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*Some Economic Aspects of the
Beef Cattle Industry
in the West of England*

Report No. 2

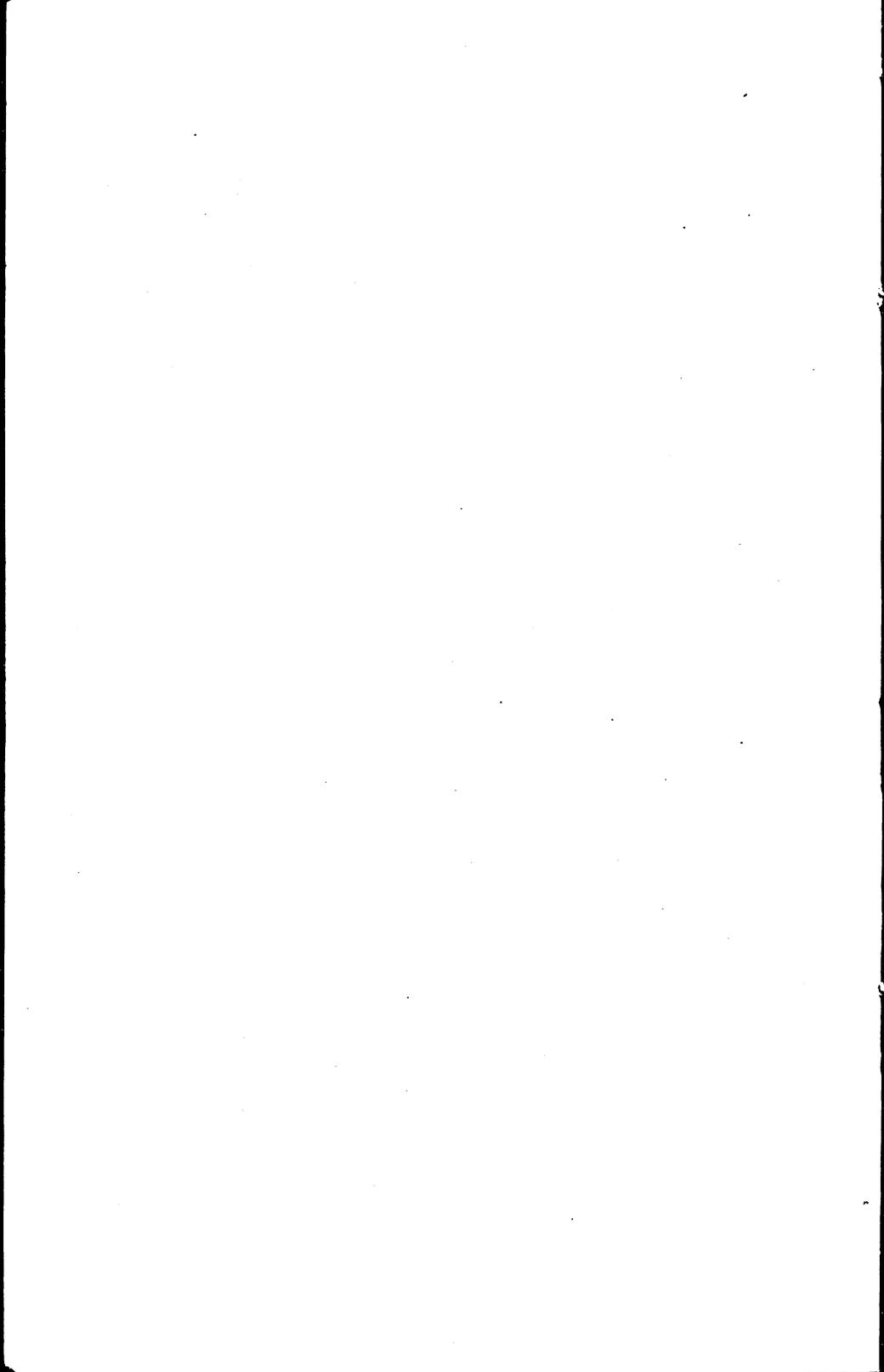
Cattle Rearing and Milk Production
in the Upland Area of S.W. Somerset

1952 - 53

by

R. R. JEFFERY

Price 5/-



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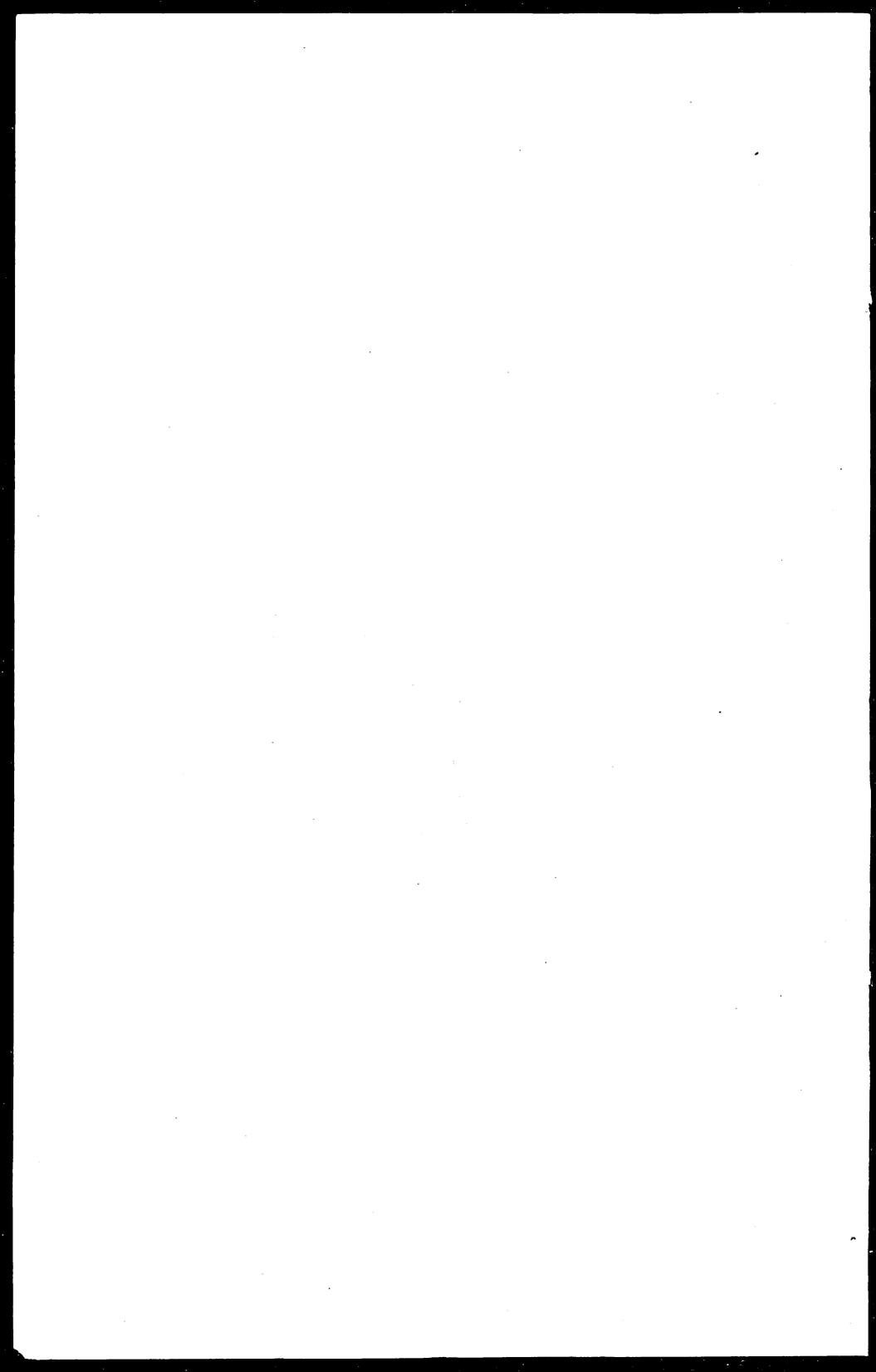
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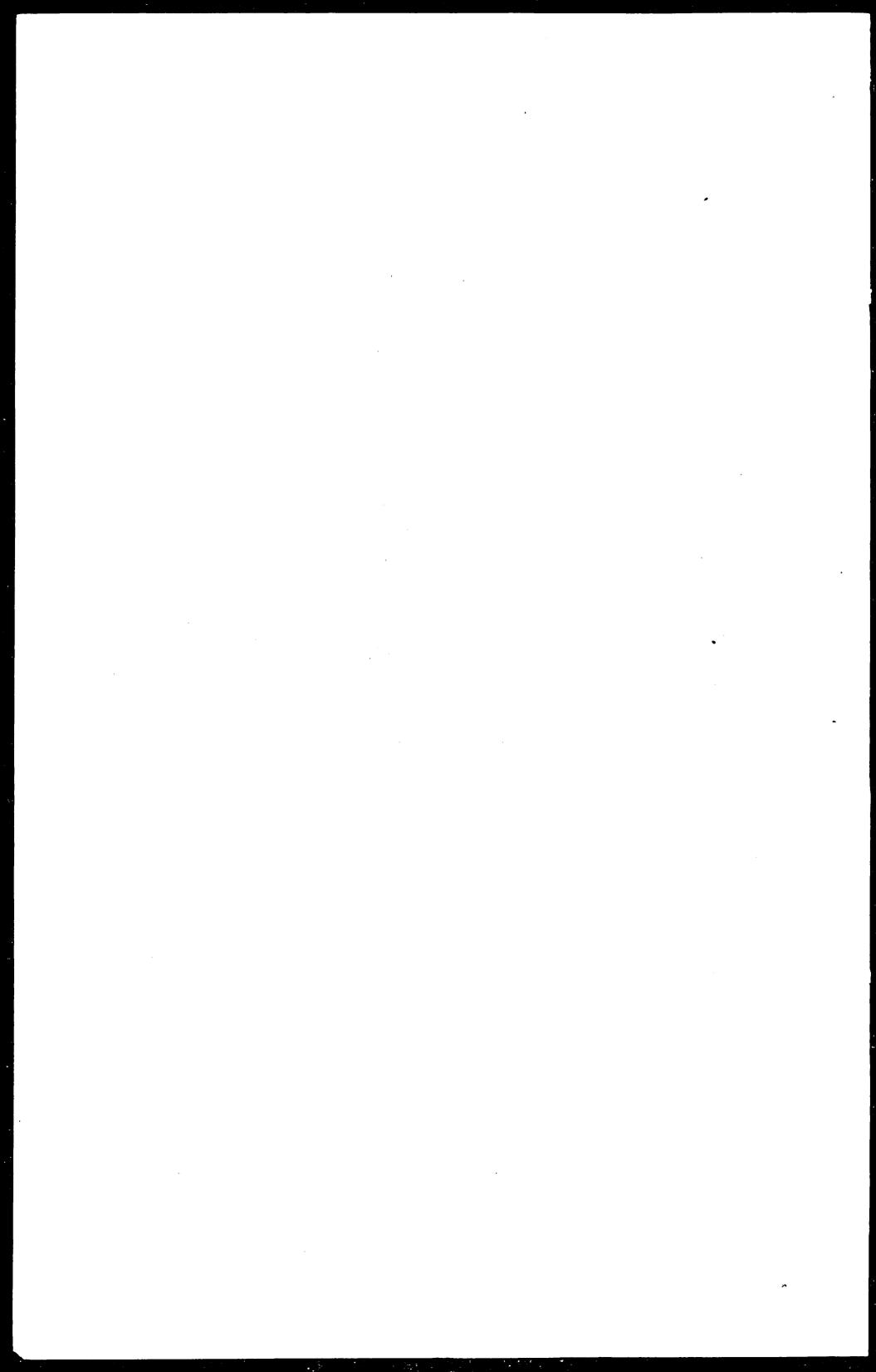
R. R. JEFFERY

November 1954



Acknowledgement

This opportunity is gratefully accepted to acknowledge the extreme helpfulness and unfailing courtesy of those Brendon Hills and Exmoor farmers who co-operated with this Department in making available so readily the large amount of detailed information involved in this investigation. A special debt of gratitude is due to a number of farmers for whom this present investigation represents the third consecutive year of participation in survey work of an exacting and protracted nature.



Introduction

THIS investigation forms the second in a series designed to cover, ultimately, the main systems of beef cattle production in the West of England. The previous survey* carried out in 1950-51 showed the rearing of beef stores, as practised in the upland marginal farming areas of N.W. Hereford, to be an unprofitable enterprise. Since that time however store cattle prices have advanced considerably, while a special Production Grant payable at the rate of £10 per head on eligible cows on upland rearing farms has been introduced, developments which together must have raised considerably the returns from store cattle rearing in these areas.

Not only is it desirable to ascertain the present level of production and costs under these changed circumstances, but the question of the relative economy of store cattle rearing and of milk production in upland marginal farming areas, a matter of controversy for many years has now, under present conditions of a saturated market for liquid milk, assumed a new and more urgent aspect. The production of milk for sale in these areas, traditionally devoted to store cattle and sheep rearing, commenced during the 1930's, and was made possible only by the development of motor transport which opened up the milk market to formerly inaccessible areas. This move, actively fostered by official policy, was greatly accelerated during the war years when an acute shortage of milk was in prospect, and when the prices determined for mutton and beef were deliberately set at a low level in order to discourage the utilisation of lowland acres for meat production, a policy which effectively crippled the market for the traditional products of the upland areas. Indeed, it is difficult to see how many of the smaller farms in these areas could have survived the war and early post-war years without the increased returns alone made possible by the sale of milk.

In more recent years however when milk supplies have again become adequate there appear to have been regrets that this

* *Costs and Returns of the Store Cattle Enterprise in the Upland Areas of N.W. Hereford 1950-51.* R. R. Jeffery, University of Bristol, Bristol I Province.

encouragement was ever given to these upland producers to enter the milk market. Although no direct evidence on the point is available it is frequently suggested that milk production under conditions prevailing in upland areas cannot be an economic proposition; that the collection of small quantities of milk in remote areas is expensive, which is undoubtedly true; that the milk produced is of a low standard of cleanliness, for which there is no evidence at all, and finally, on what is probably the real grounds of objection, for which the other points merely provide a façade, that as the country is still short of meat but faced with a surplus of milk, upland milk producers should be persuaded, in the national interest, to return to their traditional system of beef store cattle rearing, thus relieving the milk market and at the same time increasing the supplies of beef and mutton. This is clearly a point of very great importance, but the only answer that can be given at this stage is "who wills the end must will the means" and that if store-rearing was, in fact, as profitable as milk production, there would be very few farmers indeed in these areas who would not prefer the traditional, familiar, and much less exacting system of store cattle rearing. It is not only unjust but quite unrealistic to suggest that farmers in upland marginal areas who, of all farmers, must inevitably have the hardest struggle to make a living, will be willing or able to make sacrifices in the national interest not asked of more favourably situated members of the community.

There is, in fact, little or no direct economic evidence as to the relative economy of store cattle rearing and milk production in upland areas. A considerable amount of circumstantial evidence however is contained in reports dealing with the financial accounts of farms in these areas which suggests that milk production adds materially to the level of production and profit per acre on farms where it is undertaken. As however the milk selling farms in these areas tend to be considerably smaller in size than the non-milk selling farms, with a much lower ratio of sheep to cattle, and often a higher proportion of poultry and pigs, it is never possible to be certain to what extent the more favourable results are due to the fact of milk selling or to the other factors which distinguish the groups. An investigation concerned solely with the cattle enterprise will alone provide the answer to this problem. Such an investigation has been undertaken by Beynon and Davies in the Bristol II Province in 1951-52 and 1952-53. This investigation however was not confined to upland rearing areas, but the

results obtained are not without significance for such areas. The report dealing with this investigation* shows that for two groups of farms, where, in one case store cattle rearing is practised alone, and in the other where rearing is associated with milk production, the average level of production per 100 adjusted acres devoted to cattle was 68 per cent greater in the Milk Group than in the Non-milk Group, and, compared with a surplus margin of £478 per 100 acres in the former group, the Non-milk Group showed an average deficit of £145 per 100 acres.

