029	23·7
East Scotland ..	360,442	4,397	63,619	—	169,588	14,706	50,786	303,096	11·6
West Scotland ..	968,023	3,098	124,681	—	307,154	88,574	106,869	630,376	24·1
Northern Scotland ..	504,529	—	90,633	22,583	183,929	—	39,907	337,052	12·8
Totals ..		27,006	705,226	135,556	887,027	384,766	480,980	2,620,561	100·0
Types as % of total sold		1·0	26·9	5·2	33·8	14·7	18·4	100·0	
1951–2									
England	862,112	10,345	181,216	—	223,459	51,899	195,268	662,187	31·3
Wales	1,045,332	808	196,110	44,860	87,082	35,683	174,218	538,761	25·4
East Scotland ..	356,311	4,418	46,926	—	98,983	10,689	28,042	189,058	8·9
West Scotland ..	969,419	—	98,784	485	248,752	71,155	73,385	492,561	23·3
Northern Scotland ..	505,994	—	63,287	15,769	128,433	—	27,866	235,355	11·1
Totals ..		15,571	586,323	61,114	786,709	169,426	498,779	2,117,922	100·0
Types as % of total sold		0·7	27·7	2·9	37·1	8·0	23·6	100·0	
1952–3									
England	877,289	17,808	147,914	10,185	277,506	41,318	145,864	640,595	27·8
Wales	1,034,435	1,785	192,306	49,200	95,506	43,556	212,654	595,007	25·9
East Scotland ..	352,150	3,662	57,647	—	144,699	10,635	47,364	264,007	11·5
West Scotland ..	951,623	—	96,875	14,560	260,174	78,318	60,523	510,450	22·2
Northern Scotland ..	480,586	—	78,143	19,464	158,545	—	34,410	290,562	12·6
Totals ..		23,255	572,885	93,409	936,430	173,827	500,815	2,300,621	100·0
Types as % of total sold		1·0	24·9	4·1	40·6	7·6	21·8	100·0	

TABLE F

Calculated Net Sales and Purchases of Sheep of various types for Livestock Rearing Farms in Great Britain

	Total breeding ewes on farms	Rams	Draft ewes	Store sheep	Store lambs	Fat sheep	Fat lambs	Young ewes	Total sales
1950–1									
England	95,149	—	23,511	−7,554	51,494	22,113	48,697	−35,538	102,723
Wales	126,187	479	37,818	—	9,615	44,395	57,614	−25,969	123,952
East Scotland ..	120,147	1,045	22,347	6,573	97,439	11,174	13,684	−20,605	131,657
West Scotland ..	144,647	—	25,313	—	61,938	—	—	−16,779	70,472
North Scotland ..	283,797	—	49,664	—	154,442	—	—	−32,920	171,186
Totals ..		1,524	158,653	−981	374,928	77,682	119,995	−131,811	599,990
1951–2									
England	97,149	301	13,659	−30,670	33,711	34,303	37,946	−14,873	74,377
Wales	131,596	802	39,320	—	16,804	41,741	47,717	−25,358	121,026
East Scotland ..	118,770	1,603	17,709	8,041	89,802	11,259	6,758	−23,813	111,359
West Scotland ..	144,856	—	24,988	—	60,622	—	—	−11,704	73,906
North Scotland ..	284,622	—	49,097	—	119,114	—	—	−22,997	145,214
Totals ..		2,706	144,773	−22,629	320,053	87,303	92,421	−98,745	525,882
1952–3									
England	104,370	−981	16,302	−33,263	39,786	27,721	59,032	−44,983	63,614
Wales	139,690	726	44,630	—	21,470	29,464	62,745	−23,747	135,288
East Scotland ..	117,383	927	14,215	4,320	81,558	12,654	4,319	−16,985	101,008
West Scotland ..	142,197	—	26,420	—	103,349	—	8,617	−28,667	109,719
North Scotland ..	270,329	—	50,227	—	196,475	—	16,382	−54,498	208,586
Totals ..		672	151,794	−28,943	442,638	69,839	151,095	−168,880	618,215

APPENDIX II

CATTLE

THE calculation of the numbers of cattle coming from the hills and uplands of Britain is carried out in two parts depending on whether these animals are produced by beef or dairy cows:

(*a*) *The Numbers of Cattle Produced from Beef Herds.* The total number of beef cows in upland areas is known from the number of cows on which hill subsidy is paid. These were divided into five geographical groups using the same method as used for breeding ewes (Appendix I). In Scotland, it was possible to further divide breeding cows into those on hill and those on livestock rearing farms, using the same methods as used for ewes. In England and Wales, such subdivision is impossible.

The number of cows in each area and each sub-group are set out in Table A. The net sales of each type of cattle per breeding cow were calculated for each Farm Management Survey sample and are set out in Table B.

By multiplying the total number of cows in each area, and on each farm type, by the net sales per cow for the appropriate Farm Management Survey sample, a rough total of the number of cattle of each type leaving each area is obtained. In Scotland, the Farm Management Survey samples were applied to geographical areas in the same way as in the calculation of sheep numbers. No suitable farm sample showing sales of cattle from beef cows exists for England and hence the results of the Welsh samples had to be used. Where a division between cattle on hill as against livestock rearing farms is not possible, the average of net sales of the two samples "Better Land, Predominantly Livestock Rearing, Wales" and "Poor Land, Predominantly Livestock Rearing, Wales" were applied to all English and Welsh beef cows. The total numbers of cattle so calculated are shown in Table C.

(*b*) *Cattle Produced from Dairy Herds.* In Scotland most of the dairy cows on hill and livestock rearing farms are used to supply milk for domestic purposes and they are paid the hill cow subsidy. These cows have, therefore, already been accounted for in the section dealing with beef cows. The only dairy cows in the hills of Scotland, not subsidized, would be those on "Dairy, with Hill Sheep, Farms". These were assumed to be of the same number as in 1947, when the survey of *Types of Farming in Scotland* (5) was made, namely, 12,274 cows.

In England and Wales the total number of "cattle other than breeding cows over one year" is known, as it is the number of cattle on which hill cattle subsidy is paid at half rate. By assuming that the same proportion of "other cattle over one year old" are associated with beef cows on all English and Welsh hill and livestock rearing farms, as are associated with those in the Farm Management Survey sample of "Poor Land, Predominantly Livestock Rearing, Wales," the total number of "other cattle over one year" associated with beef cows can be estimated. By subtracting this number from the numbers of "other cattle over one year" on which hill cattle subsidy is paid in England and Wales, the number of "other cattle over one year" associated with dairy cows is obtained. The results of these calculations are shown in Table D.

The net sales of cattle, per cow, and per unit of "other cattle over one year old" for the Farm Management Survey sample "Livestock with Dairying, Poor Land, Wales" have also been calculated and are shown in Tables E and F. By multiplying these figures by the number of dairy cows on Scottish "Dairy, with Hill Sheep, Farms" and the number of "other cattle over one year" on English and Welsh hill and livestock rearing farms, a rough estimate of the total cattle produced from the hills and uplands is obtained. These are shown in Tables G and H. The total cattle produced by all British hill and upland cows in milk is shown in Table I.

TABLE A

Distribution of Beef Breeding Cows between Hill and Livestock Rearing Farms in Scotland

Year	Farm Management Survey areas	Hill	Livestock rearing
1950–1	East Scotland	7,423	13,196
	Northern and Western Scotland	22,572	64,762
1951–2	East Scotland	7,170	12,747
	Northern and Western Scotland	22,142	63,777
1952–3	East Scotland	6,891	12,252
	Northern and Western Scotland	20,843	58,362

TABLE B

Average Net Sales and Purchases of different classes of Cattle per Breeding Cow in Farm Samples drawn from the Farm Management Survey

	Cows	Calves	Stores	Fats	Others	Total
1950–1						
East Scotland, Hill	0·15	0·38	0·08	0·08	—	0·69
West Scotland, Hill	0·288	0·050	0·422	0·011	−0·002	0·769
Wales, Predominantly Livestock, Poor Land	0·082	0·061	0·842	0·088	0·002	1·075
Wales, Predominantly Livestock, Better Land	−0·122	0·035	0·704	0·248	0·003	0·868
East Scotland, Livestock Rearing	0·13	0·46	0·46	0·07	0·30	1·42
North Scotland, Livestock Rearing	0·051	0·487	0·325	—	0·025	0·888
1951–2						
East Scotland, Hill	0·15	0·31	0·15	0·15	—	0·76
West Scotland, Hill	0·295	0·269	0·191	0·006	0·007	0·768
Wales, Predominantly Livestock, Poor Land	0·038	0·029	0·648	0·100	−0·009	0·806
Wales, Predominantly Livestock, Better Land	0·022	—	0·648	0·160	0·013	0·842
East Scotland, Livestock Rearing	0·20	0·56	0·24	0·04	—	1·04
North Scotland, Livestock Rearing	0·048	0·308	0·283	0·163	−0·009	0·793
1952–3						
East Scotland, Hill	0·030	0·470	—	0·700	−0·700	0·500
West Scotland, Hill	0·263	0·135	0·275	0·004	—	0·677
Wales, Predominantly Livestock, Poor Land	0·020	0·031	0·458	0·120	−0·010	0·619
Wales, Predominantly Livestock, Better Land	−0·009	0·006	0·535	0·153	0·032	0·717
East Scotland, Livestock Rearing	0·210	0·330	0·330	0·040	−0·080	0·830
North Scotland, Livestock Rearing	0·080	0·188	0·568	—	−0·020	0·816

NOTE: Net purchases are prefaced by a minus sign.