In order to establish corresponding relationships in upland marginal farming areas an investigation was carried out in the Brendon Hills district of S.W. Somerset in 1952-53. The reasons why this area was chosen rather than that in N.W. Hereford, the district adopted for the previous investigation into store cattle rearing, are firstly that in the Brendon Hill area the turnover to milk selling took place rather earlier and has proceeded much farther than is the case in Hereford, reaching the stage where it is possible to obtain a group of upland marginal farms on which cattle are kept solely for milk production to the exclusion of all beef store cattle rearing. Secondly, this area of Somerset provided the scene for an earlier survey and report by this department.† Despite a specific warning to the contrary on the part of the author the results of one section of the report have been misinterpreted to suggest that it has been proved that milk production on the small farms in the Brendon Hills is an unprofitable pursuit, and this suggestion has been widely propagated in the area. Thirdly, the Brendon Hill region is a much more homogeneous area than the N.W. Hereford district where farms which are entirely marginal in character are closely intermingled with those that include varying proportions of lowland, and some which are entirely lowland in nature. In contrast, the Brendon Hills district takes the form of an elevated plateau, sharply distinguished from surrounding lowland areas, and provides a much more satisfactory region for the investigation of problems associated with this type of farming area.

Before proceeding to a description of the investigation itself it is necessary, in order to place the problems which it is hoped

* *Some Economic Aspects of Store Cattle Rearing in Devon and Cornwall in 1951-52 and 1952-53.* V. H. Beynon and E. T. Davies. University of Bristol, Department of Economics, Bristol II Province.

† *Exmoor: An Economic Survey.* V. Baker, University of Bristol, Department of Economics: Bristol I Province, March 1949.

to elucidate in perspective against a broad background, to consider first of all the changes that have occurred in recent years in the production of beef and of beef cattle in this country, and more specifically in the five West of England counties that constitute the Bristol I Province.

SUPPLIES OF BEEF IN THE UNITED KINGDOM

Total supplies of beef and veal in the United Kingdom in 1952 reached a very low level, 61 per cent of pre-war, compared with 81 per cent as recently as 1950. It is in imported supplies that the serious deficiency occurs; in 1938 imported beef and veal accounted for 49 per cent of total supplies, but in 1952 imports had fallen to less than 21 per cent of the pre-war tonnage and accounted for only 17 per cent of a total supply itself 39 per cent lower than in 1938. Imports from the Argentine, which in 1938 accounted for 60 per cent of total imports, were only 16 per cent of the pre-war level in 1952. In 1953 imports of beef and veal rose sharply, but despite this are still only half the pre-war quantity. Indeed it is only with regard to beef and veal that meat supplies in 1953 compare really unfavourably with pre-war, a circumstance that offers both the prospect of a considerable unsatisfied demand for beef, and an excellent opportunity for the home industry to meet it.

Since 1938 home-produced supplies of beef have shown a somewhat erratic trend. Supplies fell steadily to 1943 when they reached 75 per cent of the pre-war level, recovered to 91 per cent in 1946, and fell again to just under 80 per cent of the pre-war average in 1948. However, following the introduction of the Calf Rearing Subsidy and higher prices for beef under the 1947-53 expansion programme, supplies increased rapidly, reaching 102 per cent of the pre-war level in 1950, and 106 per cent in the following year. In the meantime however the calf subsidy which had proved so effective in raising supplies had been withdrawn, and this was immediately followed by a reduction in the number of beef calves reared which, by 1952, resulted in home supplies of beef falling by nearly 7 per cent, to a level once again below pre-war. When it had become apparent however that the rearing of beef store cattle was declining the calf subsidy was hastily reintroduced, and by 1953 home supplies of beef were again on the increase. Although production for 1953 was below the level of 1950 it was nearly 3 per cent above the 1952 level, and 1 per cent above pre-war. Further, production during the first five months of 1954

was 26 per cent greater than in the corresponding period of 1953.

Future trends in home beef production first become apparent in the trends shown by the numbers of beef animals of various ages, but the only beef cattle that can be identified in the agricultural census returns are steers. However, over recent years at least, trends in the number of steers have provided a good indication of the future trend in beef production; changes in the number of adult steers are reflected in beef supplies in the following year, and, in younger steers, in supplies of beef in one to two years' time.

NUMBERS OF STEERS IN THE WEST OF ENGLAND 1947-1953:

Total numbers of steers recorded at the June census for each of the years 1947 to 1953 for the five West of England counties in the Bristol I Province are set out in Table 1.

TABLE 1

Total Steers at the June Census:
England and Wales, and for Five West of England Counties: 1947-53

	TOTAL STEERS						
	1947	1948	1949	1950	1951	1952	1953
	Thousand Head						
	No.	No.	No.	No.	No.	No.	No.
Hereford . . .	34.5	37.0	40.6	42.7	40.7	38.7	40.2
Worcester . . .	17.1	18.8	21.1	23.7	24.7	22.8	23.8
Gloucester . . .	16.4	20.0	24.9	29.5	32.1	31.1	34.1
Somerset . . .	15.5	17.3	19.3	22.3	23.2	23.1	27.1
Wiltshire . . .	5.2	6.7	8.3	11.0	14.2	17.2	20.4
Province . . .	88.7	99.8	114.2	129.2	134.9	132.9	145.6
England and Wales	1020.1	1070.4	1200.1	1357.1	1413.1	1418.4	1498.1

INDEX OF NUMBERS: 1947 = 100

Hereford . . .	100	107	118	124	118	112	117
Worcester . . .	100	110	123	139	144	133	139
Gloucester . . .	100	122	152	180	196	190	208
Somerset . . .	100	112	125	144	150	149	175
Wiltshire . . .	100	129	160	212	273	331	392
Province . . .	100	113	129	146	152	150	164
England and Wales	100	105	118	133	139	139	147

Steer cattle were not fully distinguished in the census returns until 1942, but the general trend between 1939 and 1945 in England and Wales, and in the Western counties, was for an increase in the number of dairy cattle to be accompanied by a considerable fall in the number of beef cattle. Total steers in the five counties were probably about 30 per cent lower in 1945 than in 1939, a rather greater fall than for England and Wales as a whole; a considerably greater fall is recorded in Gloucester and a rather smaller decline in Hereford. Between 1945 and 1947 however some recovery took place in all five counties, carrying the total number of steers in Hereford to 93 per cent of the 1942 level, in Wiltshire to 104 per cent, and in the remaining western counties to around 80 per cent of the 1942 numbers. For England and Wales as a whole, numbers of steers continued to decline between 1945 and 1947, reaching 87 per cent of the 1942 level, but were still 1 per cent above the corresponding figure for the whole Province.

It is however between 1947 and 1953 that the really marked changes in numbers of steers, and in the level of home-produced supplies of beef, have occurred. In 1947 major changes in the circumstances affecting the beef industry came into operation, with a marked change in economic policy designed to foster an increase in the production of meat, and especially of beef and mutton, from home resources. Very considerable increases in the relative price levels of livestock and livestock products other than milk, together with a special subsidy payable on calves suitably reared for beef production had the effect of raising very considerably the returns from beef production, and from beef store cattle rearing. It is worth noting however that even in 1953, when this process had been taken several stages further, the price index for fat cattle (1936-38 = 100) was still only 299 compared with milk 314, fat sheep 314, and 331 for all livestock and livestock products.

The effect of these changes upon the number of store cattle reared was immediate. Total steers in England and Wales increased each year between 1947 and 1953, increasing over the period by nearly 478,000 to 47 per cent above the 1947 level. In the five western counties taken together the increase was even greater; total steers in 1951 were 52 per cent above 1947, and, following a slight recession in 1952, increased to 64 per cent above in 1953. All five counties show increases in total numbers of steers, but vary considerably in the extent of the increase. In Hereford the increase in 1953 over 1947 was only 17 per cent, and less than 40 per cent for Worcester. In Somerset

there was a 75 per cent increase, in Gloucester numbers more than doubled, and increased by nearly 300 per cent in Wiltshire. Over this period total steers in the Province increased by 56,900 head, of which Gloucester accounted for 17,700, Wiltshire 15,200, Somerset 11,600, Worcester 6,700 and Hereford 5,700. As a result of these disproportionate increases appreciable changes in the distribution of steers between the five counties have resulted. Hereford accounted for nearly 40 per cent of the total number in 1947 but contained less than 28 per cent in 1953 while the share contributed by Wiltshire has increased over the same period from less than 6 per cent to 14 per cent, and for Gloucester from under 20 to over 23 per cent.

Changes in the number of steers under one year old provide a much more immediate indication of any change of attitude on the part of farmers to beef production, a change that may only be indicated in the number of total steers after a time-lag of one to two years: total numbers of steers in England and Wales for example continued to rise between 1951 and 1952 while the real trend in beef store cattle rearing was, in fact, downward.

In Table 2, numbers of total steers under one year old are set out for the five counties and for England and Wales for 1947 to 1953.

Both in England and Wales and in the five counties as a whole steers under one year old increased between 1947 and 1948 by 28 per cent, an increase which is reflected in the figures for each county, but especially in Wiltshire where within twelve months the numbers more than doubled. This upward trend proceeded steadily in all five counties up to 1950, when numbers stood at 70 per cent above 1947 for England and Wales, and 65 per cent for the Province, but varied in the counties from 36 per cent above for Hereford and 48 per cent for Worcester to 98 per cent for Gloucester and 262 per cent above 1947 for Wiltshire. After 1950 however, and following immediately upon the withdrawal of the Calf Rearing Subsidy, the number of steers reared began to decline and by June 1951 steers under one year were nearly 6 per cent lower in England and Wales than in June 1950. This downward trend was halted by the reintroduction of a revised and renamed calf subsidy, and although steers under one year old in England and Wales fell by a further 1 per cent in 1952, twelve months later in 1953 numbers had increased by 15 per cent over the 1952 level, to reach a figure 81 per cent above 1947, and considerably higher than

TABLE 2

Total Steers Under One Year Old at the June Census:
England and Wales, and for Five West of England Counties: 1947-53

	TOTAL STEERS UNDER ONE YEAR OLD						
	1947	1948	1949	1950	1951	1952	1953
	Thousand Head						
	No.	No.	No.	No.	No.	No.	No.
Hereford . . .	11.4	12.9	14.3	15.5	14.3	13.2	14.7
Worcester . . .	5.4	6.5	7.2	8.0	7.5	7.2	8.1
Gloucester . . .	5.8	8.2	10.3	11.5	11.0	10.5	12.7
Somerset . . .	5.2	6.5	6.9	8.3	8.6	7.9	10.2
Wiltshire . . .	1.3	3.1	3.3	4.7	5.0	6.1	7.4
Province . . .	29.1	37.2	42.0	48.0	46.4	44.9	53.1
England and Wales	278.8	356.1	408.5	474.8	446.8	440.9	505.8

INDEX OF NUMBERS 1947 = 100							
	100						
Hereford . . .	100	113	125	136	125	116	129
Worcester . . .	100	120	133	148	139	133	150
Gloucester . . .	100	141	178	198	190	181	219
Somerset . . .	100	125	133	160	165	152	196
Wiltshire . . .	100	239	254	362	385	469	569
Province . . .	100	128	144	165	159	154	183
England and Wales	100	128	147	170	160	158	181

the previous peak in 1950. A converse trend is shown by the number of calves purchased for slaughter, but the changes occur slightly in advance of the corresponding changes recorded in the number of steers under a year old. Between 1946 and 1949 the total number of calves purchased for slaughter in the United Kingdom fell by 18 per cent, but increased by 11 per cent in 1950, and then fell steadily to 1953 when numbers were 27 per cent below 1946 and 12 per cent below the 1949 level.

The trend in the number of steer calves taken up for rearing in England and Wales, downwards from 1950 to 1952 and sharply upwards in 1953, was parallel with that for the Province as a whole, although the increase in 1953 in the West was appreciably greater than for England and Wales. Individual counties differ somewhat in the trend shown; in Hereford steers under one year fell in numbers between 1950 and 1952 by

nearly 15 per cent and, alone of the five counties, were still below the 1950 level in 1953. In Worcester and Gloucester the fall was approximately 9 to 10 per cent while in Somerset numbers did not decline until 1952, and the fall was relatively slight, while the increase in 1953 of 30 per cent was the most rapid of any. Wiltshire stands in a class by itself: steers under one year old have increased steadily and without intermission each year since 1945, and actually show a rapid increase between 1950 and 1952 when numbers in other counties were falling.

The increase in the number of steers reared in Wiltshire can only be described as phenomenal, and it is interesting to note that an equal increase has taken place in the similar and neighbouring county of Dorset. In 1947 total steers of all ages in Wiltshire numbered 5,200, having been as low as 3,800 in 1945; by 1953 they numbered 20,400, an increase of nearly 300 per cent over 1947. Gloucester too has recorded a very large increase in total steers from 16,400 in 1945 to 34,100 in 1953, and changes of this magnitude cannot fail to have considerable repercussions upon the structure of the cattle enterprise in the counties concerned. Table 1 of Appendix D, sets out the percentage distribution of cattle by type, age, and sex for the two years 1947 and 1953 for each county and for England and Wales, and shows clearly the swing to beef that has occurred since 1947 in all five counties. The change has been most marked in Gloucester and Wiltshire where total steers have increased from 9.3 per cent of total cattle in 1947 to 17.1 per cent in 1953 in the former county, and from 2.8 per cent to 9.5 per cent in the latter. In Gloucester the increase in the proportion of steers has been at the expense of the proportion of cows and female store cattle, while in Wiltshire it has been almost entirely at the expense of cows as in that county, alone of the five, the proportion of female store cattle has also increased, but there is reason to believe that possibly the greater part of the increase in this category is attributable to colour-marked heifers destined for beef production. In both Worcester and Somerset the increase in steers has been primarily at the expense of the proportion of female stores, and only secondarily at the expense of cows; in Hereford, the only county of the five showing an increase in the proportion of cows between 1947 and 1953, steers have increased entirely at the expense of female stores.

The swing to beef indicated by these figures does not imply that numbers of dairy cattle have been falling, but only that beef cattle are increasing at a greater rate than are dairy cattle.

In none of the counties has the number of total cattle other than steers declined since 1947; it was the same in Worcester in 1953 as in 1947, and 5 to 10 per cent greater in the other four counties. In fact, only in Gloucester and Wiltshire has the increase in the actual numbers of steers exceeded that for all other cattle. It is interesting to note in passing that the number of bulls has fallen heavily in all counties, and especially in the main dairying counties of Gloucester, Somerset, and Wiltshire; in Somerset for example total bulls numbered 7,130 in 1947 but only 4,270 in 1953, a fall of 40 per cent, while the number of bulls per 100 cows and in-calf heifers fell, over the same period, by 46 per cent.

The same Table also provides an interesting comparison of the present structure of the cattle enterprise in the different counties. For the past two years, 1952 and 1953, the June census returns have contained estimates of the number of cows in-milk and in-calf and heifers in-milk that are devoted primarily to milk production, or to producing calves for beef. It will be suggested later that these figures should be treated with some reserve owing to ambiguities that arise where herds of dual-function are kept. It is nevertheless interesting to note that, of total cows, "beef" cows accounted for approximately 45 per cent in Hereford, 20 per cent in Worcester, 10 per cent in Gloucester, 7 per cent in Somerset and less than 6 per cent in Wiltshire, compared with 13.3 per cent in England and 13.8 per cent in Wales.

Of total cattle on farms in Somerset and Wiltshire, "dairy" cows accounted for 43 per cent in 1953, compared with 33 per cent for Gloucester, 25 per cent for Worcester and only 17 per cent in Hereford: even in Hereford however, a county in which beef cattle and sheep rearing and feeding is the traditional form of husbandry, "dairy" cows outnumbered "beef" cows by an appreciable margin. Total steers accounted for nearly 30 out of every 100 cattle in Hereford, 24 in Worcester, 17 in Gloucester, less than 10 in Wiltshire and only just over 8 per 100 head in Somerset. Steers under one year old, calculated per 100 "beef" cows, averaged approximately 80 in Hereford, 95 in Somerset, 130 in Worcester, 148 in Wiltshire and 170 in Gloucester. Quite clearly, although the cows recorded as "mainly for producing calves for beef" may be rearing beef calves, they are not breeding more than a proportion of them, and, in the case of Worcester, Wiltshire, and Gloucester only a minority. In these counties dairy or dual purpose cows are being utilized for rearing beef-type calves, probably in most cases the colour-marked by-products of the dairy herds.

Although comparisons of county figures of cattle numbers bring to light some interesting and significant differences in trends, they only infrequently provide any clear guidance as to the reasons for these differences. Further, as all counties contain markedly different farming type areas within the county boundary, any trend shown by the county as a whole will be the net result of trends, which may well be conflicting, in the separate farming type areas. In order to throw some more light upon the varying emphasis in the "swing to beef" shown in the counties, a more detailed analysis of the changes in cattle numbers for sample parishes in the three major farming type areas of Somerset has been made. Somerset has been selected for this analysis because the investigation with which this report is primarily concerned was carried out in the upland districts of South West Somerset, because the farming type areas can be more readily distinguished in Somerset than in the other counties, and because data relating to changes in sheep numbers, which may have an important bearing on changes in cattle numbers, are already available for the sample parishes selected.