TABLE C

Net Sales and Purchases of different types of Beef Cattle from Beef Breeding Cows on Hill and Livestock Rearing Farms

Year	Geographical farm type area	F.M.S. sample used as a basis of calculation	Cows	Calves	Stores	Fats	Others	Total
1950–1	England—Hill and Livestock Rearing Farms	The average of Wales Predominantly Livestock Rearing Farms "Poor Land Group" and "Better Land Group"	−254	611	9,845	2,139	25	12,366
	Wales—Hill and Livestock Rearing Farms		−203	489	7,871	1,710	20	9,887
	East Scotland—Hill Farms	East Scotland—Hill Farms	1,113	2,821	594	594	—	5,122
	North and West Scotland—Hill Farms	West Scotland—Hill Farms	6,500	1,129	9,525	248	−45	17,357
	East Scotland—Livestock Rearing Farms	East Scotland—Livestock Rearing Farms	1,715	6,070	6,070	924	3,959	18,738
	West and North Scotland—Livestock Rearing Farms	North Scotland—Livestock Rearing Farms	3,302	31,539	21,048	—	−1,619	54,270
	Totals		12,173	42,659	54,953	5,615	2,340	117,740
1951–2	England—Hill and Livestock Rearing Farms	The average of Wales Predominantly Livestock Rearing Farms "Poor Land Group" and "Better Land Group" ..	391	182	8,448	1,694	26	10,741
	Wales—Hill and Livestock Rearing Farms		290	135	6,270	1,258	19	7,972
	East Scotland—Hill Farms	East Scotland—Hill Farms	1,075	2,223	1,075	1,076	—	5,449
	North and West Scotland—Hill Farms	West Scotland—Hill Farms	6,533	5,956	4,229	133	154	17,005
	East Scotland—Livestock Rearing Farms	East Scotland—Livestock Rearing Farms	2,549	7,139	3,059	510	—	13,257
	West and North Scotland—Livestock Rearing Farms	North Scotland—Livestock Rearing Farms	3,062	19,642	18,049	10,396	−574	50,575
	Totals		13,900	35,277	41,130	15,067	−375	104,999
1952–3	England—Hill and Livestock Rearing Farms	The average of Wales Predominantly Livestock Rearing Farms "Poor Land Group" and "Better Land Group" ..	84	254	7,007	1,917	155	9,417
	Wales—Hill and Livestock Rearing Farms		63	190	5,262	1,440	116	7,071
	East Scotland—Hill Farms	East Scotland—Hill Farms	207	3,239	−4,823	4,823	—	3,446
	North and West Scotland—Hill Farms	West Scotland—Hill Farms	5,482	2,814	5,731	83	—	14,110
	East Scotland—Livestock Rearing Farms	East Scotland—Livestock Rearing Farms	2,573	4,043	4,043	490	−980	10,169
	West and North Scotland—Livestock Rearing Farms	North Scotland—Livestock Rearing Farms	4,669	10,971	33,150	—	−1,167	47,623
	Totals		13,078	21,511	50,370	8,753	−1,876	91,836

NOTE: Figures preceded by a minus sign are net purchases, other figures are net sales.

TABLE D

Numbers of Cattle Eligible for Hill Cattle Subsidy on Milk Selling and Non-Milk Selling Upland Farms

Year	Area	Full rate breeding cows	Reduced rate (other cattle beef over 1 year)	Other cattle over 1 year associated with beef cows	Other cattle over 1 year associated with milking cows
1950–1	England	12,735	101,562	19,739	81,823
	Wales	10,182	66,185	15,782	50,403
1951–2	England	13,038	102,324	20,209	82,115
	Wales	9,675	61,141	14,996	46,145
1952–3	England	14,098	97,745	21,852	75,893
	Wales	10,585	56,506	16,407	40,099

TABLE E

Net Sales and Purchases per Cow on "Livestock Rearing Farms, Milk Selling, Poor Land, Wales"

Year	Bulls	Cows	Calves	Stores	Fats	Total
1950–1	0·004	0·110	0·065	0·755	0·076	1·010
1951–2	−0·007	0·042	0·043	0·544	0·074	0·696
1952–3	−0·001	0·050	0·054	0·464	0·050	0·617

TABLE F

Net Sales and Purchases, per Other Cattle over One Year Old, on "Livestock Rearing Farms, Milk Selling, Poor Land, Wales"

Year	Bulls	Cows	Calves	Stores	Fats	Total
1950–1	0·005	0·135	0·079	0·922	0·093	1·234
1951–2	−0·008	0·056	0·058	0·725	0·098	0·929
1952–3	−0·001	0·062	0·068	0·582	0·062	0·773

TABLE G

Production from Dairy Cows in the Scottish Hills (based on Net Sales per Cow on Welsh Milk Selling Farms)

Year	Total cows on farms	Cows	Calves	Stores	Fats	Others	Total
1950–1	12,274	1,350	798	9,267	933	49	12,397
1951–2		515	528	6,677	908	−86	8,542
1952–3		614	663	5,695	613	−12	7,573

TABLE H

Production from Milking Cows on Welsh and English Farms (based on Net Sales per Beast over One Year on Welsh Milk Selling Farms)

Year	Total beasts over 1 year	Cows	Calves	Stores	Fats	Others	Total
1950–1							
England	81,823	11,046	6,464	75,441	7,609	409	100,969
Wales	50,403	6,804	3,981	46,471	4,687	252	62,195
1951–2							
England	82,115	4,598	4,762	59,533	8,047	−657	76,283
Wales	46,145	2,584	2,676	33,455	4,522	−369	42,868
1952–3							
England	75,893	4,705	5,161	44,170	4,705	−76	58,665
Wales	40,099	2,486	2,727	23,338	2,486	−40	30,997

TABLE I

Total Cattle produced by Milking Cows in the Uplands

	Cows	Calves	Stores	Fats	Others	Total
1950–1						
Scotland	1,350	798	9,267	933	49	12,397
England	11,046	6,464	75,441	7,609	409	100,969
Wales	6,804	3,981	46,471	4,687	252	62,195
Total	19,200	11,243	131,179	13,229	710	175,561
1951–2						
Scotland	515	528	6,677	908	−86	8,542
England	4,598	4,762	59,533	8,047	−657	76,283
Wales	2,584	2,676	33,455	4,522	−369	42,868
Total	7,697	7,966	99,665	13,477	−1,112	127,693
1952–3						
Scotland	614	663	5,695	613	−12	7,573
England	4,705	5,161	44,170	4,705	−76	58,665
Wales	2,486	2,727	23,338	2,486	−40	30,997
Total	7,805	8,551	73,203	7,804	−128	97,235

NOTE: Net purchases are prefaced by a minus sign.

APPENDIX III

CROPS AND FEEDING STUFFS

THE value of crops sold, in relation to the acreage on each farm of crops and grass, in each hill and upland sample of the Farm Management Survey is shown in Table A. This has been multiplied by the area of crops and grass in each hill and upland area for which the samples are typical to obtain the total value of crops and grass sold. The total area of crops and grass on hill and livestock rearing farms in England and Wales was taken to be equal to the area of crops and grass given in the *National Farm Survey of England and Wales* (6) 1946, Type E (mainly rearing and sheep grazing) and for farms, Type X (land of small agricultural value). These totalled 1,410,000 acres. This area must be taken as the maximum area as some of the Type X land, "land of little agricultural value" is in the lowlands and may contain small areas of crops and grass. For Scotland, the area of crops and grass attached to hill and livestock rearing farms was assumed to be that attached to the following groups in the survey of *Types of Farming in Scotland* (5).