CHANGES IN CATTLE NUMBERS IN THE MAIN TYPE OF FARMING AREAS OF SOMERSET: 1939 TO 1953

Somerset may be broadly divided into a relatively small but sharply defined upland area in the south-west, mainly devoted to store sheep and cattle rearing, and a predominantly lowland area covering most of the remainder of the county. This upland area falls into two distinct farming type areas, the Exmoor Hill area and the Brendon Hills Marginal area. Over the lowland areas of the county milk production is everywhere the most important enterprise, but these areas may be broadly distinguished between those where dairying, mainly grassland dairying, is overwhelmingly the most important enterprise, and areas where milk production is carried on in conjunction with general mixed farming. Thus four broad farming type areas covering most of Somerset may be delineated as follows:

- (1) Upland Areas: Livestock Rearing
 - (a) Exmoor "Hill" area.
 - (b) Brendon Hills Marginal area.
- (2) Lowland Areas:
 - (a) Mixed farming with Dairying areas.
 - (b) Predominantly Dairying areas.

Representative parishes* spread throughout the areas occupied by each of these type groups have been selected, and parish statistics of cattle numbers for certain years between 1939 and 1953 obtained.

The area of land occupied by the sample parishes in each group is not in proportion to the total area of the county occupied by the particular type of farming area represented by the sample; the aim has been to select that number of parishes for each type group that will give adequate representation of that type in all parts of Somerset where it occurs. Thus all sample parishes combined contain approximately 19 per cent of the total acreage of farmland in Somerset, and, of the total sample area 41 per cent is accounted for by the two upland rearing groups, although this type of farming area does not in fact cover more than 10 per cent of the total area of the county.

In Table 3 the distribution of the total acreage for each of the four groups, and for Somerset as a whole, is set out for June 1951.

TABLE 3
Per Cent Distribution of Total Farm Acreage at June, 1951, for Groups of Parishes in Somerset by Farming Type Areas

	UPLAND AREAS		LOWLAND AREAS		Somerset
	Exmoor Hill Farms	Brendons Marginal	Mixed with Dairying	Predominantly Dairying	
Crops (tillage)	% 4.9	% 16.5	% 28.1	% 12.2	% 18.7
Grassland	38.4	71.0	68.8	84.6	71.6
Crops and Grass	43.3	87.5	96.9	96.8	90.3
Rough Grazings	56.7	12.5	3.1	3.2	9.7
Total Area	100.0	100.0	100.0	100.0	100.0

* Parishes of:

- (1) (a) Exmoor, Exford, Withypool.
- (b) Chipstable, Skilgate, Clatworthy, Treborough, Luxborough, Timberscombe, Brompton Regis, Exton, Dulverton, Upton, Huish Champflower.
- (2) (a) Wambrook, Whitestaunton, Combe St. Nicholas, West Hatch, Orchard Portman, Stoke St. Mary, Ashill, Iton, Puckington, Haselbury Plucknett, Miserton, North Perrott, Cannington, Bishops Lydeard, Milverton.
- (b) Sparkford, North and South Cadbury, Witham Friary, Selwood, Berkeley, Wedmore, Meare, Mark, East Pennard, Ditchat, West Bradley, Wellow, Hemington, Mells, Priddy, Chewton Mendip, Emborough.

Of the total farming area, more than 56 per cent consists of rough grazings in the Exmoor Hill group, 12.5 per cent in the Brendon Marginal group, but only just over 3 per cent in the two lowland groups. Tillage land occupies 28 per cent in the Mixed with Dairying group but only 12 per cent in the Predominantly Dairying group, where over 84 per cent of the area is under grass. As a percentage of Crops and Grass, tillage accounts for 11 per cent in the Exmoor Hill group and for nearly 19 per cent in the Brendons Marginal group.

Table 4 shows the average numbers of cattle carried per 100 adjusted acres of total farming area at the June censuses of 1939 and 1951, together with the total number of sheep.

In 1939 the number of cattle carried per 100 adjusted acres was 33 for Somerset as a whole, 40 in the Predominantly Dairying group, 30 in the Mixed with Dairying group, 19 in the Brendon Marginal, and 12 in the Exmoor Hill group: on a cow-equivalent basis the difference between the lowland and upland group was still greater owing to the high proportion of cows carried in the two former groups.

Between 1939 and 1951 the total number of cattle in Somerset increased by 24 per cent, and increases were recorded in each of the type groups. The increase was smallest in the Predominantly Dairying group, 13 per cent, but the pre-war density of stocking in this group was by far the greatest. In the other lowland group cattle numbers increased by 21 per cent, and by 30 per cent in the Marginal group: in the Exmoor Hill group however cattle numbers more than doubled over this period. Breeding cows increased in the Hill group by 47 per cent, but the outstanding increase is recorded for store cattle which, in 1951, were 138 per cent higher than in 1939, the increase being particularly marked in the case of older store cattle.

Over this same period total sheep in Somerset fell by 33 per cent, the fall being greatest, 65 per cent, in the Predominantly Dairying group where, however, sheep were of but very slight importance even in the pre-war period. In the Mixed with Dairying group total sheep fell by 45 per cent, but by only 8 per cent in the Marginal group, while in the Exmoor Hill group total sheep in 1951 were 14 per cent greater than in 1939. In the Hill group there were, in 1939, more than 15 sheep for every head of cattle, but by 1951 the proportion had fallen to 8.5 to 1. In the Mixed with Dairying group there were nearly twice as many sheep as cattle in 1939, but rather more cattle than sheep in 1951, while in the Predominantly Dairying

TABLE 4

Cattle Numbers Carried per 100 Adjusted Acres of Total Farm Area at the June Census in 1939 and 1951.
By Farming type Areas

	UPLAND AREAS				LOWLAND AREAS				Somerset	
	Livestock Rearing				Mixed with Dairying		Predominantly Dairying			
	Hill Farms		Marginal Farms		1939	1951	1939	1951	1939	1951
	1939	1951	1939	1951						
Cows and Heifers in-milk and in-calf	No. 4.37	No. 6.43	No. 6.26	No. 8.09	No. 14.66	No. 18.77	No. 27.27	No. 28.00	No. 19.18	No. 21.74
Bulls	0.17	0.18	0.19	0.25	0.63	0.50	1.25	0.97	0.83	0.62
Store Cattle:										
Two years and over	1.72	5.32	2.25	4.03	3.31	4.30	2.23	3.43	3.39	4.89
One to two years	2.61	7.76	5.82	6.91	5.75	6.26	5.16	6.59	5.04	6.66
Under one year	3.03	4.40	4.90	6.02	5.49	6.26	4.37	6.65	4.64	6.61
Total Stores	7.36	17.48	12.97	16.96	14.55	16.82	11.76	16.67	13.07	18.16
Total Cattle	11.90	24.09	19.42	25.30	29.84	36.09	40.28	45.64	33.08	40.52
Total Sheep	180	205	131	120	56	31	12	4	47	31
<i>Cow Equivalents:</i>										
Cattle	No. 7.19	No. 14.57	No. 11.60	No. 15.45	No. 21.13	No. 26.13	No. 33.55	No. 36.26	No. 26.03	No. 30.86
Sheep	19.50	22.46	17.83	16.80	7.93	4.30	1.67	0.53	6.50	4.37
Total	26.69	37.03	29.43	32.25	29.06	30.43	35.22	36.79	32.53	35.23

TABLE 4—continued

	UPLAND AREAS		LOWLAND AREAS		Somerset
	Livestock Rearing		Mixed with Dairying	Predominantly Dairying	
	Hill Farms	Marginal Farms			
	1951 as per cent of 1939				
	%	%	%	%	%
<i>Stock Numbers:</i>					
Cows and Heifers in-milk and in-calf	147	129	128	103	114
Bulls	106	132	79	78	85
Store Cattle	238	131	116	142	140
Total Cattle	202	130	121	113	124
Total Sheep	114	92	55	35	67
<i>Cow Equivalents:</i>					
Cattle	203	133	124	108	119
Sheep	115	94	54	32	67
Total	139	110	105	104	108

areas cattle outnumbered sheep by more than 3 to 1 even in the pre-war period, and by more than 10 to 1 in 1951.

If total sheep and cattle carried in the groups are compared on the basis of cow-equivalent units per 100 adjusted acres it is seen that in all groups where sheep numbers have declined this decrease has been more than offset by increased stocking with cattle. In the two lowland areas the net increase in stock units has been about 4 to 5 per cent between 1939 and 1953, 10 per cent in the Upland Marginal group, and no less than 39 per cent in the Exmoor Hill group. This very substantial increase in the level of stocking in the Hill group is undoubtedly the result of the special measures taken to encourage production in this type of upland region. The re-seeding of rough pasture carried out under the Hill Farming Act materially increased the stock-carrying capacity of farms on Exmoor, while payments of Hill Sheep and Cattle subsidies enabled the necessary expansion in livestock numbers to be financed. In the marginal areas however no such special assistance was available and many producers turned to the production of milk for sale as the only means of offsetting the relatively low prices determined during the war and early post-war years for cattle, sheep, and wool. This change to milk selling enabled a considerably increased monetary income to be achieved without calling for an increase in the numbers of stock carried, and, although over the district as a whole an increase in the density of stocking with cattle has more than offset a fall in sheep numbers, most of this increase probably occurred on those farms, especially the larger farms, which did not enter the liquid milk market. On the Mixed with Dairying farms sheep have given way to, but on balance are more than offset by, the enlargement of the dairy herd, but any marked increase in the density of stocking has been kept in check by the extra cropping required to maintain the dairy herd, and by increased cash cropping. The relatively small net increase in the density of stocking in the Predominantly Dairying group, where, even in the war years little crop production for direct human consumption was undertaken, mainly reflects the difficulty experienced by farms of this type in providing feed from the farm acres to replace the greatly reduced supplies of purchased concentrates, an adjustment that usually resulted in the maintenance of slightly more cows at a considerably lower level of yield per cow.

Changes in the numbers of cattle since 1939 have inevitably been accompanied by changes in the structure of the cattle enterprise. In the Hill group the proportion of adult cattle

shows a greater increase than for cattle in the younger categories. In the Marginal group however the proportion of breeding stock has increased slightly, a change which might be expected to follow from the development of milk selling on many farms, while here too the proportion of adult stores has increased at the expense of the younger classes. In both of the upland groups store cattle are being retained considerably longer on the farm and sold at a greater age at the present time than was the case in pre-war days, a development which cannot help but add to the already difficult problem of wintering. In both of the lowland groups the proportion of cows and heifers has increased at the expense of a fall in the proportion of store cattle of all ages.

The present structure, at June 1953, is set out in Table 5 for each of the groups.

The table illustrates clearly the great difference in the structure of the cattle enterprise between areas devoted primarily to store cattle rearing and to milk production. Cows and heifers in-milk and in-calf account, on average, for 63 per cent of total cattle in the Predominantly Dairying group, 53 per cent in the Mixed and Dairying group, but for only 33 to 34 per cent in the two upland livestock rearing groups. Total store cattle over two years old range from 6.8 per cent in the Predominantly Dairying group to 21.8 per cent in the Hill group and include, in the latter group, a very high proportion of heifers, a circumstance that may perhaps be attributed to the impact of the recently introduced Hill Cow Production Grant. Total steers averaged 26 per cent of total cattle in the Hill group, 30 per cent in the Marginal group, but less than 10 per cent in the Mixed with Dairying group.

Since 1952 the agricultural census figures have distinguished between Beef and Dairy cows or, more precisely, between "Cows and heifers in-milk and cows in-calf but not in-milk,

(a) for producing milk or calves for the dairy herd

(b) mainly for producing calves for beef."

In view of a previous failure in the middle thirties to obtain a reliable estimate, through the census returns, of the relative numbers of beef and dairy cattle, a close inquiry was made among the farmers co-operating in this investigation as to how this section of the June 1953 return was completed in each individual case. The results are illuminating.

A substantial minority of farmers were unaware that specific instructions as to how the entries should be made are contained on the census form: of those who were aware by no means all

TABLE 5

Percentage Distribution of Cattle by Class and Age Groups at the June Census 1953.
By Farming type Areas

	UPLAND AREAS		LOWLAND AREAS		Somerset
	Livestock Rearing		Mixed and Dairy	Predominantly Dairy	
	Hill	Marginal			
<i>Breeding Cows and Heifers:</i>	%	%	%	%	%
Cows in-milk and in-calf and heifers in-milk:					
(a) Dairy . . .	9.1	13.9	38.8	52.0	43.2
(b) Beef . . .	19.4	13.6	3.6	2.1	3.3
Total . . .	28.5	27.5	42.4	54.1	46.5
Heifers in-calf . . .	4.9	6.3	10.5	9.0	8.9
Total . . .	33.4	33.8	52.9	63.1	55.4
<i>Bulls: Service</i> . . .	0.9	0.6	0.9	1.4	1.0
Rearing . . .	0.1	0.2	0.2	0.4	0.3
Total Bulls . . .	1.0	0.8	1.1	1.8	1.3
<i>Store Cattle:</i>					
Two years and over:					
Male . . .	6.8	6.5	2.9	1.1	2.7
Female . . .	15.0	7.7	7.1	5.7	8.6
Total . . .	21.8	14.2	10.0	6.8	11.3
One to two years:					
Male . . .	10.0	11.6	3.0	0.9	2.4
Female . . .	13.7	15.0	14.6	12.8	12.8
Total . . .	23.7	26.6	17.6	13.7	15.2
Under one year:					
Male . . .	9.5	11.9	3.5	1.5	3.1
Female . . .	10.6	12.7	14.9	13.1	13.7
Total . . .	20.1	24.6	18.4	14.6	16.8
Total Stores . . .	65.6	65.4	46.0	35.1	43.3
Total Cattle . . .	100.0	100.0	100.0	100.0	100.0
Total Stores:					
(a) Male . . .	26.3	30.0	9.4	3.5	8.2
(b) Female . . .	39.3	35.4	36.6	31.6	35.1

had studied them, and of those that had, not one had been able to understand them. In point of fact, in relation to the system of cattle management commonly practised in this area, the instructions are quite unintelligible. No difficulty arises in the case of herds where no milk is sold, nor where no beef stores are reared, but in the case of herds both selling milk and rearing beef store cattle, a combination occurring on over one-third of all farms in the Brendon Hills, no guidance can be obtained from the instructions as framed at present. These instructions indicate that with mixed herds the entries should be divided, cow by cow, according to their individual use, and where pail feeding is practised, division was to be based on the estimated gallonage used respectively for (1) the feeding of calves for beef; (2) any other purpose. The most common method of management among the mixed herds of the Brendon Hills area is that the cows are milked during the early months of the lactation when, according to circumstances, they may or may not also suckle a calf at the same time, while the latter months of the lactation are entirely devoted to suckling a calf. The herd cannot thus be divided cow by cow according to their individual use as they are used for both purposes, sometimes simultaneously, while the instructions regarding pail feeding do not apply. Faced with this difficulty most farmers with mixed herds appear to have entered their cows on a "half-and-half" basis, but individual farms under virtually identical conditions have sometimes entered all their cows as "beef", and others all as "dairy", for a number of diverse reasons varying from a vague apprehension that the figures might be used at a later date as the basis for the determination of a quota for milk sales, to the rather more hopeful, but in the event unfounded, belief that they might perhaps provide the basis on which payments under the new Hill Cow Production Grant would be made.

If it is assumed, as appears most logical, that the basis of apportionment in the case of these mixed herds should be the same as that provided where pail feeding is practised, i.e. the estimated proportion of total milk produced that is used for rearing beef calves, then for the mixed herds included in the investigation in the Brendon Hills region the appropriate division would be 74 per cent of cows as "dairy" and 26 per cent as "beef": the actual returns made by these farms at the June 1953 census gives 35 per cent as dairy cows and 65 per cent as beef cows. Four farms in this group returned all their cows as "beef" despite the fact that in no case did the proportion of

total milk produced that was fed to calves exceed 34 per cent, and in most cases was less than 20 per cent.

It is clear that in at least one district where the rearing of beef store cattle is carried on simultaneously with the production of milk for sale, the apportionment of cows between "beef" and "dairy" in the June returns does not give a very accurate reflection of the relative importance of milk production, and the same may well be equally true of other districts where similar systems of cattle management are practised. However, with this limitation in mind, the proportion of "beef" cows in the four farming type areas of Somerset is shown below for the June returns in 1952 and 1953.