Hill Sheep Farms (Type 1)
Dairy with Hill Sheep Farms (Type 6)
Stock Rearing Farms (Types 2A and 2B)

A total of 711,000 acres.

The mean value of sales per acre for three sample groups of hill farms, i.e.

Predominantly Livestock Rearing, Poor Land, Wales.
Livestock Rearing with Dairying, Poor Land, Wales.
Upland Farms with Fell Grazing Rights, Northern England,

were applied to the area of crops and grass on English and Welsh hill farms on Type X land—land of small agricultural value. Similarly, the mean of the sales per acre of crops for the two sample groups "Predominantly Livestock Rearing, Better Land, Wales" and "Upland Farms without Fell Grazings, Northern England," were applied to the area of crops and grass on English and Welsh farms, Type E—mainly rearing and sheep grazing. In Scotland, the sales per acre for East Scotland hill and livestock rearing farms were applied to that area. For the rest of Scotland, the sales per acre for hill farms in the Western Scottish sample were used for hill farms and the sales of the Northern Scottish sample were used for livestock rearing farms.

The value of feeding stuffs purchased per cow and followers for each of the Farm Management Survey samples was calculated in the way set out in Table A.

The average for the two sample groups, "Predominantly Livestock Rearing, Poor Land and Better Land, Wales," was applied to the total number of beef cows on hill and livestock rearing farms in England and Wales. This gave an approximation of the total spent on purchased feeding stuffs. Sample figures for the East Scotland area were used for the Eastern Scottish hill and livestock rearing groups. Statistics from the Western Scottish hill sample were used for the Western and the Northern Scottish hill groups and the mean of the English, Welsh and East Scotland livestock rearing groups for all other livestock rearing farms in Scotland. As no estimates were available for the Western Scottish hill group for the year 1950–1, these were assumed to vary from the 1952–3 figure by the same proportion as did the 1950–1 figures from the 1952–3 figures in the Eastern Scottish group of hill farms. As no costs were available for Northern Scottish hill groups for 1950–1 and 1951–2, these were derived from the 1952–3 figure in the same way. The Northern Scottish livestock rearing group crop sales were used for these types of farms in Northern and Western Scotland; as no figures were available for 1950–1 and 1952–3 these were considered to vary from the 1952–3 figure as did Eastern Scottish

TABLE A

Crop Sales, Feed Purchases and Wintering Costs in Farm Management Survey Samples

Area	Crop sales			Feeding stuffs purchased			Wintering costs		
	Total crop sales £	Area crops and grass acres	Net crop sales per acre £	Total spent on feeding stuffs £	No. of cows	Cost of feeding per cow £	Total wintering cost £	Total ewes	Wintering cost per ewe £
1950–1									
Wales, Predominantly Livestock, Poor Land ..	1,810	4,337	0·4173	7,932	456	17·3947	2,313	12,245	0·1889
Wales, Livestock with Dairying, Poor Land ..	1,761	4,739	0·3716	16,763	760	22·0565	4,486	14,558	0·3082
Wales, Predominantly Livestock, Better Land, Non-Milk Selling	12,322	8,723	1·4125	6,055	1,093	5·5398	2,485	7,532	0·3299
East Scotland, Hill Farms	5,146	3,100	1·6600	8,246	434	19·000	4,247	30,380	0·1398
East Scotland, Livestock Rearing Farms	23,892	5,720	4·1769	10,120	550	18·400	No wintering		
West Scotland, Hill Farms	3,039	2,867	1·0600	Not available			Not available		
North Scotland, Livestock Rearing Farms	4,461	1,949	2·289	Not available			Not available		
England, Upland Farms with Fell Grazing	555	3,037	0·1827	19,074	641	29·756	490	4,611	0·1063
England, Upland Farms without Fell Grazing ..	352	930	0·3785	5,217	202	25·828	46	520	0·0885
1951–2									
Wales, Predominantly Livestock, Poor Land ..	1,285	4,333	0·2966	6,489	423	15·340	4,680	11,843	0·3952
Wales, Livestock with Dairying, Poor Land ..	1,116	4,794	0·2328	19,275	755	25·529	4,525	15,384	0·2941
Wales, Predominantly Livestock, Better Land, Non-Milk Selling	12,626	8,968	1·4079	6,788	1,103	6·1541	4,894	7,916	0·6182
East Scotland, Hill Farms	4,092	3,168	1·2917	11,055	462	23·9285	5,082	31,845	0·1596
East Scotland, Livestock Rearing Farms	24,096	6,696	3·5985	12,984	624	20·8076	No wintering		
West Scotland, Hill Farms	2,472	2,954	0·8368	12,241	471	25·9893	9,210	37,728	0·2441
North Scotland, Livestock Rearing Farms	3,752	1,706	2·199	Not available			Not available		
England, Upland Farms with Fell Grazing	667	3,157	0·2113	20,131	690	29·175	571	4,814	0·1187
England, Upland Farms without Fell Grazing ..	231	1,026	0·2251	6,319	229	27·593	66	528	0·125
1952–3									
Wales, Predominantly Livestock, Poor Land ..	1,233	4,883	0·2525	6,962	462	15·0692	3,807	14,900	0·2555
Wales, Livestock with Dairying, Poor Land ..	1,273	4,721	0·2696	17,356	791	21·9418	5,876	16,147	0·3639
Wales, Predominantly Livestock, Better Land, Non-Milk Selling	12,688	9,211	1·3775	5,019	1,078	4·6558	6,083	8,462	0·7189
East Scotland, Hill Farms	5,066	3,230	1·5684	9,044	544	16·6250	5,712	32,606	0·1752
East Scotland, Livestock Rearing Farms	30,264	6,648	4·5523	11,520	600	19·2000	No wintering		
West Scotland, Hill Farms	1,794	1,784	1·0057	5,280	251	21·0358	6,115	25,412	0·2406
North Scotland, Hill Farms	1,503	867	1·7336	Not available			Not available		
North Scotland, Upland Farms	4,164	1,788	2·3288	Not available			Not available		
England, Upland Farms with Fell Grazing	434	3,421	0·1268	22,743	710	32·032	434	5,332	0·0814
England, Upland Farms without Fell Grazing ..	261	1,131	0·2308	6,038	270	22·363	139	557	0·250

livestock rearing groups. In order to get an estimate on the dairy cow side, the net purchases of feeding stuffs per cow for the sample, "Livestock Rearing Farms with Dairying, Poor Land, Wales," were applied to all the total number of dairy cows being kept on hill and livestock rearing farms. The results of these calculations are shown in Table C.

The cost, per ewe, of wintering hill and upland sheep in the lowlands is shown in Table A for each of the Farm Management Survey sample farm groups. In England and Wales, the results of the Farm Management Survey samples were applied to the total ewes on each type of farm in each country, in the same way as in the calculation of total ewe numbers sold from the hills (see Appendix I). In Scotland, as none of the livestock rearing farms in the Eastern Scottish sample wintered their ewes elsewhere, it was assumed that the number of livestock rearing farms wintering ewe lambs in the lowlands in this area would be negligible and could be neglected. The Eastern Scottish hill group wintering figures were applied to the total ewes on hill farms in that area. The wintering costs per ewe for the West of Scotland sample of hill farms were applied to Western Scottish hill farms. As no figure was available for 1950–1, this was calculated by assuming it would vary from the 1952–3 figure by the same proportion as the 1950–1 figures varied from the 1952–3 figure for Eastern Scottish hill farms. No estimate is available of wintering costs on livestock rearing farms in North and Western Scotland. The mean figures for the other three groups of livestock rearing farms (English, Welsh and Eastern Scottish) were applied to these two areas (Table D). While this is not a very satisfactory system, any errors or over-estimation involved will not be sufficient to disprove the main argument stated in the main text, i.e. that the total cost of purchased feeding stuffs and wintering exceeds the value of crop sales on hill and upland farms.