"Beef" cows as per cent of total cows

	1952	1953
Exmoor Hill group	73.0	68.0
Brendons Marginal group	50.0	49.6
Mixed with Dairying group	9.2	8.3
Predominantly Dairying group.	4.2	4.0
Somerset	7.2	7.0
England and Wales.	12.1	13.3

The proportion of "beef" cows fell in all groups and for Somerset as a whole between 1952 and 1953, but increased in England and Wales. In all groups the actual numbers of dairy cows increased between the two years, and "beef" cows also increased in numbers in the two upland regions, although at a slower rate. Numbers of "beef" cows fell however in both the two lowland groups, a circumstance that is difficult to reconcile with the fact that the number of steer calves under one year old rose sharply in these areas during the same period.

Changing trends in the production of beef, as indicated by corresponding trends in the number of steers reared, fall, between 1939 and 1953, into three periods. During the first period, covering the war and early post war years up to 1947, the total number of steers on farms in the Mixed Dairying group remained fairly steady after an initial drop in the early war years; in the Predominantly Dairying group numbers fell steadily over the period and were 25 per cent lower in 1947 than in 1942. Over the same period total steers increased by 2 per cent in the Marginal group, and by nearly 40 per cent in the Exmoor Hill group.

The second period covers the years 1947 to 1950 when, under the influence of higher relative prices for fat cattle, and of the

first Calf Rearing Subsidy, the number of steers reared increased rapidly in most areas, reaching a peak in 1950 or 1951.

TABLE 6

Index of Numbers: 1950 = 100. Total Steers and Steers under one year old at the June Censuses. By Type of Farming Groups in Somerset

TOTAL STEERS					
Type Group	1947	1950	1951	1952	1953
Exmoor Hill	83	100	98	89	83
Brendons Marginal	74	100	85	81	84
Mixed with Dairying	97	100	102	101	115
Predominantly Dairying	56	100	129	143	177
Somerset	70	100	104	104	122
STEERS UNDER ONE YEAR OLD					
Exmoor Hill	67	100	98	86	85
Brendons Marginal	71	100	81	79	88
Mixed with Dairying	119	100	100	100	129
Predominantly Dairying	53	100	131	110	149
Somerset	62	100	103	95	123

Between 1947 and 1950 total steers increased in all groups. In the Exmoor Hill group, in which a considerable expansion had taken place between 1942 and 1947, a further increase of about 20 per cent occurred between 1947 and 1950; in the Brendon Marginal group, where the increase in the earlier period had been slight, numbers increased by 34 per cent. In the Mixed with Dairying group total steers remained steady between 1942 and 1947 and were only 3 per cent higher in 1950. The most marked response however occurred in the Predominantly Dairying group; between 1942 and 1947 total steers fell by 25 per cent, but in the subsequent period increased by 77 per cent, raising the 1950 total to 33 per cent above the 1942 level.

The final phase, and the one of most immediate importance, covers the period 1950 to 1953 when the numbers of steers reared has been affected, first by the withdrawal of the Calf Rearing Subsidy, and then by its subsequent reintroduction as the renamed Calf Production Grant. In the Hill group, total steers declined each year between 1950 and 1953, and in the latter year were 17 per cent below the 1950 level, and back to 1947 numbers. In the Marginal group the decline was more marked between 1950 and 1952, but with the reintroduction of

the Calf Subsidy there was a slight recovery in 1953, and, although it left total numbers well below the 1950 level, not all the ground gained between 1947 and 1950 had been lost. In the Mixed with Dairying group farmers had been little influenced by the "change of emphasis" in 1947, and so too when the Calf Subsidy was withdrawn no adverse effect followed, and total steers were slightly above the 1950 level in both 1951 and 1952, and a sharp increase occurred in 1953 bringing total steers in that year to 15 per cent above the 1950 level. In the Predominantly Dairying areas total steers expanded rapidly and continuously from 1947 to 1953, and in the latter year were 77 per cent above the 1950 level, and more than three times as numerous as in 1947. However, a study of the much more sensitive indicator of farmers' reactions towards beef production which is provided by a study of changes in numbers in steers under one year old shows a rather different trend in this group, but confirms the trend shown by changes in total steers in the other three groups. In the Predominantly Dairying group the number of steers under one year old reached a peak in 1951, but the withdrawal of the Calf Rearing Subsidy provoked a sharp fall in 1952, while its reintroduction brought about an even more marked increase in 1953, changes not revealed by a study of the total number of steers.

We are now, as a result of this analysis of changes in the number of steers in different farming type areas, in a somewhat better position to understand the "swing to beef" which has occurred since 1950. For Somerset it has been shown that the increase in the rearing of beef store cattle has been almost entirely confined to the lowland areas: over the upland rearing areas of Somerset as a whole total beef stores were, in 1953, well below the 1950 level, and, although there is now a slight upward trend in the Brendon Hills Marginal area, the trend in the Exmoor Hill area is still downward. In part, this decline in the number of beef calves reared in the upland regions may represent the obverse of the increased rearing in the lowland areas: normally upland store rearers purchase an appreciable number of crossbred type calves from the lowland areas for rearing each year. Owing to the increased rearing of beef calves in the lowland areas of Somerset, and to a considerable export of beef type cross-bred calves out of the county, calves suitable for rearing for beef had become, in the Spring of 1953, both very scarce and very dear to buy, with the result that upland store rearers in Somerset were able to obtain considerably fewer calves for rearing than had been the case in former years.

Exactly how it is that rearing calves, too dear in Somerset for local store rearers to buy, can find a keen market in the north of Scotland is a point that would bear examination. In any case however the capacity for any further expansion in beef store cattle rearing in the upland areas of Somerset is probably limited. These areas, and especially the Exmoor Hill area, are very heavily stocked with sheep, and further increases in production from these areas are dependent upon the further raising of the level of productivity of crops and grassland which, if it occurs at all, is likely to be a long-term objective. Further, increases in cattle numbers will be dependent in the case of many farms upon the provision of facilities for housing the increased numbers. Also, while the Hill Cow Production Grant continues, and while surplus beef type calves from lowland areas remain so dear, it seems probable that many store rearers in this area will make the adjustment indicated as appropriate to this situation, preferring to keep more cows for the sake of the production grant they attract, and to buy fewer extra calves for rearing. Already there are strong indications that this is what is happening on the Exmoor Hill farms.

It is in the Mixed with Dairying areas that the trend in beef-cattle rearing is most interesting. Total steers remained stable in number in these areas right through from 1942 to 1952, unaffected by changes in price emphasis; not even the introduction of the Calf Rearing Subsidy promoted any increase, and neither did its withdrawal bring about any reduction. Yet it is in this farming type area that arable by-products are available, and where new leys are to be found in greatest concentration; in fact this is precisely the type of area in which it is generally assumed that the greatest scope for an increase in beef production exists. Further, although dairy herds have been expanded somewhat in these areas, this has been accompanied by a reduction of 45 per cent in total numbers of sheep between 1939 and 1952. Why is it then that after ten years of relative stability in the number of beef cattle reared the number of steers under one year old suddenly increased, in 1953, by nearly 30 per cent? In the absence of any factual evidence the explanation for this sudden awakening of interest in increased beef production on these lowland farms of Mixed with Dairying type can only be a matter of conjecture. Lack of confidence in the future of some arable crops, especially corn, is almost certainly one factor involved, allied to a suspicion that the land may have been overcropped in the last fifteen years; knowledge that the milk market is over supplied and likely to become more

so, that eggs and pigmeat do not meet so ready a market as previously; all these, together with relatively more attractive prices for beef, and the knowledge that of all forms of meat, beef alone remains in seriously short supply may, by 1952, have left many farmers in a state of indecision as to future policy, a state of balance that was possibly tipped towards beef production by the reintroduction of the Calf Rearing Production Grant.

In the Predominantly Dairying areas rather different influences have been at work. Compared with the almost static position up to 1952 in the Mixed with Dairying areas, changes in the number of steers reared in this group have been mercurial. Steers under one year old increased by 87 per cent between 1947 and 1950, and by a further 31 per cent in 1951, but, following the withdrawal of the calf subsidy, numbers fell by 17 per cent in 1952, but increased again by 35 per cent in 1953 following its reintroduction. In 1953 steers under one year old were 49 per cent higher than in 1950, and total steers 77 per cent higher. However, although the proportional increase has been much greater than in the Mixed with Dairying areas, the increase in the latter areas is of considerably greater importance: even after the total number of steers in the Predominantly Dairying districts had trebled between 1947 and 1953, they still accounted for only 3.5 per cent of total cattle, compared with nearly 10 per cent in the Mixed with Dairying areas.

This increase in the rearing of beef stores in lowland Predominantly Dairying areas is as potentially important as it is unexpected, but here again the underlying reasons can only be conjectured. Several points however are worth noting as having a bearing upon this development. Although sheep stocks in these areas were, in pre-war years, of very slight importance, only 42 per cent remained by 1947, and a further decline to 35 per cent of the pre-war level occurred between then and 1952. Further, the requirements of the increased number of beef stores would represent only a very small proportion of the total land resources available in these areas. During the war and earlier post-war years the predominantly grassland farms characteristic of these areas were hard pressed to provide the necessary food supplies for dairy cows and followers, but more recently an easing of the position with regard to purchased food supplies had reduced the strain imposed upon the land resources of these farms. Also, during the last decade or so the annual requirements for heifers for herd replacement purposes has been materially reduced by developments which have

resulted in the control of contagious abortion, the elimination of tuberculosis in an increasing number of dairy herds, new and more effective methods of combating mastitis, and by a general improvement in cowshed hygiene. The development and growing use of A.I. has had the effect of releasing land previously devoted to the maintenance of bulls, while heifers of superior breeding resulting from the use of A.I. may be reducing the incidence of culling on account of low yield. All these factors point towards the same general conclusion that in the last year or two there has emerged on many lowland dairy farms some scope for the carrying of an increased head of stock, and that this has taken the form both of an increase in the number of dairy stock, and of the rearing of calves for beef.

The extra beef calves reared are almost invariably colour-marked calves bred from cows not selected for the breeding of dairy replacements, and the general opinion seems to be that they are being reared, in small numbers per farm, on a proportion of the medium sized and larger dairy farms in these areas. These beef animals grow up together with the reduced number of dairy replacements, utilizing the food and accommodation formerly devoted to the female dairy stock that they have replaced, and, as one farmer remarked, "You hardly notice they are there, you don't miss the food they eat, and when you sell them at two years old the £50 or £60 they bring in is very welcome".

The expansion of beef store cattle rearing on grassland dairy farms is generally preferred to the introduction of a sheep flock, and sheep numbers show little or no signs of recovering in these areas. The introduction of sheep on this type of farm involves upsetting, to a greater or less extent, an established routine, which is not true of an expansion in cattle numbers, and although it is fashionable to refer to flocks of sheep on such farms as "scavenger" flocks, with the implication that they consume only what would otherwise be wasted, the truth of the matter is that sheep, if they are to make a worth-while contribution, must be adequately fed throughout the year, and are likely to compete severely with the cows for grazing at the most critical period of the year. Further, sheep on farms where hedges are cattle-proof but rarely sheep-proof are unlikely to permit their owner to proclaim that "you hardly notice they are there".

Generally speaking, therefore, the extra steers now being reared on lowland farms in Predominantly Dairying areas are very probably in substitution for a proportion of dairy replace-

ments now no longer required. In rather different circumstances too, in these areas, the same development may also be taking place. There are, in all such areas, a proportion of farms which do not produce milk for sale by reason of unsatisfactory buildings or water supply, shortage of labour, or disinclination on the part of the farmer concerned. Some of these farms are engaged in the rearing of purchased heifer calves for the production of down-calving or newly calved heifers for sale to local milk producers who do not rear all their own replacements. With the need for fewer replacements in the dairy herds, the spread of attestation, and a growing realization that the purchase of cows and heifers of unknown breeding and uncertain performance may not be the best means of maintaining a herd, the demand for cattle of this type has declined somewhat in recent years, while the price of beef type cattle has increased considerably. Cattle rearers of this type can switch at will from the purchase of dairy type heifer calves to colour-marked steer or heifer calves to rear as beef stores, and with a state of near equality between the price of down-calvers and beef stores the question of whether or not the beef animal attracts a special production grant is probably sufficient to tip the scales in either direction. If this is in fact the case it is possibly the explanation of why it was that the withdrawal of the calf subsidy and its subsequent reintroduction had a much greater effect upon the number of steers reared on farms in the Predominantly Dairying areas than in any other farming type area.

This development of beef store cattle rearing in the Predominantly Dairying areas of Somerset has had quite a significant influence upon the numbers of this class of animal in the county, for, although the numbers both as a proportion of total cattle and per 100 acres is much lower than in other farming type areas, yet these dairying areas account for a large proportion of the total area of the county. It can be estimated, very approximately, that of the total of 27,150 steers in Somerset in 1953, over 7,000 are to be found in the Predominantly Dairying areas, more in fact than in the upland rearing areas, and about one-half the number found in the Mixed with Dairying areas. Furthermore, of a net increase in the number of total steers in the county of just under 4,000 between 1951 and 1953, the two lowland-type areas each accounted for approximately 2,100, balanced by a small decrease in the upland rearing areas combined.

So far as Somerset is concerned the swing to beef store cattle

rearing between 1950 and 1953 has taken place almost entirely in the lowland areas, at first in the Predominantly Dairying areas, but strongly reinforced in 1953 by a marked increase in the Mixed with Dairying areas. In both cases this expansion springs from the utilization of calves produced as by-products of dairy herds. It seems entirely reasonable to suppose that the same considerations which have brought about this development in Somerset will have resulted in similar developments in comparable areas in the other counties of the West of England. Predominantly Dairying areas similar to those in Somerset cover the whole of the northern part of Wiltshire, and, in the Valley of the Severn, extend over the Western half of Gloucester into southern Worcester. Both Wiltshire and Gloucester, counties in which the expansion in the number of steers reared has been greatest, contain, apart from a lowland predominantly dairying area, a large proportion of light land upland arable on the Cotswolds and Wiltshire Downs, but it is not possible to say, without an analysis of parish statistics, in which districts within the counties expansion in beef cattle rearing has occurred. Observation suggests however that this expansion has certainly taken place in both farming type areas, but has probably been more important on the upland arable areas. Both the Downs and the Cotswolds have been heavily cropped over the last decade, and the maintenance of fertility is becoming a matter of concern on a considerable proportion of farms, pointing to the need for a larger head of grazing stock. Commercial sheep flocks on the Downs have largely disappeared and sheep numbers in Wiltshire as a whole, in 1953, were only 33 per cent of the pre-war level. The reintroduction of the folded flock on the Downs is precluded by present-day labour costs, while the almost complete absence of sheep-proof fences, or even of any fences at all over much of this area, leaves the establishment of free range sheep flocks dependent upon a heavy capital outlay upon fencing. On the Cotswolds these difficulties are much less acute, and in Gloucester the number of sheep in 1953 was 63 per cent of pre-war, but in both counties it appears probable that the expansion in the numbers of grazing livestock is more likely to take the form of beef cattle rather than sheep, a development which from the point of view of integration with established enterprises involved considerably less disturbance of the farming organization. There is also evidence that some farmers in this area, who previously bought only mature store cattle for finishing, are going over to rearing as well as feeding out cattle as a counter to the high price of stores.

In Hereford, and to a lesser extent in Worcester outside the predominantly dairying areas, the rearing and feeding of cattle and sheep, in association with arable farming, has for long been the traditional method of husbandry. In these counties, and in Hereford especially, wartime developments produced relatively little disturbance of this pattern. Crop production for direct human consumption increased at the expense of sheep and beef cattle, but the fall in the numbers of both beef cattle and sheep was slight compared with the reductions in the other counties of the West. Conversely, the expansion in the numbers of beef cattle since 1947 in Hereford has been slight, and further expansion is unlikely to be very marked while the traditional system of rearing one calf per cow is adhered to.