TABLE B

Value of Crops and Grass Sold from Hill and Livestock Rearing Farms

Region	Area crop and grass	Value of crops and grass sold		
		1950–1	1951–2	1952–3
	acres	£	£	£
England and Wales Hill Farms	560,000	181,000	133,000	121,000
England and Wales Livestock Rearing Farms	850,000	763,000	693,000	683,000
East Scotland Hill Farms	30,000	50,000	39,000	47,000
East Scotland Livestock Rearing Farms ..	58,000	242,000	209,000	264,000
North and West Scotland Hill Farms ..	178,000	189,000	149,000	179,000
North and West Scotland Livestock Rearing Farms	444,000	1,016,000	976,000	1,033,632
Totals	2,120,000	2,441,000	2,199,000	2,327,632

TABLE C

Purchased Feeding Stuffs

	1950–1	1951–2	1952–3
	£	£	£
To beef cows			
England	200,789	197,757	195,928
Wales	251,134	266,496	260,954
East Scotland—Hill Farms	141,037	171,564	114,563
East Scotland—Livestock Rearing Farms	242,806	265,240	235,238
North and Western Scotland—Hill Farms	541,389	575,448	438,453
North and Western Scotland—Livestock Rearing Farms	1,074,401	1,158,892	899,650
To dairy cows			
Wales	1,414,308	1,178,081	879,772
England	2,295,953	2,096,395	1,665,092
Scotland	270,721	313,343	269,316
Total	6,432,538	6,223,216	4,958,966

TABLE D

Costs of Wintering Ewe Gimmers on Hill and Upland Farms

	1950–1	1951–2	1952–3
	£	£	£
England—Hill Farms	91,821	102,332	71,411
England—Livestock Rearing Farms	8,392	12,143	26,092
Wales—Hill Farms	263,239	360,221	320,364
Wales—Livestock Rearing Farms	41,629	81,352	100,423
East Scotland—Hill Farms	50,390	56,867	61,697
East Scotland—Livestock Rearing Farms		(No wintering)	
West Scotland—Hill Farms	186,344	236,635	228,960
West Scotland—Livestock Rearing Farms	30,231	53,828	68,880
North Scotland—Hill Farms	97,121	123,513	115,629
North Scotland—Livestock Rearing Farms	59,313	105,765	130,947
Total	828,480	1,132,656	1,124,403

APPENDIX IV

MONETARY VALUE

If the value of net sales per ewe for each Farm Management Survey sample of hill and livestock rearing farms is multiplied by the total number of ewes in each geographical area, the total value of sheep sold from that area is obtained. This estimation is set out in Tables A and B. A similar calculation is made in Tables A and C for the value of cattle produced by beef breeding cows and from dairy cows. The results of the same samples of farms have been applied to each geographical area, as in the calculations of livestock numbers described in Appendices I and II, except in the case of Northern Scottish hill farms where no results were available for 1950–1 and 1951–2. Western Scottish results were applied to these farms.

The value of milk produced in the hills and uplands was obtained by multiplying the quantity produced by the average price of milk in United Kingdom.* This calculation is shown in Table D.

The average price of wool is available for only three of the samples and is shown in Table E. These prices are very similar to each other in any one year. This justified the taking of an average of these prices and applying it to the whole "clip" produced by the hills and uplands. The results of these calculations are shown in Table F.

Miscellaneous Items

The total value of miscellaneous sales, valuation changes and of farm produce consumed by the farmer and his family for each of the Farm Management Survey samples is shown in Table G. In the same table these amounts are expressed as a percentage of the value of net sales of sheep for each sample.

The value of miscellaneous items, expressed as a percentage of net sales of sheep, was then multiplied by the total net sales of sheep of the area for which the sample was typical, to find the total value of miscellaneous output for that area (see Table H). When multiplying the total value of net sheep sales for each area by the percentage figure calculated from the Farm Management Survey samples, the mean of the two "Welsh Poor Land" groups was applied to the Welsh hill sheep figure. The Western Scottish hill farm sample figure was used for Western and Northern Scottish hill farms and the Northern Scottish livestock rearing farms sample figure was used for Northern and Western Scottish livestock rearing farms. All other sample percentages were applied directly to the region to which they are applicable.

A second calculation of the value of miscellaneous income was made by dividing the total for each sample by the area of crops and grass attached to that sample, so obtaining the miscellaneous income per acre of crops and grass. This calculation is carried out in Table G. The miscellaneous income, per acre of crops and grass, was then multiplied by the total area of crops and grass for which the sample is typical to obtain the total miscellaneous income of the hills and uplands. This calculation is carried out in Tables J and K.

* Note: The average price per gallon was calculated by dividing the total value of milk, from the "Departmental Calculation", by the total quantity of milk produced as stated in Agricultural Statistics (14), as follows:

Year	Total milk sold million gallons	Value of milk sold £ million	Price shillings per gallon
1950	1,883	299	3·1
			3·25
1951	1,790	302	3·4
			3·40
1952	1,816	313	3·4
			3·45
1953	1,937	340	3·5

TABLE A

Net Sales of Sheep and Cattle on Samples of Hill and Upland Farms

	Sheep					Cattle				
	Total ewes	Purchases	Sales	Value of net sales	Value of net sales per ewe	Total cows	Purchases	Sales	Value of net sales	Value of net sales per cow
		£	£	£	£		£	£	£	£
1950–1										
Wales, Predominantly Livestock, Poor Land	12,447	3,066	28,253	25,187	2·024	456	5,679	22,052	16,373	35·9
Wales, Livestock with Dairying, Poor Land	14,558	1,883	25,244	23,361	1·605	760	6,779	20,273	13,494	17·7
Wales, Predominantly Livestock, Better Land	7,532	11,421	51,213	39,792	5·283	859	20,081	52,595	32,514	37·85
Northern England, Upland Farms with Fell Grazing ..	4,611	3,482	18,306	14,824	3·215		Not	available		
Northern England, Upland Farms without Fell Grazing	520	811	3,016	2,205	4·238		Not	available		
East Scotland, Hill Farms ..	30,380	8,029	76,136	68,107	2·242	434	6,789	14,105	7,316	16·8
East Scotland, Livestock Rearing Farms	7,568	10,186	42,834	32,648	4·314	528	5,742	19,690	13,948	26·4
West Scotland, Hill Farms ..	37,415	12,144	78,628	66,484	1·777	455	3,115	13,954	10,839	23·8
Northern Scotland, Livestock Rearing Farms	4,921	2,198	11,854	9,656	1·962	197	2,626	8,372	5,746	29·2
1951–2										
Wales, Predominantly Livestock, Poor Land	11,842	5,039	30,205	25,166	2·125	423	7,315	23,478	16,163	38·2
Wales, Livestock with Dairying, Poor Land	15,384	3,440	28,295	24,855	1·616	755	9,282	20,181	10,899	14·4
Wales Predominantly Livestock, Better Land	7,916	10,384	52,769	42,385	5·354	846	22,750	60,038	37,288	44·076
Northern England, Upland Farms with Fell Grazing ..	4,814	3,593	20,064	16,471	3·421		Not	available		
Northern England, Upland Farms without Fell Grazing	527	1,452	3,311	1,859	3·521		Not	available		
East Scotland, Hill Farms ..	31,845	9,669	60,786	51,117	1·605	462	5,412	16,962	11,550	25·0
East Scotland, Livestock Rearing Farms	8,856	15,600	52,272	36,672	4·141	624	7,248	24,120	16,872	27·0
West Scotland, Hill Farms ..	37,728	12,260	66,458	54,198	1·436	471	6,958	16,140	9,182	19·5
Northern Scotland, Livestock Rearing Farms	4,540	2,036	9,592	7,556	1·664	227	1,570	7,827	6,257	27·6

TABLE A—*continued*

	Sheep					Cattle				
	Total ewes	Purchases	Sales	Value of net sales	Value of net sales per ewe	Total cows	Purchases	Sales	Value of net sales	Value of net sales per cow
1952–3										
Wales, Predominantly Livestock, Poor Land	14,900	6,359	40,395	34,036	2·284	462	10,849	29,448	18,599	40·3
Wales, Livestock with Dairying, Poor Land	16,147	3,078	33,995	30,917	1·915	792	7,735	20,828	13,093	16·5
Wales, Predominantly Livestock, Better Land ..	8,462	9,717	60,600	50,883	6·013	895	26,423	69,335	42,912	47·95
Northern England, Upland Farms with Fell Grazing ..	5,332	4,414	20,419	16,005	3·002		Not	available		
Northern England, Upland Farms without Fell Grazing	556	1,775	3,473	1,698	3·054		Not	available		
East Scotland, Hill Farms ..	32,606	8,500	87,312	78,812	2·417	544	7,854	17,102	9,248	17·0
East Scotland, Livestock Rearing Farms	9,120	12,624	57,360	44,736	4·905	600	10,176	26,688	16,512	27·5
West Scotland, Hill Farms ..	25,412	6,302	41,481	35,179	1·384	251	3,815	8,734	4,919	19·6
Northern Scotland, Hill Farms	9,392	1,590	20,947	19,357	2·061	120	764	3,097	2,333	19·4
Northern Scotland, Livestock Rearing Farms	2,723	2,196	10,604	8,408	3·087	213	2,190	11,658	9,468	44·5