Thus, over the whole of the West of England a swing to beef has occurred since 1947, and especially since 1950, in lowland areas, and on the upland arable areas of Wolds and Downs; while numerically the increase in the rearing of cattle for beef is more important in the mixed farming areas, the proportionate increase is greatest in the predominantly dairying areas. In both cases however the increases are based upon the dairy herd which, by the use of colour-marking bulls on dairy and dual purpose cows, has provided the extra calves which alone makes this expansion possible. The most important source of evidence on this point is contained in the figures of numbers of artificial inseminations by colour-marking bulls. For Wiltshire, the proportion of total inseminations for which colour-marking bulls were responsible increased from 3.8 per cent in 1949-1950 to 8.1 per cent in 1951-52, and jumped to 14.6 per cent in 1952-53, with by far the biggest increase in the predominantly dairying area of the Wiltshire Vale. For Gloucester, the corresponding figures are 11.0 per cent, 16.5 per cent, and 23.2 per cent, although in all three periods in this case the figures included a proportion of Hereford inseminations used in Hereford and Hereford Cross beef herds. For Somerset the increase in 1952-53 was even more marked; in that year colour-marking inseminations accounted for 7.9 per cent of the total compared with only 2.0 per cent in 1951-52 and 1.8 per cent in 1949-50; there has also been, in Somerset, a considerable increase in the demand for semen from bulls of the Devon breed, though this appears to have arisen from new members, and is not connected with crossing in dairy herds. The most outstanding feature in this county is, however, the very big demand that is arising for Aberdeen Angus semen; inseminations for this breed increased from 1.3 per cent of total colour-marking bull

insemination in 1951-52 to 42.8 per cent in 1952-53, while for the Taunton and Ilminster sub-stations the proportion reached 96.1 per cent and 82.9 per cent respectively.

Inquiries made among the officers in charge of A.I. centres confirm the general picture afforded by the analysis of steer cattle numbers in the farming type areas. It appears that the use of colour-marking semen is now widespread among herds in all dairying areas of the West, and not confined to any particular area or size or type of herd. Generally speaking, dairy herds on small farms are selling off the colour-marked calves, many of which go to the Midlands for rearing; these farms usually cross to the Hereford, possibly because the Hereford cross bullock is better known and commands a higher price in that area. Many of the medium and larger sized farms however are not only breeding but also rearing these colour-marked calves, but it is very difficult to discover at this stage whether it is intended to finish off the cattle on these farms, or whether they will be sold as adult stores for feeding out elsewhere. Again generally speaking, the smaller farms, and the larger farms with the rougher types of dairy herd, which intend to sell off the calves are those using the Hereford for colour-marking calves; the better quality herds, especially on the medium and larger farms where the intention is to rear the calves, appear to prefer the Angus for crossing, and this breed finds a special use for Friesian heifers, not only to provide a good quality beef store, but to facilitate calving. The higher prices prevailing for beef, and the reintroduction of the calf rearing subsidy, together with signs of actual or potential over supply of a number of arable and livestock products, have brought about a marked increase in beef store cattle rearing in lowland areas, not only in the Mixed with Dairying areas but also in the Predominantly Dairying grassland areas, but has had relatively little effect on these lowland areas traditionally devoted to the rearing and feeding of store cattle, and even less upon the upland marginal rearing areas. An attempt to discover why farmers in the upland areas of S.W. Somerset have responded so little to the more favourable economic circumstances associated with store cattle rearing in the last few years was one of the main objectives of the investigation which forms the subject of this report.

**A Survey into the Economics of Milk Production and
Beef Store Cattle Rearing in the Brendon Hills
Upland Marginal Farming Area of S.W. Somerset
1952-53**

THE SURVEY AREA:

The Brendon Hills district of S.W. Somerset takes the form of an undulating plateau lying at a general elevation of 800 to 1,000 feet, but rising in some limited areas to well above this level. To the north and east the district rises steeply out of, and is sharply distinguished from, the fertile vales of Williton and Taunton, while to the west it merges into the still higher-lying Exmoor region, and to the south descends rather less precipitously into the hilly country of North Devon. The region is much intersected with deep coombes, giving rise to steep fields and difficult transport conditions.

This is a marginal farming district, and over the entire area the soils, derived from the Devonian formation, are thin, stony, and often podsolized and of poor quality. Annual rainfall rises from 40 inches on the eastern fringes to 50 inches or more in the western areas where the region joins with Exmoor. Winter temperatures are not extreme, though falls of snow are a frequent occurrence, and the main limitation imposed by climate is found in a combination of cold and penetrating wetness in winter, and high humidity in the form of rain, mist, and late-persisting dews in summer. Spring is late arriving in these hills and, with an early onset of winter conditions, the growing season is considerably shorter than in the lowland areas only a few miles away.

Since the development of motor transport this area is no longer remote in the sense that it is difficult of access from surrounding districts: such difficulty of access as now persists is very largely a matter of the situation of house and buildings in relation to parish roads. The farmstead is typically situated in a sheltered hollow in a hillside near a source of water, and is generally some distance from a metalled road, which tend to run along the tops of the hills or along the river valleys. The farm lane giving access to the buildings often crosses several fields and, being steep, and rarely better than a roughly compacted stone-based track, is frequently a deterrent to all forms

of motor transport. The parish roads, though often steep and narrow, are well metalled, and maintained in first-class condition. Fortunately too, now that the benefits formerly reserved to hill farming districts have been extended to marginal farming areas under the Livestock Rearing Act, great progress is being made in improving and surfacing the access road on many farms.

Fields in this district are small in size, and even on the farms of over 250 acres do not average more than 7 acres in extent, while on the smaller farms they are commonly of less than 4 acres. Almost universally these fields are divided by high earth banks, up to 10 feet wide at the base, and surmounted by a beech hedge. Although the combination of small fields and high banks and hedges permits flexibility in the control of cropping and stocking, and provides much needed shelter for stock, they also give ideal harbourage to a truly enormous rabbit population, to the great detriment of both crops and banks. The banks and hedges erected in former times when labour was both plentiful and cheap present, under the radically changed circumstances of today, one of the biggest problems with which farmers in the district have to contend, not only with regard to the heavy labour cost involved in maintaining them in some semblance of order, but, from the point of view of liability for dilapidations when a tenancy is given up, problems which every increase in wage rates makes more intractable. It is perhaps fortunate from this point of view, though from few others, that owing to the break-up during this century of several large estates that formerly covered most of this area, the Brendon Hills today has a rather higher proportion of owner-occupiers than is found in the county as a whole.

The basic physical limitations of high elevation, low temperature, excessive rainfall, thin soils and a short growing season, associated with steep fields and heavy leaching from the soil of natural and added soil nutrients, provide a combination of adverse natural factors which give rise to the primary economic limitations from which such areas suffer. Productivity per acre under these conditions is inevitably low; even at a lower level of output, input-output relationships are often less favourable than in the lowlands, while lack of flexibility in the use to which the land can be put leads to a high degree of specialization. The upland farmer is precluded from the production of virtually the whole range of cash crops, and arable cropping is limited in extent, restricted in range, and subsidiary to the

requirements of livestock. This has led in the past to an enforced concentration upon the production of store sheep and cattle, an extensive form of production which offers limited scope for intensification, and which, in view of the fact that there are no guaranteed prices for store stock, is very vulnerable to economic changes, and to enforced sales on a poor market when keep is short.

This region, for all practical purposes, may be considered to be covered by the eleven parishes indicated in the footnote on page 268. Altogether the area contains 324 holdings of one acre and upwards, which cover a total area of 40,600 acres, of which just over 5,000 acres is returned as rough grazings. In view of the extensive nature of store rearing, which, if it is to yield an adequate living, needs to be conducted on a relatively large acreage, it is surprising to find that the Brendon Hills contain a large number of small farms. Nearly 36 per cent of these 324 holdings are of less than 50 acres in extent, while more than one half are under 100 acres, and 70 per cent less than 150 acres. Farms of 150 to 300 acres account for 25 per cent of total holdings, and those over 300 acres for 5 per cent. Furthermore, there is abundant evidence, derived from maps, farm leases, and title deeds that at some previous period the number of small farms in this district was much greater than at the present time. A number of farms included in the present survey have been formed by the amalgamation of two, three, and in one case five formerly separate holdings. In many cases, such buildings as existed on these smaller holdings have vanished, leaving the present farm with a range of buildings quite inadequate to its present size. Historically these small holdings most probably were subsistence or part-time holdings, with the occupier in the latter case also working on the larger farms in the district, or, perhaps, employed in the mineral mines at one time operating in the area. Be that as it may, despite a considerable amount of amalgamation it still remains true that, in an area of unfavourable physical and economic conditions, requiring a relatively large acreage for the successful pursuit of the traditional extensive system of store rearing, a very large proportion of small farms remains, and most of these normally provide, at the present time, the main source of income for a farming family.

DISTRIBUTION OF MILK PRODUCTION IN THE BRENDON HILLS:

The trend in store cattle numbers in this area has been outlined already, and it only needs to be noted briefly that, following

a fall in numbers between 1939 and 1947, a considerable expansion took place between 1947 and 1950, followed by a sharp decline in 1951, a further slight fall in 1952, and an increase in 1953 which carried the total number of steers to 84 per cent, and steers under one year old to 88 per cent of the 1950 numbers. In contrast to this trend total sales of milk from all milk-selling farms in these same eleven parishes increased from 701,908 gallons in 1948 to 817,402 gallons in 1953, an increase of $16\frac{1}{2}$ per cent. For Somerset as a whole, over the same period, total milk sales increased by nearly 20 per cent. Milk sales per acre of crops and grass averaged 125 gallons for Somerset in 1953, but only 23 gallons per acre in the Brendon Hills. As a further aid to a correct perspective it may be noted that the Brendon Hills accounted for about 4.5 per cent of the total area of crops and grass in Somerset in 1953, for 10.0 per cent of total steers, but for only 0.82 per cent of total milk sales.

During 1948 there were 129 registered milk producers on the Brendon Hills, but 39 of these were no longer on the register in 1953. Of these 39 farmers, twelve still occupied the same holding as in 1948 but had given up milk selling; of these twelve, eight sold less than 2,000 gallons per year in 1948, and four of these less than 1,000 gallons; two only sold more than 7,000 gallons per year. Of the 27 remaining holdings that experienced a change of occupier between 1948 and 1953, 16 were held in the latter year by farmers who continued to sell milk from the holding, but in the other eleven cases the new occupiers were not engaged in the production of milk for sale. Altogether therefore, milk selling ceased, between 1948 and 1953, on 23 farms on the Brendon Hills, but it also commenced on 19 holdings from which, in 1948, no milk was sold, and the total number of registered producers fell only very slightly from 129 in 1948 to 125 in 1953.

It is unfortunately not possible to trace the gradual expansion of milk production in this district from the early days of the Milk Marketing Board as the relevant records for the pre-war and early war years were disposed of as salvage during the war. It is useful however to examine the structure of the enterprise as it existed in 1953.

Of the 324 holdings in the eleven parishes, 125, or 38.6 per cent, were selling milk, but if the very small holdings of under 20 acres are eliminated from both counts, 117 farms out of a total of 257, i.e. 45.6 per cent, were producing milk for sale. Of this total, four farms sold only very small quantities of retail

milk at the farm door in isolated regions where no alternative supply is available, so that 113 holdings, or 44 per cent of all holdings of 20 acres and over may be considered to be selling milk as a matter of deliberate policy, rather than to provide a service in areas which would otherwise be without a source of milk supplies. If the incidence of milk selling is considered in relation to size of holding it is found that on holdings of less than 20 acres of total crops and grass, 12 per cent are selling milk, 45 per cent of those of 20 to 50 acres, 52 per cent on holdings of 50 to 100 acres, and on 53 per cent of farms in the 100- to 150-acres size group. In the 150- to 200-acre group the proportion falls to 41 per cent, and to 35 per cent for farms between 200 and 300 acres; while 30 per cent of the largest farms of over 300 acres are engaged in milk selling. Although milk production is most concentrated among farms of 50 to 150 acres it is nevertheless widely spread throughout the entire range of farm size.

Within the area as a whole there are some quite marked differences in the concentration of milk production; it is greatest in the parishes of Upton and Skilgate where, among holdings of 20 acres and over, roughly two out of every three farmers are milk sellers, compared with one out of two in Huish Champflower, Chipstable and Timberscombe, two out of five in Dulverton, and roughly one out of three in the remaining parishes. Judged on the basis of milk sales per acre for the parish as a whole, Timberscombe is outstanding, with 54 gallons per acre, followed by Dulverton and Huish Champflower with slightly over 30 gallons per acre; at the other extreme Clatworthy has less than 10 gallons per acre. Average annual sales per producer exceeded 10,000 gallons only in the parishes of Timberscombe and Dulverton, and were less than 5,000 gallons per producer in five of the eleven parishes. On all counts, the incidence of milk selling was considerably less pronounced in the parishes of Clatworthy, Brompton Regis, Exton and Luxborough.

The proportion of total annual sales marketed during the winter six months in 1952-53 was 47.3 per cent for the district as a whole, compared with 47.6 per cent for the Mid-Western M.M.B. Region. There is thus no indication of that maldistribution of sales, high in summer and very low in winter, often alleged to be inevitably associated with milk production in upland regions. In fact, the monthly distribution of milk sales for the Brendon Hills in 1953-53 closely followed the general pattern for the Mid-Western Region, with a slightly

lower proportion of sales during the period January–April, and a slightly higher proportion in July–October, while the peak is actually lower for the Brendon Hills than for the Region.

This fairly even distribution of milk sales throughout the year is obviously not found in all parishes, and still less on all farms. The proportion of winter milk varied between parishes from 43.9 per cent in Upton to 52.0 per cent in Timberscombe; it is below 45 per cent in three of the eleven parishes and above 47 per cent in another three. On individual farms the extreme range of winter milk is from 19.4 per cent to 71.2 per cent of total yearly sales. Forty-eight per cent of all farms had more than 45 per cent of sales during the winter, and 12 per cent of farms had more than 55 per cent; at the other extreme nearly 10 per cent of farms had less than 35 per cent of winter sales, and 14 per cent had 35 to 40 per cent of total sales during the winter six months.

Of total milk sales in the area in 1953 nearly 95 per cent were by wholesale. In most parishes retail sales were less than 3 per cent of the total, and were less than 1 per cent in two parishes; only in Dulverton and Brompton Regis did sales by retail exceed 10 per cent.

In Table 7 data relating to the milk-selling farms, distributed by size of farm, are set out.

TABLE 7

Milk Producing Farms on the Brendon Hills: Number and Size of Farms, Milk Sales per Producer, and Number of Cows per Farm: by Size Groups 1953

Size group: Crops and Grass	Number of Farms		Average Farm Size	Milk Sales		Number of Cows per Farm	Per cent of "Dairy" Cows
				Average per Pro- ducer	Per cent of Total		
Acres	No.	%	Acres	Gals.	%	No.	%
Under 20	8	6.4	14.8	1,693	1.7	3.75	86.7
20–50	23	18.4	34.3	4,636	13.6	7.78	84.9
50–100	30	24.0	75.2	5,793	22.2	10.97	74.8
100–150	27	21.6	123.0	6,614	22.8	12.82	54.6
150–200	16	12.8	174.8	7,381	15.1	15.19	60.9
200–300	15	12.0	240.0	8,536	16.3	19.00	60.7
300 & over	6	4.8	369.0	10,833	8.3	22.50	61.5
All Farms	125	100.0	120.8	6,269	100.0	12.38	65.7

Milk producing farms are most commonly found in the 50- to 100-acre size group, but occur only slightly less frequently in the 20- to 50-, and 100- to 150-acre groups. These three size groups together account for 64.0 per cent of total producers and 58.6 per cent of total milk sales. Farms of less than 20 acres contribute 6.4 per cent of producers but only 1.7 per cent of total sales, while at the other extreme farms of over 300 acres account for less than 5 per cent of producers but over 8 per cent of sales.

With increasing farm size the rate of stocking with cows decreases steadily; on farms of up to 50 acres the rate of stocking was over 20 cows per 100 acres, falling to 10 in the 100- to 150-acres group, and to 6 cows per 100 acres on the largest farms. This decrease reflects the increasing emphasis on sheep as farm size increases, until, in the largest size groups, cattle are of only relatively minor importance. Of the farms under 20 acres, one in three carried some sheep, a surprisingly high proportion for farms so small, while just under half the farms in the 20- to 50-acre group also had sheep. The proportion rises to nearly two-thirds of farms in the 50- to 100-acre group, three-quarters in the 100- to 150-acre group, and to seven out of eight farms in the 150- to 200-acre group; for farms of over 200 acres the proportion with sheep increases to over 95 per cent.

Sales per farm increased, on average, with increasing farm size, ranging from approximately 1,700 gallons per year in the smallest size group to 5,800 to 6,600 gallons for farms of 50 to 150 acres, and to 10,800 gallons in the largest size group. There were however within each size group very wide differences between the amount of milk sold per farm, much greater than the differences in the number of cows kept. These differences reflect the relative emphasis placed upon store cattle rearing and milk selling, and all combinations can be found between the extremes of milk selling with the complete exclusion of all store rearing, to store rearing associated with the sale of very small quantities of retail milk. Thus, annual sales of less than 2,000 gallons were made by 18 of the 125 producers, and, although five of these had holdings of less than 20 acres, six were found on farms of over 150 acres, and two on farms of over 300 acres. Of these six larger farms one sold only small quantities of retail milk at the farmhouse door, but the other five were selling milk surplus to rearing requirements in a few months during the summer. At the other extreme there were eleven producers, 8.8 per cent of the total, selling more than

15,000 gallons per year, and, of these, six were on farms of over 150 acres, but one was a farm of just under 50 acres. Altogether, just under 49 per cent of all milk sellers sold less than 4,000 gallons per year—an average of about 11 gallons per day—and they accounted for under 20 per cent of total sales, while 21 farms, 16·8 per cent of producers, with annual sales in excess of 10,000 gallons accounted for 45 per cent of total sales. The most common gallonage sold is 2,000–4,000 per annum—5½ to 11 gallons per day on average over the year—and although most cases, 75 per cent, occur on farms of 20 to 150 acres, they are found in all size-of-farm groups, including the largest. Of the 37 farms exceeding 150 acres in size, 14 sold less than 4,000 gallons per year, and 6 of these sold less than 2,000 gallons.

To summarize briefly, numbers of store cattle have tended to fall on the Brendon Hills during the last few years, and although the trend is at present upwards, numbers are below the level reached in 1950. In contrast, milk sales continue to expand although the total number of farms selling milk has fallen slightly since 1948, and there has been a considerable turnover of both farms and farmers engaged in milk selling. The production of milk for sale, although most commonly encountered on farms of 50 to 150 acres, is widely spread over the entire range of farms, but tends to decrease in relative importance with increasing size of farm, a change associated with the growing importance of sheep as farm size increases. Although sales per farm tend to increase with size of farm, within the groups of medium and large farms there is considerable variation dependent firstly upon the relative emphasis placed upon milk selling and store rearing within the cattle enterprise, and secondly upon the relative importance on individual farms of the sheep and cattle enterprises. Generally speaking however, sales per farm tend to be small, even on a substantial proportion of the medium sized and larger farms, and on nearly one-half of all milk selling farms milk sales do not exceed an average of 10 gallons per day throughout the year. However, some 45 per cent of all farms of 20 acres or over on the Brendon Hills are engaged in milk selling to a greater or lesser extent.

THE SAMPLE:

Complete records were obtained for 35 farms in the Brendon Hills marginal area, and for a further ten farms on Exmoor. This section of the report is concerned with the marginal farms

only; the results for the Exmoor Hill farms are presented separately in Appendix A.

Of the 35 marginal farms for which records are available, two have been excluded from all analyses, one because a considerable amount of cattle dealing was involved, and the other because a change in farming policy occurred half-way through the period, resulting in the sale of a large proportion of the cattle on the farm. The remaining 33 farms, all of which are occupied by bona-fide working farmers, are divided into three groups, each representative of different systems of cattle management found in this district.

(1) *Dairy Group*; This group, which includes twelve farms, is restricted to those farmers whose cattle are maintained solely for the production of milk for sale, and, although some rear their own dairy replacements, none are engaged in the rearing of beef stores. Farms of this type account for less than 10 per cent of all holdings of 20 acres and over on the Brendon Hills.

(2) *Milk and Stores Group*; Included here are ten farms representing the "half-way" system of cattle management, found on 35 to 40 per cent of farms in this district, in which milk selling is associated with the rearing of beef store cattle. The relative emphasis upon milk selling varies considerably according to circumstances on individual farms: on the larger farms, where the supply of labour is often the main limiting factor, greater emphasis is placed upon sheep, and within the cattle enterprise rather more upon store rearing than upon milk selling, which is undertaken only to the extent to which labour is available for milking. The most common objective on the smaller farms where this system of management is followed may be stated to be the production of 500 to 600 gallons of milk per cow per year, of which 100 to 150 gallons is taken by calves, and the remainder sold or utilized for domestic purposes.

(3) *Store Cattle Group*: This group, containing eleven farms, represents those farmers, still slightly over half the total in the district, who follow the traditional system of beef store cattle rearing to the exclusion of any liquid milk sales; a small number however produce a certain amount of clotted cream for sale during the summer months.

ACREAGE AND CROPPING DATA:

Crop Rotations:

Over the arable land on Brendon Hill farms a regular rotation of crops is almost invariably practised. On the medium

sized and smaller farms, where sheep are of relatively less importance, the sequence of cropping is: Ley corn—Roots—Corn undersown. On farms where the proportion of arable land is limited by tenancy agreements, or by the nature of the farm itself, the ley is usually left down for 3 to 4 years, but where no such restrictions exist the ley often remains for 6 to 8 years, and even longer in the case of steeper and poorer, but still ploughable, fields. However, although this sequence of crops is generally adhered to, ley fields are not necessarily ploughed in turn; a field that has been in grass for only two to three years, but which carried an inferior sward, will be broken in preference to one that has already gone its full term, but on which the sward is still relatively good.

On the larger farms, where sheep form the predominant enterprise, and root crops are in consequence of greater importance, a more common rotation in recent years has been: Ley corn—Roots—Corn—Rape and grass seeds. However, now that purchased concentrates are freely available and cheaper, many farmers are reverting to a rotation that reduces the hazards of corn growing, and enables a greater provision of sheep fodder to be made at the expense of the corn acreage, i.e. Ley roots—Corn—Roots—Rape and grass seeds. By varying the proportion of fields cropped according to these two rotations, and the length of time during which fields are left down to grass, any desired proportion of roots to corn, or of tillage to grassland can be readily achieved. Variations of these rotations are practised on distant or inaccessible fields where the dung-cart cannot go: in these cases fields are broken as infrequently as possible, and are cropped with corn followed by folded roots, and then go back to grass by direct seeding, using rape as a companion crop. If the field is difficult to work the corn crop may be omitted, and a crop of roots for folding is followed by direct seeding with rape.

Farm Acreage:

For each of the three groups data are set out in Table 8 relating to the average farm acreage, at June 1952, for crops, grass and rough grazings.

Total farm area averaged approximately 110 acres in the Dairy group, 200 in the Milk and Stores, and 230 in the Stores group. The average size of farm in the Dairy group is considerably influenced by the inclusion of one exceptional farm of over 300 acres: nine of the twelve farms are of 100 acres or less, and three of these are under 50 acres. In the Milk and

TABLE 8

Average Acreage per Farm, and as Per Cent of Total Crops and Grass. June 1952

	AVERAGE PER FARM			PER CENT OF CROPS AND GRASS		
	Dairy	Milk and Stores	Stores	Dairy	Milk and Stores	Stores
Number of Farms . . .	12	10	11	—	—	—
TILLAGE:	Ac.	Ac.	Ac.	%	%	%
1. Cereals:						
(a) Wheat . . .	0.4	0.3	0.8	0.4	0.2	0.4
(b) Barley . . .	2.4	1.8	8.2	2.6	1.0	3.9
(c) Oats . . .	5.7	10.4	10.2	6.1	6.1	4.9
(d) Mixed Corn . . .	2.4	4.7	4.2	2.6	2.8	2.0
Total Cereals . . .	10.9	17.2	23.4	11.7	10.1	11.2
2. Roots and Green Fodder:						
(a) Mangolds* . . .	0.6	0.9	1.5	0.6	0.5	0.7
(b) Turnips . . .	2.7	8.8	10.3	2.9	5.2	4.9
(c) Swedes . . .	0.6	1.9	3.0	0.6	1.1	1.4
(d) Kale . . .	3.2	1.7	0.9	3.5	1.0	0.4
(e) Cabbage . . .	0.5	1.2	0.7	0.5	0.7	0.4
(f) Mixed roots . . .	1.9	2.3	3.8	2.1	1.4	1.8
(g) Potatoes . . .	0.4	1.5	0.7	0.4	0.9	0.4
(h) Arable Silage . . .	—	0.4	0.3	—	0.2	0.1
Total Roots, etc. . .	9.9	18.7	21.2	10.6	11.0	10.1
Total Tillage . . .	20.8	35.9	44.6	22.3	21.1	21.3
GRASSLAND:						
(a) For Mowing . . .	25.1	31.9	40.1	26.9	18.7	19.1
(b) For Grazing . . .	47.3	102.6	124.5	50.8	60.2	59.6
Total Grassland . . .	72.4	134.5	164.6	77.7	78.9	78.7
Total Crops and Grass . . .	93.2	170.4	209.2	100.0	100.0	100.0
Rough Grazings . . .	17.7	28.3	23.0	19.0	16.6	11.0
TOTAL FARM ACREAGE . . .	110.9	198.7	232.2	119.0	116.6	111.0
Total Adjusted Acreage . . .	96.1	172.9	214.3	103.1	101.5	102.5
Temporary Grassland . . .	40.8	75.4	60.6	43.8	44.2	29.0
Permanent Grassland . . .	31.6	59.1	104.0	33.9	34.7	49.7

* Includes a small proportion of Fodder Beet in all groups.

Stores group, where the average size of farm is nearly twice as great, only two farms, the smallest of which is 70 acres, were under 100 acres in total area; five farms fall within the 100-

200-acre range, and three were above 300 acres in extent. Farms in the Stores group are still larger; the smallest is 90 acres and, but for the circumstance that this particular farm was very remote from a pick-up point for milk, would have been engaged in milk selling. The next smallest farm in this group was 180 acres, and eight of the twelve farms were of more than 200 acres.

Dairying is thus largely confined to small and very small farms, is only infrequently found on the medium sized, and rarely on the large farms. Milk production associated with beef store cattle rearing, in a wide range of relative importance of the two products, is found on farms of all sizes, although it tends to be most concentrated on the medium sized farms: generally speaking, the smaller the farm the greater is the relative importance of milk selling, and vice versa. Store rearing unassociated with milk selling is typically found on the medium and large farms, and only infrequently on small farms. This tendency for the different systems of production to be associated fairly closely with size of farm is in itself significant: the small farm, if it is to provide an adequate level of income, must be managed on intensive lines, while the large farm can achieve the same total production with a lower level of production per acre spread over a much greater area. If the twenty-two milk selling farms in the survey are sub-divided according to the proportion that the value of milk sales bears to the value of the total production of the cattle enterprise, this association of increasing dependence upon milk sales with decreasing size of farm is clearly shown:

<i>Value of milk as per cent of total production of the cattle enterprise</i>	<i>Number of Farms</i>	<i>Average adjusted acreage per farm</i>
<i>%</i>	<i>No.</i>	<i>Ac.</i>
Less than 60 .	6	223
60 to 70 .	3	170
70 to 75 .	5	106
75 to 85 .	4	77
85 and over .	4	65

Cropping:

Of total farm area, rough grazings accounted for 16 per cent in the Dairy group, 14 per cent in the Milk and Stores and 10 per cent in the Stores group; the fact that the highest proportion occurs among the smallest farms is, at first sight, surprising. The Brendon Hills district is, with a few exceptions of

slight importance, all enclosed, and rough grazings are most commonly found on the sides of the numerous small valleys where land is often so steep and rocky as to be virtually waste, or in fields which, by reason of gradient, altitude, aspect or inaccessibility have reverted to natural vegetation. The smaller dairy farms tend to be located in the sheltered valleys, and, together with the advantage of the more fertile land in the valley bottoms, have to accept a high proportion of rough land on the steep sides of the valleys.

The proportion of the total area of crops and grass that is in tillage is very similar in all three groups at slightly over 20 per cent, and, in each group, is divided almost equally between cereals and root crops. Only one farm, in the Dairy group, grew no cereals at all, but several others among the smaller farms in both milk selling groups do not intend to continue with cereal production now that purchased feeding stuffs are freely available. Wheat, mainly for poultry, is grown only on a very few farms, while barley is important only on farms where pigs are kept on a commercial scale. With the one exception already noted, oats and/or mixed corn were grown on all farms in all groups, and were by far the most important of the cereal crops, especially in the two milk selling groups.

In the overall proportions of crops and grassland, and in the division of crops between cereals and roots, there is a marked similarity between the groups despite very considerable differences in average farm area, and in the systems of cattle management practised. It will be shown later however that in the provision of root crops for cattle very marked differences exist between the groups, with a much higher proportion of root and green fodder crops provided in the Dairy group. The fact that the proportion of farm area under root and green fodder crops is almost identical in the three groups arises from the balancing influence of sheep requirements: sheep are much more numerous on the larger farms of the two store rearing groups than on the dairy farms, nearly three-quarters of which keep no sheep at all.

As a consequence of the differing emphasis upon sheep there are marked differences in the proportion of the various types of roots and green fodder grown in the groups. On most farms in all groups a wide variety of root crops are provided; a policy of "not too many eggs in one basket" typifies the attitude of most Brendon Hills farmers towards their cropping policy, an approach bred by long experience of the very unreliable climatic conditions in this upland region. Root crops were rather

less varied on these farms where no sheep are kept, but where sheep are important, anything up to eight root and green fodder crops are provided, with five separate crops the most common number. In the Milk and Stores, and Stores groups, over 75 per cent consists of turnips, swedes and mixed roots, grown mainly for the sheep, and only 10 per cent and 4 per cent respectively of kale, compared with 33 per cent of kale in the Dairy group. Even of the smallest farms in the Dairy group three or four separate crops are commonly provided for cattle, most of which do not occupy more than a fraction of an acre on any farm.

Grassland accounts for just under 80 per cent of total crops and grass in all three groups but, whereas nearly one-third of this is cut for hay or silage in the Dairy group, the proportion is less than one-quarter in the two store rearing groups. The proportion of total grassland returned as temporary grass averages 56 per cent in each of the two milk selling groups, but only 37 per cent in the Stores group. The distinction between temporary and permanent grassland as made in the census returns is, however, notoriously unreliable. Farmers commonly base their returns on the schedules of an existing or, in the case of owner-occupiers, of a former lease; any fields shown as arable on such a lease will frequently be returned as temporary grass irrespective of the length of time it has been in grass, and of future intentions regarding it. A better indication of the importance of leys, though still a far from satisfactory one, is provided by the incidence of maiden leys. These accounted for 12 per cent of total grassland in the Dairy group, 9 per cent in the Milk and Stores, and 6 per cent in the Stores group. On this basis of calculation leys of four years and under would account for approximately 48 per cent of the total grass acreage in the Dairy group, 36 per cent in the Milk and Stores, and 24 per cent in the Stores group.

Taken all round there is surprisingly little difference between the groups in the general pattern of cropping. Even where the transition to dairying has been complete, with the elimination of both sheep and store cattle, this has been effected with only the minimum disturbance of the traditional overall cropping pattern, involving mainly the substitution of kale for turnips, the cutting of a rather higher proportion of grassland for hay, and a rather greater proportion of leys in the total grassland acreage.

Before leaving this question of cropping, it is worth while noting a new practice—new to the Brendon Hills, which is being developed on, as yet, a very small minority of farms in

the district, but which is of the greatest potential importance. On farms in upland areas of this type stocking capacity is governed chiefly by the numbers of stock that can be wintered, and the critical period is in the early spring, before the pastures have produced any growth, and when food stocks for both sheep and cattle are normally at a very low level. In a bad season this "hungry-gap" period is one of acute anxiety, especially for those who seek increased output by heavier stocking, with the additional risk that this entails. Provision of an early bite from specially sown mixtures is proving to be a most potent weapon in this particular "battle of the gap". As developed on the Brendon Hills, the most common practice is to undersow ley corn, which is to be followed by a root crop, with Italian Rye grass or Devon Eaver, either alone or with trefoil. In order to reduce the risk of difficulty at the time the corn is harvested, sowing of the grass seeds is delayed until the corn is well up. After harvest the young seeds may be used for flushing the ewe flock, after which it is unstocked, and the dressing of dung normally applied to the following root crop is spread over the field early in the New Year to stimulate an early bite for ewes or for milking cows. Any portion of the field required for mangolds, cabbage, etc., is then ploughed, but where crops such as turnips are to be sown, as will in fact be the case in most instances on all but the dairy farms, further valuable grazing is available during the early months up to June, and it has proved possible in favourable circumstances to take a cut for silage before ploughing.

In some cases where fields are not too clean, or where the risk of additional trouble from grass material in the sheaves at harvest time is not thought justified, an alternative practice is to work the "arish" immediately the corn is off and sow the grass seeds directly. This procedure will not always be possible in a wet season, and in any case the autumn grazing is lost. Which-ever method is adopted however it represents an additional crop obtained from land which would otherwise be temporarily idle, and is available for feeding at a period of the year when it will be of the greatest possible value. The reduction in the corn acreage which is likely to occur in this district will somewhat limit the scope of this practice, but the overwhelming necessity for providing additional keep in the early spring is such that it calls urgently for the provision of an early bite, either by appropriate stocking and manurial treatment of the general purpose leys, or even, if need be, by the provision of special leys to fulfil this purpose.