TABLE B

The Value of Sheep sold from Hill and Upland Farms

Geographical area	Value of net sales per ewe	Number of ewes	Total value of net sales
	£		£
Hill Farms			
1950–1			
England	3·215	1,059,315	3,405,698
Wales	1·814	863,797	1,566,928
East Scotland	2·242	360,442	808,110
West Scotland	1·777	968,023	1,720,177
North Scotland	1·319	504,529	665,473
Total			8,166,386
1951–2			
England	3·421	1,045,332	3,576,081
Wales	1·870	862,112	1,612,149
East Scotland	1·605	356,311	571,879
West Scotland	1·436	969,419	1,392,086
North Scotland	1·113	505,994	563,171
Total			7,715,366
1952–3			
England	3·002	1,034,435	3,105,374
Wales	2·099	877,289	1,841,430
East Scotland	2·417	352,150	851,147
West Scotland	1·384	951,623	1,317,046
North Scotland	2·061	480,586	990,487
Total			8,105,484
Livestock rearing farms			
1950–1			
England	4·238	126,187	534,780
Wales	5·283	95,149	502,672
East Scotland	4·314	120,147	518,314
West Scotland	1·962	144,647	283,797
North Scotland	1·962	283,797	556,810
Total			2,396,373
1951–2			
England	3·521	131,596	463,349
Wales	5·354	97,149	520,136
East Scotland	4·141	118,770	491,827
West Scotland	1·664	144,856	241,040
North Scotland	1·664	284,622	473,611
Total			2,189,963
1952–3			
England	3·054	139,690	426,613
Wales	6·013	104,370	627,577
East Scotland	4·905	117,383	575,636
West Scotland	3·087	142,197	438,962
North Scotland	3·087	270,329	834,506
Total			2,903,294

TABLE C

The Value of Cattle produced on Hill and Upland Farms

	Value of net sales per cow	Number of cows	Total value of net cow sales
	£		£
Beef cows			
1950–1			
England	38·9	12,735	495,391
Wales	38·9	15,787	614,114
East Scotland—Hill Farms	16·8	7,423	124,706
East Scotland—Livestock Rearing Farms	26·4	13,196	348,374
North and Western Scotland—Hill Farms	23·8	22,572	537,214
North and Western Scotland—Livestock Rearing Farms	29·2	64,762	1,891,050
Total			4,010,849
1951–2			
England	41·1	13,038	535,862
Wales	41·1	14,996	616,335
East Scotland—Hill Farms	25·0	7,170	179,250
East Scotland—Livestock Rearing Farms	27·0	12,747	344,169
North and Western Scotland—Hill Farms	19·5	22,142	431,769
North and Western Scotland—Livestock Rearing Farms	27·6	63,777	1,760,245
Total			3,867,630
1952–3			
England	44·1	14,098	621,722
Wales	44·1	16,407	723,549
East Scotland—Hill Farms	17·0	6,891	117,147
East Scotland—Livestock Rearing Farms	27·5	12,252	336,930
Western Scotland—Hill Farms	19·6	20,843	408,523
North and Western Scotland—Livestock Rearing Farms	44·5	58,362	2,597,109
Total			4,804,980
Dairy cows			
1950–1			
England	17·7	52,367	926,896
Wales		32,258	570,967
Scotland		12,274	217,250
Total		96,899	1,715,113
1951–2			
England	14·4	52,553	756,763
Wales		29,533	425,275
Scotland		12,274	176,746
Total		94,360	1,358,784
1952–3			
England	16·5	48,572	801,438
Wales		25,663	423,439
Scotland		12,274	202,521
Total		86,509	1,427,398

TABLE D

Value of Milk sold from the Hills and Uplands

	Area	Gallons sold	Price per gallon	Value of milk sold
			shillings	£
1950–1	England	26,183,500	3·25	4,254,818
	Wales	15,258,034	3·25	2,479,430
	Scotland	6,137,000	3·25	997,262
	Total			7,731,510
1951–2	England	26,276,500	3·40	4,467,005
	Wales	13,369,105	3·40	2,227,748
	Scotland	6,137,000	3·40	1,043,290
	Total			7,738,043
1952–3	England	24,286,000	3·45	4,189,335
	Wales	12,138,599	3·45	2,093,908
	Scotland	6,137,000	3·45	1,058,632
	Total			7,341,875

TABLE E

Average Price of Wool in Sample Areas

Area	1950–1 per lb.	1951–2 per lb.	1952–3 per lb.
East Scotland—Hill	28·5	73·0	56
East Scotland—Livestock Rearing ..	31·0	79·0	58
England—Hill	25·0	65·0	53
England—Upland	25·0	68·0	53
West Scotland—Hill	—	73·0	56

TABLE F

Value of Wool produced by the Hills and Uplands

Year	Total weight of wool lb.	Price per lb.	Value £
1950–1	21,991,321	27	2,474,024
1951–2	21,109,462	75	6,596,706
1952–3	21,293,046	56	4,968,377

TABLE G

Miscellaneous Incomes as a Percentage of the Value of Net Sales of Sheep for the various Farm Management Survey Samples

Farm Management Survey Sample	1950–1			1951–2			1952–3		
	Value of net sheep sales	Miscellaneous income	Miscellaneous income as % net sheep sales	Value of net sheep sales	Miscellaneous income	Miscellaneous income as % net sheep sales	Value of net sheep sales	Miscellaneous income	Miscellaneous income as % net sheep sales
	£	£	%	£	£	%	£	£	%
Wales, Predominantly Livestock Rearing, Poor Land	25,187	10,463	41·5	25,166	15,112	60·0	34,036	21,619	63·5
Wales, Livestock with Dairying, Poor Land	23,361	15,993	68·4	24,855	25,120	101·1	30,917	24,143	78·1
Wales, Predominantly Livestock, Better Land	45,506	26,067	57·3	57,112	36,628	64·1	64,233	40,182	62·6
East Scotland, Hill Farms ..	68,107	6,324	9·3	51,117	10,824	21·2	78,812	19,312	24·5
East Scotland, Livestock Rearing Farms	32,648	11,352	34·8	36,672	20,496	55·9	44,736	28,752	64·2
West Scotland, Hill Farms ..	66,484	3,326	5·0	54,195	6,706	12·4	35,179	11,637	33·1
North Scotland, Livestock Rearing Farms	9,656	−1,801	−18·7	7,556	12,248	162·1	8,408	11,898	141·5
North England, Upland Farms (with Fell Grazing) ..	14,824	11,202	75·5	16,471	4,670	28·3	16,005	12,339	77·1
North England, Upland Farms (without Fell Grazing) ..	2,205	1,697	77·0	1,859	2,310	124·2	1,698	6,342	373·5
North Scotland, Hill Farms ..		Not available			Not available		19,357	8,164	42·2

TABLE H

Total Value of Miscellaneous Sales from British Hill and Livestock Rearing Farms

Region	1950–1			1951–2			1952–3		
	Value of net sheep sales	Miscellaneous incomes as % net sheep sales	Value of miscellaneous income	Value of net sheep sales	Miscellaneous incomes as % net sheep sales	Value of miscellaneous income	Value of net sheep sales	Miscellaneous incomes as % net sheep sales	Value of miscellaneous income
	£	%	£	£	%	£	£	%	£
Hill Farms									
England	3,405,698	75·5	2,571,302	3,576,081	28·3	1,012,031	3,105,374	77·1	2,394,243
Wales	1,566,928	54·9	860,243	1,612,149	80·5	1,297,799	1,841,430	70·8	1,303,732
East Scotland ..	808,110	9·3	75,154	571,879	21·2	121,238	851,147	24·5	208,531
North Scotland ..	665,473	15·1	100,486	563,171	37·5	211,189	990,487	42·2	417,985
West Scotland ..	1,720,177	5·0	86,008	1,392,086	12·4	172,618	1,317,046	33·1	435,942
Livestock Rearing Farms									
England	534,780	77·0	411,780	463,349	124·2	575,479	425,915	373·5	1,590,792
Wales	502,672	57·3	288,031	520,136	64·1	333,407	627,577	62·6	392,863
East Scotland ..	518,314	34·8	180,373	491,827	55·9	274,931	581,046	64·2	373,031
North and West Scotland	840,607	−18·7	−157,193	714,651	162·1	1,158,449	1,273,468	141·5	1,801,957
Total ..			4,416,184			5,157,141			8,919,076

TABLE J

Miscellaneous Income per Acre of Crops and Grass for Farm Management Survey Samples of Hill Sheep and Livestock Rearing Farms

Farm Management Survey Sample Group	1950–1			1951–2			1952–3		
	Total miscellaneous income	Area of crops and grass	Miscellaneous income per acre crops and grass	Total miscellaneous income	Area of crops and grass	Miscellaneous income per acre crops and grass	Total miscellaneous income	Area of crops and grass	Miscellaneous income per acre crops and grass
	£	acres	£	£	acres	£	£	acres	£
Predominantly Livestock Rearing, Poor Land, Wales	10,463	4,337	2·41	15,112	4,333	3·49	21,619	4,883	4·43
Livestock Rearing with Dairying, Poor Land, Wales	15,993	4,739	3·37	25,120	4,794	5·24	24,143	4,721	5·11
Predominantly Livestock Rearing, Better Land, Wales	26,067	8,723	2·99	36,628	8,968	4·08	40,182	9,211	4·36
Northern England Upland Farms (with fell grazing)	11,202	3,037	3·69	4,670	3,157	1·48	12,339	3,427	3·60
Northern England Upland Farms (without fell grazing)	1,697	921	1·84	2,310	1,023	2·26	6,342	1,131	5·61
East of Scotland Hill Farms	6,324	3,100	2·04	10,824	3,168	3·42	19,312	3,230	5·98
East of Scotland Livestock Rearing Farms	11,352	5,720	1·98	20,496	6,696	3·06	28,752	6,448	4·46
West of Scotland Hill Farms	3,326	2,867	1·16	6,706	2,954	2·27	11,637	1,784	6·52
North of Scotland Livestock Rearing Farms	−1,801	1,941	−0·93	12,248	1,706	7·18	11,898	1,788	6·65

TABLE K

Miscellaneous Income of the British Hills and Uplands

Region	Farm Management Survey Sample used	Area crops and grass	1950–1		1951–2		1952–3	
			Rate per acre	Total miscellaneous income	Rate per acre	Total miscellaneous income	Rate per acre	Total miscellaneous income
		acres	£	£	£	£	£	£
England and Wales Hill Farms	The mean of "Wales Predominantly Livestock Rearing, Poor Land", "Wales Livestock Rearing with Dairying, Poor Land" and Northern England Upland Farms (with fell grazing) ..	560,000	3·160	1,769,600	3·400	1,904,000	5·170	2,895,200
England and Wales Livestock Rearing Farms	The mean of "Wales Predominantly Livestock Rearing Farms, Better Land" and Northern England Upland Farms (without fell grazing)	850,000	2·420	2,057,000	3·170	2,694,500	4·980	4,233,000
East Scotland Hill Farms	Eastern Scotland Hill Farms	30,000	2·040	61,200	3·420	102,600	5·980	179,400
East Scotland Livestock Rearing Farms	Eastern Scotland Livestock Rearing Farms ..	58,000	1·980	114,840	3·060	177,480	4·460	258,680
North and West Scotland Hill Farms	West Scotland Hill Farms	178,000	1·160	206,480	2·270	404,060	6·520	1,160,560
North and West Scotland Livestock Rearing Farms	North of Scotland Livestock Rearing Farms ..	444,000	—0·930	—412,920	7·180	3,187,920	6·650	2,952,600
	Total			3,796,200		8,470,560		11,679,440

APPENDIX V

COSTS OF PRODUCTION

1. Costs related to the Area of Crops and Grass

In each of the Farm Management Survey samples, the costs relating to seeds, fertilizer, rent, machinery and miscellaneous expenses were divided by the area of crops and grass in the sample to obtain the expenses per acre of crops and grass (Table A). These unit area costs were then multiplied by the total area of crops and grass for which the sample is typical to obtain the total expense of each item in each particular area (Table B). The acreages used in this calculation were the same as those used in the calculation of crop production and the method of deriving them is described in Appendix III.

2. Labour Costs

Two methods have been used to obtain the cost of labour on farms in the hills and uplands.

(*a*) *Method based on the Area of Crops and Grass*

This is the same method as that used in calculating rent, fertilizer and seed costs. The labour costs for each Farm Management Survey sample, expressed per acre of crops and grass, are shown in Table C. These were then multiplied by the area of crops and grass for which the sample is typical to obtain the total labour costs for each region (Table D).

(*b*) *Method based on the Total Number of Workers in the Area*

The total workers on hill and livestock rearing farms must first be divided into classes, i.e. men over twenty-one years of age, youths and boys, women and girls. In doing this, it was necessary to assume that the proportion of each type, on all hill and livestock rearing farms, was the same as in the sample, "Predominantly Livestock Rearing Farms, Poor Land—Wales". Regular hired labour and family labour are both divided in this way in Table E. The numbers of workers in each class were then multiplied by the existing wage rates, to obtain the total cost of labour.

3. Costs of Labour of Farmers and Farmers' Wives

The number of farmers in the hills and uplands can be calculated from the *National Farm Survey of England and Wales* (19) and *Types of Farming in Scotland* (20). These are as follows:

Full-Time Farmers	..	31,683
Part-Time Farmers	..	8,320

If it is assumed that part-time farmers spend half their time working on their farms and farmers' wives one-quarter of their time, the following number of effective workers is obtained:

Effective Farmers on (*a*) full-time farms=31,683
(*b*) part-time farms= 4,160
Effective Farmers' Wives on (*a*) full-time farms=7,921
(*b*) part-time farms=2,080

If to these numbers are attached the minimum agricultural wage rates for the years studied, the cost of the manual work of farmers and their wives is obtained. This calculation is set out in Table F.

For comparative purposes the value of work done by lowland farmers and their wives is also needed. If it is assumed that lowland farms of less than 5 acres are part-time

TABLE A

Costs per Acre of Crops and Grass

Farm Management Survey Sample	Seeds £	Fertilizer £	Rent £	Machinery £	Miscellaneous £
1950–1					
Predominantly Livestock Rearing, Poor Land, Wales	0·5137	0·7238	1·1298	1·8773	2·0768
Livestock Rearing with Dairying, Poor Land, Wales	0·5432	0·8384	1·1344	2·4792	2·7896
Predominantly Livestock Rearing, Better Land, Wales	0·5808	0·9504	1·2038	1·5839	2·1330
Northern England Upland Farms (with fell grazing rights)	0·3322	0·9802	1·6615	3·6052	1·2792
Northern England Upland Farms (without fell grazing rights)	0·2957	0·8709	1·4473	3·1419	0·7397
Eastern Scotland Hill Farms	0·9100	3·4400	3·3820	6·8300	4·4000
Eastern Scotland Livestock Rearing Farms	0·7500	1·6692	0·9346	4·1423	1·6808
Western Scotland Hill Farms	0·7175	1·7018	3·5048	7·0048	4·5867
Northern Scotland Livestock Rearing Farms	0·9917	2·2109	1·0554	1·0954	3·8153
1951–2					
Predominantly Livestock Rearing, Poor Land, Wales	0·5968	0·8375	1·2086	1·7332	2·3351
Livestock Rearing with Dairying, Poor Land, Wales	0·5811	0·9151	1·1727	2·2714	3·0749
Predominantly Livestock Rearing, Better Land, Wales	0·6527	1·0421	1·2316	1·9578	2·6316
Northern England Upland Farms (with fell grazing rights)	0·3576	1·2195	1·6259	3·8860	1·4957
Northern England Upland Farms (without fell grazing rights)	0·4016	1·0127	1·3830	2·9591	0·8041
Eastern Scotland Hill Farms	0·9062	2·8750	3·5000	5·0313	4·5417
Eastern Scotland Livestock Rearing Farms	0·8888	2·3799	0·9391	3·8530	1·8637
Western Scotland Hill Farms	0·7370	2·3317	3·1821	9·1290	4·9397
Northern Scotland Livestock Rearing Farms	1·1957	2·6624	1·0856	2·0656	3·9637
1952–3					
Predominantly Livestock Rearing, Poor Land, Wales	0·5398	0·8871	1·2062	1·3567	2·5963
Livestock Rearing with Dairying, Poor Land, Wales	0·5628	1·0076	1·2614	2·3321	3·3866
Predominantly Livestock Rearing, Better Land, Wales	0·5808	0·9365	1·2808	0·3674	2·5249
Northern England Upland Farms (with fell grazing rights)	0·2742	0·8386	1·6129	3·7421	1·5644
Northern England Upland Farms (without fell grazing rights)	0·2767	0·6923	1·3696	3·2458	0·9531
Eastern Scotland Hill Farms	0·9263	3·2737	3·5368	7·2526	5·1894
Eastern Scotland Livestock Rearing Farms	0·7870	2·3176	1·0072	3·8339	2·1010
Western Scotland Hill Farms	0·6171	1·8072	2·9210	7·2606	5·7988
Northern Scotland Livestock Rearing Farms	1·1627	2·7075	0·9217	1·7701	4·4038