RENT:

The average rent, or rental value, per farm and per acre for the three groups is set out below:

	Average per Farm		
	Dairy	Milk and Stores	Stores
	£	£	£
Farmhouse	13.5	12.4	14.7
Cottages	2.2	4.8	8.4
Buildings	12.2	11.7	14.2
Total	27.9	28.9	37.3
Crops and Grass	134.7	149.9	186.4
Rough Grazings	5.3	5.3	4.3
Total Farm Rent	167.9	184.1	228.0

	Average per Acre		
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Crops and Grass	28 11	17 7	17 10
Rough Grazings	5 11	3 9	3 8

Total farm rent averaged £168 per farm in the Dairy group, very little less than in the Milk and Stores group for farms nearly twice as large. The average rent per acre of crops and grass in the Dairy group was 28s. 11d. compared with less than 18s. 0d. per acre in the two store rearing groups; on the smaller dairy farms the average rent of the land reached nearly £2 per acre. Total rental value assessed for all buildings on the farm averaged about 16 per cent of total farm rent in each group, a higher proportion for cottages in the two store rearing groups being offset by a lower proportion for farmhouse and buildings. Six of the twelve farms in the Dairy group have buildings licensed for the production of T.T. milk, a grade of milk produced by only two of the ten farms in the other milk selling group.

It is difficult to know what valid inferences can be made regarding relative quality of land and buildings from the average rental values of groups of farms. The rent structure for agricultural land is so chaotic at the present time that very substantial differences indeed exist between essentially similar farms according to the date of tenancy or purchase. In the case of the farms in this survey, those in the Dairy group, unlike those in the two store rearing groups which are well scattered throughout the area, are mainly situated in parishes on the southern part of the hills, where conditions of soil, elevation and aspect are all slightly more favourable. On the

other hand the proportion of tenancies, or owner-occupation, dating from pre-war days is very much lower in the Dairy group, and it is impossible to say to what extent the higher rental value of the land in this group is due to better quality and situation of the land, to the much higher incidence of post-war occupations and tenancies, or to the premium commanded by holdings equipped and otherwise suitable for milk production, although the last consideration may well be the most important.

STOCKING: NOVEMBER, 1952

The average number of stock carried per farm at the time when the investigation commenced in November, 1952, is summarized in Table 9. A much more detailed analysis of cattle numbers is presented later.

TABLE 9
Average Number of Stock per Farm: November, 1952

	Dairy	Milk and Stores	Stores
	No.	No.	No.
CATTLE: Cows	15.7	12.7	12.8
Other cattle	10.5	31.6	37.5
Total Cattle	26.2	44.3	50.3
SHEEP: Breeding ewes	30.0	118.0	156.0
Other sheep	26.0	91.0	139.0
Total Sheep	56.0	209.0	295.0
PIGS: Breeding pigs	1.3	0.9	1.4
Other pigs	8.7	6.7	9.8
Total Pigs	10.0	7.6	11.2
HORSES	1.2	2.4	2.2
POULTRY	102.0	220.0	195.0

Total cattle carried per farm averaged 26 in the Dairy group, rising to 44 in the Milk and Stores group, and to 50 head per farm in the Stores group. Numbers of cows however are highest in the Dairy group with 15.7 per farm, compared with less than 13 in the other two groups. For every three cows carried in the Dairy group there are approximately two followers, compared with two and a half followers per cow in

the Milk and Stores group, and nearly three per cow in the Stores group.

Sheep were kept on only four of the largest farms in the Dairy group, on all but two of the Milk and Stores group, and on all farms in the Stores group, averaging approximately 56, 210 and 300 sheep per farm respectively in the three groups. Nearly all farms in all groups had at least one pig fattening for the house, while over half the farms in the Dairy group, three-quarters in the Stores group, but only one-third in the Milk and Stores group had one or more breeding sows per farm. The largest number of sows on any farm however was only four, and even at this level were restricted to three farms in the Dairy group and one farm in each of the other two groups. Horses averaged just over one per farm in the Dairy group and over two in the other two groups where, however, more than half the horses consist of riding ponies kept for herding and shepherding. Five farms, all in the Dairy group, had no horse at all, but it may be noted in passing that all farms in all groups, including farms under 50 acres, possessed at least one tractor. Poultry are kept on all farms and, in all cases but one, on a scale permitting some commercial production, although about half the flocks were of 100 birds or less. Average numbers of poultry per farm were highest in the Milk and Stores and the Stores group, but one large flock in the former group accounted for 40 per cent, and one flock in the latter for 26 per cent of all poultry in the group.

In order to compare the relative density of stocking in the groups the average numbers of stock carried per 100 adjusted acres of total farm area are set out in Table 10.

Total cattle per 100 adjusted acres are highest in the Dairy group, and cows in that group were more than twice as numerous as in the two store rearing groups. Stocking with sheep increased as the importance of milk production declined, from less than 60 per 100 acres in the Dairy group to double that number in the Milk and Stores group, and to nearly 140 sheep per 100 acres in the Stores group. Numbers of pigs, both breeding and store pigs, were twice as great in the Dairy group, while there was but little difference between the groups in the numbers of horses and poultry carried per 100 acres.

On a cow-equivalent basis, cattle accounted for 68 per cent of total stock carried in the Dairy group, of which cows accounted for more than four-fifths, 46 per cent in the Milk and Stores group, equally divided between cows and followers, and 39 per cent in the Stores group with followers accounting

TABLE 10
Average Numbers of Stock per 100 Adjusted Acres of Total Farm Area,
November 1952

	Dairy	Milk and Stores	Stores
CATTLE: Cows	No. 16.3	No. 7.3	No. 5.9
Other Cattle	10.9	18.3	17.5
Total Cattle	27.2	25.6	23.4
SHEEP: Breeding ewes	31.0	68.0	73.0
Other sheep	27.0	53.0	65.0
Total Sheep	58.0	121.0	138.0
PIGS: Breeding pigs	1.4	0.5	0.7
Other pigs	9.0	3.9	4.5
Total Pigs	10.4	4.4	5.2
HORSES	1.2	1.4	1.0
POULTRY	107.0	127.0	91.0
Total Stock as Cow-equivalent Units .	Units 35.7	Units 36.0	Units 34.8

for nearly three-fifths. In the Stores group sheep contributed 54 per cent of total stock, 46 per cent in Milk and Stores group and 23 per cent in the Dairy group. Total stock carried, on a stock unit basis, was similar in all three groups, varying only from 34.8 cow-equivalent units per 100 adjusted acres in the Stores group to 36.0 units in the Milk and Stores group. It is perhaps surprising that the density of stocking in the group of mainly small, higher rented, dairy farms is not considerably greater than in the other two groups, and especially than in the Stores group, where farms are large, and extensive systems of sheep and cattle management are practised. The need to provide, while purchased concentrates were rationed, maintenance and a proportion of the production ration from the farm acreage imposes a much more severe limitation upon the number of stock maintained on the small dairy farm than it does upon a larger farm, especially where a class of stock is kept that makes only limited demands upon concentrated foods.

The comparison of density of stocking made above relates to November, a time of year when stocking on the store rearing

farms is near its lowest point. On a dairy farm the number of stock carried varies but little from season to season, but on upland store rearing farms the density of stocking is adjusted to meet the very great seasonal variations in food supplies. In these areas, stock carried through the winter is kept to the barest minimum, but numbers increase greatly in the spring as a result of the natural increase following upon lambing and calving, and increase further throughout the summer with the increasing age and size of store stock, reaching a peak in August when, with the commencement of the store sheep and cattle sales, numbers are reduced to match the declining productivity of the pastures until, with the onset of winter, the lowest point is reached. If the density of stocking is calculated for July for these three groups a rather different picture emerges.

Density of Stocking: July as per cent of November

	<i>Dairy</i>	<i>Milk and</i>	<i>Stores</i>
	<i>%</i>	<i>Stores</i>	<i>%</i>
	<i>%</i>	<i>%</i>	<i>%</i>
Total Cattle	101	111	108
Total Sheep	110	138	135
All Stock	103	123	122

Cow Equivalent Units for All Stock: per 100 Adjusted Acres of Total Farm Area

	<i>Units</i>	<i>Units</i>	<i>Units</i>
November	35.7	36.0	34.8
July	36.8	44.2	42.4

Overall density of stocking on the Dairy farms was 3 per cent greater in July than in November, due almost entirely to increases in the number of sheep carried; stocking on those dairy farms which have no sheep was actually 5 per cent lower in July. In both the store rearing groups July stocking was more than 20 per cent greater than in November, and, although the increase in sheep stock was mainly responsible, cattle made an appreciable contribution to the increase in these groups. Total stock, as cow-equivalent units per 100 acres, shows only a slight variation between the three groups in November, but in July the density of stocking in the two store rearing groups had increased to 44.2 units and 42.4 units per 100 acres compared with only 36.8 units in the Dairy group.

BREED OF CATTLE AND HERD REPLACEMENT POLICY:

The distribution of cows, by breed, for the three groups is as follows:

Distribution of Cows by Breed: Per Cent of Total Cows

	<i>Dairy</i>	<i>Milk and Stores</i>	<i>Stores</i>
	%	%	%
Devons	3·8	37·6	82·3
Devon × Shorthorn	14·0	53·1	12·9
Ayrshire	32·8	—	—
Ayrshire crosses	4·8	—	—
Friesian	10·7	0·8	0·7
Friesian crosses	5·9	0·8	0·7
Shorthorn	9·7	6·2	0·7
Shorthorn crosses*	12·4	—	—
Other breeds and crosses	5·9	1·5	2·7
	100·0	100·0	100·0

* Crosses other than with Devon.

In the Dairy group the herds are mainly mixed and cross-bred in character, with seven of the twelve herds containing three or more breeds or crosses, although in most cases one breed or cross represents a high proportion of the total number of cows. No herd consisted entirely of pure-bred cattle of one breed, although two herds, one Ayrshire and one Red Poll, approached closely to this. Only one herd contained any pedigree cattle. In the group as a whole, pure-bred cattle accounted for 60·2 per cent of total cows, and, of these, Ayrshires, with 32·8 per cent of total cows, were most numerous. Pure-bred Ayrshires together with Ayrshire crosses accounted for 37·6 per cent, a figure closely approached by the proportion of cows having Shorthorn blood. Whereas however two-thirds of the Ayrshires were accounted for by two herds, with the remaining cows spread in ones and twos throughout most of the remaining herds, the Shorthorns are spread much more evenly over the sample. Although Ayrshires would appear to be pre-eminently suited to dairying in this upland, high rainfall area, several producers are giving a trial to Friesians and Friesian cross cows, and these in total accounted for 16·6 per cent of all cows in the Dairy group. If Friesian cattle will withstand the somewhat unfavourable winter climatic conditions in this area they have two distinct advantages compared with the Ayrshire; not only will they normally give higher milk yields but, crossed with a Devon bull, they produce a calf well worth rearing for beef, and likely therefore to command a good price among local store rearing farms.

In the Milk and Stores group the general aim on the majority

of farms, an aim incidentally not achieved by many, is to maintain a type of cow which will "put 500 gallons in the churn and 100-150 gallons in a calf" each year, and which, bred to a Devon bull, will produce a calf capable, with a good start in life, of producing a good quality beef store. To implement this policy on the milk production side it is necessary to depart from pure Devon cattle, as few cows of this breed are capable of attaining the level of milk production sought; hence the Devon \times Shorthorn cow forms the mainstay of herds in this group, accounting for 53 per cent of total cows.

A minority of farmers in this group however consider that this policy of "three teats for the churn and one for the calf" leads to the danger of falling between two stools, and that a better policy is to maintain a majority of pure-bred Devon cows to suckle their calves outdoors, and a minority of dairy or dual-purpose cows to be utilized for milk production. Thus, within the herds in this group there are a number of Shorthorn, Red Poll and Friesian cows kept specifically for milking, and selected as likely to produce, mated to a Devon bull, a calf of a type satisfactory for beef production. On two of the largest farms in this group, where sheep form the predominant enterprise, and only relatively small quantities of milk are sold, only pure-bred Devon cattle are kept, while on two of the smallest farms where no sheep are kept, all the cows were cross bred. Pure-bred Devons accounted in all for nearly 38 per cent of total cows in this group, but none of these, nor any other cattle in the group, were pedigree.

In the Stores group pure-bred Devons predominate, accounting for 82 per cent of total cows, with Devon \times Shorthorn providing a further 13 per cent. Five herds, three of which contained only pedigree cattle, consisted entirely of pure-bred Devons, and two other herds had only a house-cow of another breed. The remaining three herds in this group contained, apart from a majority of Devons, a proportion of Devon \times Shorthorn cows to provide surplus milk for the manufacture of cream. All cows in this group are bred to the Devon, and only one farm in the group utilized A.I. for this purpose. All herds are self-contained apart from the occasional purchase of dairy or cross-bred cows as house-cows, or for cream production.

Breeding and replacement policy present no difficulties to farmers in the Stores group whose system of cattle management is aimed solely at the production of beef store cattle. The case is very different in the two milk selling groups however. Of the

twelve herds in the Dairy group, five purchased all their replacements, and breeding policy consists simply of mating the cows to a Devon bull, by A.I., to obtain a calf which will command a relatively high price to rear as a beef store. Where mixed herds are kept, and replacements for the herd reared on the farm, the breeding problem becomes complex, but is very greatly assisted by the choice of breed of bull made possible by A.I. The most common policy in this case is to mate the cows breed to breed, and two herds were using semen from three different breeds of bull, and three herds from two different breeds. In some cases where this type of multiple breed policy is followed, the intention is to persist with a mixed herd until such time as a clear advantage is shown by one of the breeds under trial, at which stage only pure-bred heifers of the selected breed will be maintained for replacement purposes. In some other cases where mixed and cross-bred herds are maintained the present policy is to go right over to one chosen breed, by mating all cows to bulls of this breed, and retaining for replacements the milkiest type of heifer, irrespective of its breeding on the dam's side. Altogether, three of the twelve herds are at present in the process of changing over, by one or other of these methods, to the Shorthorn breed, one to Friesians, one to Red Poll, and one to Ayrshires: five other herds will eventually consist entirely of Shorthorns, Friesians or Ayrshires, but will continue with a mixture of pure-bred cows of two or more of these breeds for a period, pending a decision as to their relative merits. The ready choice of breed of bull made possible by the existence of an A.I. service will undoubtedly, in time, largely eliminate the calves of mongrel breeding at present emanating from many of these dairy herds, with cross-breeding restricted to the use of the Devon bull on cows not required to breed a calf for replacement purposes. It may be noted that of the twelve farms in the Dairy group eight used A.I. exclusively, two were mainly dependent upon A.I. but used a neighbour's Devon bull for some of their cows, while the remaining two farms both kept their own bull.

It is, however, among farms in the Milk and Stores group that breeding and replacement policy gives rise to the most acute problems, as indeed is inevitable where herds consisting, as a matter of policy, mainly of cross-bred cows are maintained. Cows of a reliable dual purpose breed seem to be the ideal solution to the problems, both of breeding and replacement, for a system of management combining milk production and beef cattle rearing, but this area has for so long been the

traditional home of Devon cattle, with Shorthorns common in the adjoining lowland areas, that the adoption of the Devon \times Shorthorn cow was a natural development, one which also, in the uncertain times before the war when the practice was first developed, left open the possibility of a rapid return to pure-bred Devons should a change in circumstances require it.

The most common method of obtaining replacements is by purchase. Sometimes freshly calved cows or in-calf heifers of Shorthorn cross type are bought from neighbouring dairy areas, but more commonly heifer calves or yearlings of this type are sought, to rear to calving stage on the farm. Heifer calves later bred from these purchased animals to a Devon bull may sometimes be retained as herd replacements, in the hope, not infrequently disappointed, that they will have inherited an adequate level of milk yield. However, the spread of attestation among these herds, with the attendant risk and inconvenience attaching to the purchase of replacements of unknown origin and uncertain milking capabilities, has turned the thoughts of many farmers practising this system of dual production towards the possibility of breeding their own replacements with the aid of A.I. The line of action most often contemplated is the use of Shorthorn semen on a proportion of the herd to provide the relatively few female replacements required, and using Devon semen for the remainder of the herd.