TABLE B

Total Costs of Various Items in Hill and Livestock Rearing Regions

Region	Farm Management Survey Sample costs per acre crops and grass used	Area crops and grass	Total costs per region				
			Seeds	Fertilizer	Rent	Machinery	Miscellaneous
		'000 acres	£	£	£	£	£
1950–1							
England and Wales Hill Farms	The mean of "Predominantly Livestock Rearing, Poor Land, Wales", "Livestock Rearing, Poor Land with Dairying Wales" and Northern England Upland Farms (with fell rights) ..	560	259,280	474,600	732,816	1,486,184	1,147,216
England and Wales Livestock Rearing Farms	The mean of "Predominantly Livestock Rearing, Better Land, Wales" and Northern England Upland Farms (without fell rights)	850	372,470	774,180	1,126,760	2,008,465	1,220,855
East Scotland Hill Farms ..	East Scotland Hill Farms	30	27,300	103,200	101,400	204,900	132,000
East Scotland Livestock Rearing Farms	East Scotland Livestock Rearing Farms	58	43,500	96,814	54,207	240,253	97,486
North and West Scotland Hill Farms	West of Scotland Hill Farms ..	178	127,715	302,920	623,854	1,246,854	816,433
North and West Scotland Livestock Rearing Farms	North of Scotland Livestock Rearing Farms	444	440,315	981,640	468,598	486,358	1,693,993
	Total		1,270,580	2,733,354	3,107,635	5,673,014	5,107,983
1951–2							
England and Wales Hill Farms		560	286,608	554,792	747,992	1,472,912	1,289,064
England and Wales Livestock Rearing Farms		850	448,120	873,290	1,111,205	2,089,640	1,460,215
East Scotland Hill Farms ..		30	27,186	86,250	105,000	150,939	136,251
East Scotland Livestock Rearing Farms	As above	58	51,550	138,034	54,468	223,474	108,095
North and West Scotland Hill Farms		178	131,186	415,043	566,414	1,624,962	879,267
North and West Scotland Livestock Rearing Farms		444	530,891	1,182,106	482,006	917,176	1,759,883
	Total		1,475,541	3,249,515	3,067,085	6,479,103	5,632,775
1952–3							
England and Wales Hill Farms		560	256,984	510,216	761,712	1,387,120	1,408,848
England and Wales Livestock Rearing Farms		850	364,480	692,240	1,126,165	1,535,780	1,478,405
East of Scotland Hill Farms ..		30	27,789	98,211	106,104	217,578	155,682
East of Scotland Livestock Rearing Farms	As above	58	45,646	134,421	58,418	222,366	121,858
North and West Scotland Hill Farms		178	109,844	321,682	519,938	1,292,387	1,032,186
North and West Scotland Livestock Rearing Farms		444	516,239	1,202,130	409,235	785,924	1,955,287
	Total		1,320,982	2,958,900	2,981,572	5,441,155	6,152,266

TABLE C

Labour Costs, per Acre of Crops and Grass, on Farm Management Survey Samples

Farm type group	1950–1			1951–2			1952–3		
	Total labour cost	Area of crops and grass	Cost of labour per acre of crops and grass	Total labour cost	Area of crops and grass	Cost of labour per acre of crops and grass	Total labour cost	Area of crops and grass	Cost of labour per acre of crops and grass
	£	acres	£	£	acres	£	£	acres	£
Predominantly Livestock Rearing, Poor Land, Wales	17,092	4,337	3·9410	17,902	4,333	4·1316	21,566	4,883	4·4165
Livestock Rearing with Dairying, Poor Land, Wales	22,543	4,739	4·7569	23,834	4,794	4·9717	26,172	4,721	5·5437
Predominantly Livestock Rearing, Better Land, Wales	28,922	8,723	3·3156	32,284	8,968	3·5999	34,613	9,211	3·7577
Northern England Upland Farms (with fell grazing rights)	14,129	3,037	4·6522	14,629	3,157	4·6338	15,009	3,421	4·3873
Northern England Upland Farms (without fell grazing rights)	2,861	930	3·0763	3,333	1,026	3·2485	3,915	1,131	3·4616
East of Scotland, Hill Farms	39,804	3,100	12·840	46,365	3,168	14·6354	50,490	3,230	15·6315
East of Scotland, Livestock Rearing Farms	29,216	5,720	5·1077	35,496	6,696	5·3011	38,016	6,648	5·7184
West of Scotland, Hill Farms	32,580	2,867	11·3637	33,112	2,954	11·2092	20,629	1,784	11·5633
North of Scotland Livestock Rearing Farms	9,719	1,949	4·9866	7,676	1,706	4·4994	7,902	1,788	4·4194

farms, the total number of lowland farms of each type can be obtained by deducting the number of hill and upland farms from the total number of farms in the United Kingdom (Table G).

If the same assumptions are made relating to the time spent by farmers and their wives as was made for hill and upland farms, the numbers of effective farmers and wives on lowland farms can be calculated and by use of the minimum agricultural wage for the three years studied, the value of work done on the farm is obtained (Table H).

TABLE D

Total Labour Costs on Hill and Livestock Rearing Farms

Area	1950–1 £	1951–2 £	1952–3 £
England and Wales Hill Farms	2,492,000	2,564,240	2,678,000
England and Wales Livestock Rearing Farms	2,716,515	2,910,570	3,068,160
East Scotland Hill Farms	385,200	439,062	468,945
East Scotland Livestock Rearing Farms ..	296,246	307,481	331,667
North and West Scotland Hill Farms ..	2,022,738	1,995,238	2,058,267
North and West Scotland Livestock Rearing Farms	2,214,139	1,997,733	1,962,213
Total	10,126,838	10,214,324	10,567,252

TABLE F

Value of Work done by Farmers and Wives on Hill and Upland Farms

Effective workers	Minimum annual wage rate—Full time			Total value of farmers' and farmers' wives' labour		
	1950–1	1951–2	1952–3	1950–1	1951–2	1952–3
	£	£	£	£'000	£'000	£'000
Farmers						
Full-time farms ..	260·0	280·8	293·8	8,238	8,897	9,309
Part-time farms ..	,,	,,	,,	1,081	1,168	1,222
Wives						
Full-time farms ..	197·6	213·2	223·6	1,565	1,689	1,771
Part-time farms ..	,,	,,	,,	411	443	465
Total ..				11,295	12,197	12,767

TABLE E

Labour Costs as measured from the Number of Farm Workers

Hill and livestock Rearing Farms in—	Number of workers	Type of worker	Classes of workers	Percentage of each class	Number of each class	Minimum wage rates 1950–1	Minimum wage rates 1951–2	Minimum wage rates 1952–3	Total cost of farm labour 1950–1	Total cost of farm labour 1951–2	Total cost of farm labour 1952–3
						£	£	£	£	£	£
Scotland	10,015	Regular hired	Men over 21 ..	59·6	5,969	260·0	280·8	293·8	1,551,940	1,676,095	1,753,692
			Youths and boys	23·1	2,313	187·2	202·8	213·2	432,994	469,076	493,132
			Women and girls	17·3	1,733	197·6	213·2	223·6	342,441	369,476	387,499
			Total ..	100·0	10,015				2,327,375	2,514,647	2,634,323
	4,137	Family labour	Men over 21 ..	51·3	2,122	260·0	280·8	293·8	551,720	595,858	623,444
			Youths and boys	14·0	579	187·2	202·8	213·2	108,388	117,421	123,443
			Women and girls	34·7	1,436	197·6	213·2	223·6	283,754	306,155	321,089
			Total ..	100·0	4,137				943,862	1,019,434	1,067,976
	2,685	Casual labour			2,685	65·0	70·2	73·4	174,525	188,487	197,079
Total									3,445,762	3,722,568	3,899,378
England and Wales	18,600	Regular hired	Men over 21 ..	59·6	11,086	260·0	280·8	293·8	2,882,360	3,112,948	3,257,067
			Youths and boys	23·1	4,297	187·2	202·8	213·2	804,398	871,432	916,120
			Women and girls	17·3	3,217	197·6	213·2	223·6	635,679	685,864	719,321
			Total ..	100·0	18,600				4,322,437	4,670,244	4,892,508
	7,594	Family labour	Men over 21 ..	51·3	3,896	260·0	280·8	293·8	1,012,960	1,093,997	1,144,644
			Youths and boys	14·0	1,063	187·2	202·8	213·2	198,994	215,576	226,632
			Women and girls	34·7	2,635	197·6	213·2	223·6	520,676	561,782	589,186
			Total ..	100·0	7,594				1,732,630	1,871,355	1,960,462
	4,997	Casual labour			4,997	65·0	70·2	73·4	324,805	350,789	366,780
Total									6,379,872	6,892,388	7,219,750
Great Britain ..									9,825,634	10,614,956	11,119,128

TABLE G

Numbers of "Lowland" Farms

	Full time			Part time		
	1950–1	1951–2	1952–3	1950–1	1951–2	1952–3
Number of farms in the United Kingdom	425,199	424,024	421,935	110,459	113,156	112,989
Number of farms in British hills and uplands	31,683	31,683	31,683	8,320	8,320	8,320
Number of lowland farms	393,516	392,341	390,252	102,139	104,836	104,669

TABLE H

Value of Work done by Farmers and their Wives on "Lowland" Farms

Number of effective workers (full time)	Minimum annual wage rate			Total value of farmers and wives		
	1950–1	1951–2	1952–3	1950–1	1951–2	1952–3
	£	£	£	£'000	£'000	£'000
Farmers 444,585 ..	260·0	280·8	293·8	115,592	124,888	130,031
Wives 123,913 ..	187·2	202·8	213·2	23,197	25,207	26,378
Total	—	—	—	138,789	150,095	156,409

APPENDIX VI

COSTS AND REVENUE OF CROFTS IN SCOTLAND

PART of the revenue of these crofts, that from sheep, cattle, wool and milk, has been jointly calculated with the rest of the gross output of the hills and uplands. Other items, however, have not been accounted for but it is possible to estimate them from the results of a survey of a sample of crofts made by the North of Scotland College of Agriculture (23). The survey covers the year 1953–4 and the period studied in this report ends in 1952–3. As the difference between the two years cannot be very great, and as the production and costs from the crofts additional to those already calculated is small when compared with the total production and costs of the hills and uplands, it was decided to incorporate an estimation of croft costs and production based on this sample with the total output of the hills and uplands for 1952–3. The additional costs and output for 1950–1 and 1951–2 were assumed to vary from this figure in the same proportion as the costs and output of the rest of the hills and uplands.

The value of croft production, not already accounted for, is set out in Table A, and these values can be expressed per acre of crops and grass.

The actual number of crofts in the hills of Scotland is not completely clear, but the publication *Types of Farming in Scotland* (21) lists 8,320 part-time farms in the Highlands which could generally be described as crofts. These have a total area of crops and grass of 83,200 acres. If the output of crofts, per acre of crops and grass, is multiplied by this figure, a rough total of the unaccounted items of production on crofts is obtained.

The total net sales of £2,333 were produced from 120·5 acres of crops and grass. The total area of crops and grass attached to crofts is 83,200 acres and thus the total production of these items amounts to £1,610,752.

The value of sheep, wool and cattle from crofts can be calculated in the same manner as that used in the general calculation, i.e. by expressing the value of these items per cow and per ewe and multiplying by the total number of ewes and cows attached to the crofts (Table B).

The gross output of Scottish crofts can now be stated:

Gross output of crofts:	Sheep	£557,232
	Wool	£242,736
	Cattle	£512,978
	Other	£1,610,752
	Subsidies	£811,949
	Total	£3,735,647

The direct subsidies received by all crofts were: £1,176 or £9·759 per acre of crops and grass; a total of £811,949 for all crofts. This has been included in gross output.

CROFTING COSTS

These have been calculated in two parts. The total cost of bought-in feeding stuffs was obtained by estimating the money spent on feeding stuffs per cow for the whole sample and multiplying this by the number of cows in the sample (Table C). Other crofting expenses were calculated on the basis of area of crops and grass in Table D.

Total crofting expenses were then the sum of miscellaneous expenses and expenses on animal feeding stuffs, i.e. £2,063,493.

TABLE A

Value of Net Sales of Crofts in the Northern Scottish Sample

Item	Sales £	Purchases £	Net sales £
Pigs	780	293	487
Horses	39	—	39
Poultry	1,037	59	978
Crops	251	—	251
Miscellaneous	576	—	576
Valuation increase	—	—	2
Total			2,333

TABLE B

Sheep and Cattle Production on Scottish Crofts Sample

	Sales	Purchases	Net sales	Total cows or ewes in sample	Net sales per ewe or cow	Ewes or cows on all crofts	Total value of production
	£	£	£		£		£
Sheep ..	1,172	20	1,152	430 ewes	2·679	208,000 ewes	557,232
Wool ..	502	—	502	430 ewes	1·167	208,000 ewes	242,736
Cattle ..	1,328	249	1,079	35 cows	30·828	16,640 cows	512,978

TABLE C

Cost of Purchased Feeding Stuffs on Crofts Sample

Total spent on feeding stuffs	£1,170
Number of cows in sample	35
Expenditure per cow on feeding stuffs	£33·428
Number of cows on crofts	16,640
Total spent by crofts on feeding stuffs	£556,242

TABLE D

Miscellaneous Expenses of Crofts

Total miscellaneous expenses of the sample	£2,183
Area of crops and grass	120·5
Expenses per acre of crops and grass	£18·116
Total area of crops and grass attached to crofts ..	83,200 acres
Total miscellaneous expenses of crofts	£1,507,251

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(3) Ref. (2), p. 5.

(4) Livestock Rearing Act 1951, H.M.S.O., 1951, p. 3.

(5) Department of Agriculture for Scotland, "Types of Farming in Scotland", H.M.S.O., 1952, Appendix A, Tables 40, 41 and 42 (pp. 75-77 and 81).

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(7) Stamp, L. D., "Man and the Land", Collins, 1955, p. 247.

(8) Calculations were made from the following "Farm Management Survey" samples:

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Samples used—
Wales, Livestock with Dairying, Poor Land.
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Wales, Predominantly Livestock, Better Land.

(*b*) D. H. Dinsdale, 1950–1, and E. U. Carpenter, 1951–2 and 1952–3, Farm Management Survey Report, University of Durham, Farm Economics Branch.
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(9) Numbers of sheep and cattle on which hill sheep and hill cattle subsidies were paid were supplied by the Ministry of Agriculture, Fisheries and Food and by the Scottish Ministry of Agriculture.

(10) Ref. (5), pp. 75-77.

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(12) Hunt, K. E., "Statistical Appendix to the State of British Agriculture", University of Oxford Institute of Research in Agricultural Economics, 1953–4, Tables 59, 49, 46 and 22.

(13) Clark, K. R., and Hunt, K. E., "Food and Agriculture Notes and Statistics", *The Farm Economist*, Vol. VII, No. 7, 1954, p. 321, Table 3.

(14) General Statistical Office, "Annual Abstract of Statistics, 1954", Table 200, p. 170 and Table 166, p. 141.

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(19) Ref. (6), pp. 86-87, Table G.

(20) Ref. (5), p. 22, Table 13.

(21) Ref. (5), Appendix A, Table 51 (p. 87).

(22) Hunt, K. E., Ref. (11), Table 13.

(23) Grant, A., "Hill Farming and Crofting in the North of Scotland, 1953–4", Economic Report No. 44, North of Scotland College of Agriculture, Agricultural Economics Department.

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