This system is already practised by one farmer included in the Milk and Stores group, but in most cases the development is still at the stage of contemplation. Much will depend upon the type of Shorthorn bull available for the supply of semen. It is held that, with a Shorthorn bull of a beefy type, not only would an adequate level of milk yield be obtained in the heifers from this cross, but any steer calves born would make very satisfactory beef stores, being larger if slightly coarser than the present cross with the Devon. It is possible by the selective use of Shorthorn and Devon semen to maintain a somewhat precarious balance between milk and beef in a cross-bred herd, although a pure breed, for example the dual purpose Shorthorn, would, if suited to the district, be very much more satisfactory from this point of view. No farmer in the group studied is contemplating such a change, but it seems to be a development well worth serious consideration. A pure-bred, dual purpose herd of Shorthorn cows should make it much easier to maintain a 600-700-gallon herd average than with a herd containing a high proportion of Devon blood. For replacement purposes a proportion of the herd could be bred

pure, and any steer calves resulting, provided a Shorthorn bull of the right type is maintained at the A.I. centre, would yield good beef stores, while the remainder of the herd, crossed to the Devon, would yield beef stores of even better quality. At the present time however nine of the ten farms are breeding to the Devon exclusively, and the remaining farm to Devon and Shorthorn. Four farms use A.I. alone and the remaining six have a bull of their own, or utilize a neighbour's bull.

REARING METHODS:

Of the seven farms in the Dairy group that reared some or all of their herd replacements, five reared the calves on the bucket, one on whole milk entirely, and the other four on whole milk for varying periods, all relatively short, followed by milk substitute and calf meal. The two farms that reared by suckling utilized stale cows or hard milkers; the calves remain on the cow for three to four months and are weaned directly on to solid food.

Among farmers in the Milk and Stores group, where it is generally accepted that a calf reared on the bucket, especially if milk substitutes are used, will "take two-and-a-half years growing to make two years growth", the great majority of calves are reared on the cow. The most common practice is to utilize a cow that has been milked for the previous 5 or 6 months, the calf remaining on the cow for the rest of her lactation. If no stale cow is available when a calf is born, the new calver may be partly milked out and the calf allowed the remaining milk: when two cows calve at close intervals one may be milked entirely and the second used to suckle the two calves. If more fresh cows are available than it is desired to milk, extra rearing calves may be bought. The system of rearing is, in fact, extremely elastic, and readily adaptable to the varying circumstances on individual farms, and according to labour requirements at different seasons of the year. Whichever method is adopted in any particular set of circumstances the calf receives a really good start in life, suckling from 100 to 200 gallons of milk. A few farms in this group practise a limited amount of bucket rearing, generally for autumn born and winter born calves, when the price of milk is high. In such cases the calves suckle a cow, generally their own dams, for 2 to 4 weeks, and are then transferred to milk substitutes, and finally to substitutes alone, receiving in all about 20 to 50 gallons of whole milk per head.

In the Stores group, where over 80 per cent of cows are pure

Devons, and where no milk is sold, the system of rearing practised on the great majority of farms is that of single suckling, the cows with their calves running out together throughout the summer. According to the time of calving the calves remain on their dams for 5 to 9 months, until weaning, which occurs when the cattle are housed at the onset of rough weather, usually in November–December, but which may be delayed until January when favourable conditions persist throughout the early winter months. The few calves that are born during the winter are usually suckled indoors, and weaned at about five months old; those born in late winter are suckled indoors and usually turned out in the spring to run with their dams, but they may remain housed by night and run in a paddock by day, with the cows brought in for suckling. Calves dropped after midsummer may be weaned at the normal time in the autumn after a relatively short period on the cow, but in other cases they will continue to suckle indoors for a further period.

Exceptions to this very general pattern of one cow one calf suckling are met with on those farms where a proportion of Devon cross cows are kept to provide milk for the house, or for the production of cream for sale. In these cases one cross-bred cow may be entirely milked out and another rear the two calves. Less frequently, the calf from a cow needed for milking may be reared on the bucket, utilizing scald milk and calf meal. Also, on some of the few relatively small farms engaged in store-rearing, where no bull is kept, difficulty is often experienced in getting cows in-calf when they are running out with their calves. In such cases the calves may be confined to a paddock near the buildings and the cows brought in twice a day. Where this system is followed the cows are under close supervision, and a proportion of cross-bred cows are often maintained, either for cream production, or to enable more than one calf to be reared per cow. However, the single suckling system, with cows and calves running out together all the time, involves the absolute minimum of labour requirements for cattle; for the majority of larger farms in this district labour supplies tend to be severely taxed during the summer months, and any modification of the traditional system of single suckling towards a more intensive system of rearing is out of the question. On the contrary, the high price required for, and the great difficulty of obtaining, suitable beef-type calves, together with the disappointing sale for clotted cream during 1953, have persuaded a number of farmers to give up cream production, and with it the attempt to rear extra calves, and to revert entirely to the

single suckling method of rearing with its greatly reduced labour requirements.

THE SEASON 1952-53:

In an upland district such as the Brendon Hills, where climatic conditions are a factor limiting production, variations in these conditions are likely to have a more marked effect upon production and profit than are the corresponding variations in lowland districts where conditions are less extreme.

By and large, the year covered by this investigation, November 1952 to October 1953, was a very favourable one for cattle. The previous summer had provided heavy crops of hay made under unusually good conditions, root crops were generally good, and with corn crops also above average farmers in this district looked towards the coming winter without any of the usual anxiety, and indeed with high hopes of a substantial carry over of hay at the end of the feeding period. However, as though to underline the uncertainties of existence in this region, winter arrived very early and with dramatic suddenness in the middle of November, with a severe freeze up followed by snow which put an end to all growth, and killed off most of the "foggage" which plays such an important part in the grassland economy of the district. Although this spell of weather, unusually severe for the time of year, was of only short duration, the damage was done, and cattle had to be housed and hand fed a good 3 to 4 weeks earlier than usual.

Subsequently winter conditions were very favourable, especially after Christmas, with long periods of dry open weather which enabled outlying cattle to obtain the maximum value from such grazing as was available. The dry weather had the effect however of delaying the spring growth of grass, and cattle were turned out about a week later than normal, and to very little grazing. Although stocks of hay had not been entirely exhausted, the indoor cattle had grown tired of their food and were restive to be out, while farmers had grown tired of feeding them. Turning out time for cattle in 1953 was generally in the third week in April for the more sheltered farms in the Dairy group, and about a week later in the Milk and Stores group, but in the Stores group, where in such a season cattle are housed up to the last moment to reserve what grazing there is for the more important ewes and lambs, turning out time for cattle was spread over the first two weeks of May. Only on those farms where corn had been undersown with, or followed

by, early growing rye grass was it possible to turn out cattle in the early part of April, usually to plenty of keep.

Although the winter feeding period was extremely long, the unusual abundance of good quality food, especially hay, resulted in cattle wintering very well indeed, but the carry over of stocks of hay, except where an early bite of grass had been provided, was generally small. However, a bullock in poor condition in spring has much less chance of making up in growth during the summer, no matter how favourable the conditions are then, a circumstance that is especially true for the breeding cow which not only has to suckle a calf throughout the summer, but needs to put flesh on her back against the coming winter. The good condition in which cattle were turned out to grass enabled them to make the most of the favourable conditions that resulted in the summer of 1953, which was a wet and exceedingly grassy period, with an abundance of grazing available right through the summer and autumn and well into the winter. As a result, store cattle sold in the autumn were in very forward condition, and the cattle remaining faced the winter with abundant reserves of grass conserved on their "backs", and as "foggage" on the grassland. No favourable situation is without its drawbacks, and husk was very troublesome on those farms liable to this complaint, while some milk producers were misled by the abundance, and the appearance of quality in the late summer grass into delaying the feeding of concentrates to their cows, with disappointing results.

The Investigation

PRESENTATION OF RESULTS:

This investigation, dealing with the relative economy of dairying and of various combinations of milk selling and beef store cattle rearing, consists primarily of a record of the total costs incurred for the twelve-month period November 1952, to October 1953, in respect of the cattle enterprise as a whole, related to the resulting total production of the enterprise over the same period. The final result is, therefore, for each farm and each group, an aggregate figure of production and production costs, and the question arises of a common basis for the calculation of results that will permit a comparison between groups, and between farms in the different groups.

Between cattle enterprises covering the complete range from

milk production to the exclusion of all rearing, to store rearing without any milk selling, there is no end-product common to all which could provide a basis for comparison. Neither is it possible to adopt the breeding cow as a common unit; for every 100 cows there were 68 followers in the Dairy group, 241 in the Milk and Stores, and 270 in the Stores group, while between farms in the same group there were also considerable variations in the proportion of cows to followers. Production, costs and margin will, if calculated per cow, be on an altogether higher plane where a large number of followers are maintained than where few or none are involved. More important, such a basis of calculation would take no account of the very different areas of land required to maintain each cow plus her variable number of followers: this averaged 6.3 acres per cow in each of the two store rearing groups, but only 4.2 acres per cow, for cows plus followers, in the Dairy group.

It seems clear, therefore, that the only satisfactory basis for comparison between enterprises involving grazing stock, and embracing widely differing systems of production and management, is in the relating of production and costs to the acreage of the farm devoted wholly to the enterprise, a method which not only permits of comparison between various types of cattle enterprise, but also between these and various systems of sheep enterprise on similar farms. The basis of calculation of results adopted is, therefore: "PER 100 ADJUSTED ACRES DEVOTED SOLELY TO THE CATTLE ENTERPRISE", but this is referred to throughout the remainder of the report, in both text and tables, for the sake of brevity, as simply "PER 100 ACRES".

The question of what area of land can, in fact, be considered to be solely devoted to cattle presents some difficult problems of apportionment, especially on mixed farms where sheep are also maintained. The apportionment of the annual production of the grassland between grazing and conservation products, and of grazing between cattle and other stock are the most complex of these problems, but similar difficulties of apportionment arise in the case of crops yielding joint products; for example the case of a grain crop of which all the straw but only a portion of the corn may be consumed by cattle. Although no finality is possible in these apportionments the overall estimate made for the total farm area involved can be derived with sufficient accuracy for the purpose of the comparisons attempted in this report.

The distribution of the land devoted to cattle between different forms of utilization is set out in Table 11.

TABLE 11

Distribution of Acreage Devoted to Cattle: per 100 Acres

	Dairy	Milk and Stores	Stores
<i>Grassland:</i>	Ac.	Ac.	Ac.
1. Hay and Aftermath	29.6	30.3	35.0
2. Silage and Aftermath	3.1	1.3	2.8
3. Pasture.	50.4	51.2	49.3
Total Grassland	83.1	82.8	87.1
<i>Crops:</i>			
1. Corn and Straw	7.2	12.9	10.5
2. Roots and Green Fodder:			
(a) Mangolds*	0.6	0.8	0.5
(b) Turnips	1.7	0.3	0.2
(c) Swedes	0.4	0.6	1.0
(d) Kale	4.5	0.9	—
(e) Cabbage	0.6	0.9	0.7
(f) Mixed roots	1.1	0.8	—
(g) Arable Silage	0.8	—	—
Total Roots, etc.	9.7	4.3	2.4
Total Crops	16.9	17.2	12.9
Total Acreage	100.0	100.0	100.0

* Includes a small proportion of Fodder Beet in all groups.

Of every 100 acres devoted to cattle, over 80 acres in all three groups consisted of grassland, either grazed or fed as hay or silage. Grassland mown for hay, and total grassland, formed a rather higher proportion of the total in the Stores group, but total grazing, i.e. pasture land plus the value of aftermath grazing in terms of annual pasture land acreage, accounted for 61 to 62 acres per 100 acres in all three groups. Total tillage crops accounted for approximately 17 acres per 100 in the two milk selling groups compared with 13 acres in the Stores group; of this crop area, corn and straw absorbed 75 per cent or more in the two store rearing groups, but only just over 40 per cent in the Dairy group. Total roots and green fodder in the latter group accounted for nearly 10 acres per 100, but for less than 5 acres in the Milk and Stores, and under $2\frac{1}{2}$ acres per 100 in the Stores group: the outstanding feature of the Dairy group in this respect is the relatively large area, $4\frac{1}{2}$ acres per 100, devoted to kale.

The pattern of land utilization in the Stores group represents the traditional system for store cattle rearing in this area,

involving a high degree of dependence upon grazing and hay, a moderate proportion of corn and straw, and very slight provision of roots and green fodder. To meet the additional needs of milk production, and especially of winter milk, a slightly higher proportion of roots and corn is provided in the Milk and Stores group, with the root crops more evenly spread over a wider range of individual crops. Adaptation of the traditional pattern of cropping has proceeded still further in the case of farms in the Dairy group: the proportion of corn is considerably reduced, being replaced by purchased concentrates, and the proportion of roots greatly expanded, extending over a wider range of crops, and with marked emphasis upon kale.

In order to illustrate how the provision made for cattle is integrated into the general cropping plan of the farm as a whole, Table 12 shows the proportion of the total farm area devoted to each crop that is utilized by cattle.

TABLE 12
Home-grown Foods Utilized by Cattle as a Percentage of Total Farm Production. Acreage Basis

	Dairy	Milk and Stores	Stores
	%	%	%
1. Corn	39	60	29
2. Straw	79	81	87
3. Hay	96	96	92
4. Silage	100	100	94
5. Roots and Green Fodder			
(a) Mangolds*	64	70	34
(b) Turnips	41	5	1
(c) Swedes	42	53	25
(d) Kale	93	39	36
(e) Cabbage	87	72	74
(f) Other	63	—	—
Total	66	21	12
6. Grazing:			
(a) Winter	63	45	37
(b) Summer	66	41	36
(c) Year	65	42	36
Per cent of Total Farm area devoted to:			
(a) Cattle	67	47	40
(b) Sheep	21	41	49

* Includes a small proportion of Fodder Beet in all groups.

Cattle received nearly two-thirds of total grain produced in the Milk and Stores group, slightly over one-third in the Dairy group, and slightly under this proportion in the Stores group: poultry and pigs would account for nearly all the balance of grain in each group, with small amounts fed to horses and sheep. About four-fifths of all straw grown in all groups was utilized by cattle, either for feed or bedding, and over 90 per cent of hay; apart from some silage fed to sheep on one farm in the Stores group, all silage made was consumed by cattle. Of the total acreage of roots and green fodder, cattle accounted for 66 per cent in the Dairy group, but for only 21 per cent in the Milk and Stores, and 12 per cent in the Stores group.

In the Dairy group cattle accounted for two-thirds or more of all root and green fodder crops except turnips and swedes, and the proportion was as high as 93 per cent for kale; in the Milk and Stores group cattle accounted for less than 40 per cent of the kale acreage, but for 72 per cent of cabbages, 70 per cent of mangolds, and over one-half of the swedes, while in the Stores group they consumed the produce off about three-quarters of the cabbage acreage, one-third of the mangolds and kale, a quarter of the swedes, but only 1 per cent of the turnip acreage which, however, accounts for nearly half the total area of roots grown in this group. Of total grazing, cattle absorbed 65 per cent in the Dairy group, 42 per cent in the Milk and Stores, and 36 per cent in the Stores group.

Of total farm area, cattle accounted, on average, for 67 per cent in the Dairy group, and sheep for 21 per cent, while in the Milk and Stores group cattle still account for a high proportion, 47 per cent, as against 41 per cent for sheep; in the Stores group however the proportion is reversed, 40 per cent for cattle and 49 per cent for sheep. In five out of twelve farms in the Dairy group, and two out of ten in the Milk and Stores group, cattle accounted for 80 per cent or more of the total farm area, while on five out of eleven farms in the Stores group, three farms in the Milk and Stores, and even on one farm in the Dairy group, cattle accounted for less than 40 per cent of the total farm acreage.

The number of cattle carried per 100 acres is set out in Table 13.

Total cattle averaged approximately 40 in the Dairy group, 54 in the Milk and Stores group, and 59 per 100 acres in the Stores group: cows averaged 24 per 100 acres in the Dairy group but only 16 in the two store rearing groups. Total cattle, in terms of cow-equivalent units, were closely similar in all

TABLE 13
Cattle Numbers per 100 Acres

	Dairy	Milk and Stores	Stores
<i>Number per 100 acres:</i>	No.	No.	No.
Cows	23·6	15·8	16·0
Other Cattle	16·0	37·9	43·0
Total Cattle	39·6	53·7	59·0
<i>Cow Equivalent Units per 100 acres:</i>	Units	Units	Units
Cows	28·3	17·3	16·0
Other Cattle	6·4	17·2	18·4
Total Cattle	34·7	34·5	34·4
<i>Acres:</i>	Ac.	Ac.	Ac.
Per cow	4·24	6·34	6·27
Per cow Equivalent Unit: All Cattle	2·88	2·90	2·91

three groups, at 34 to 35 units per 100 acres, but, whereas on this basis cows accounted for over 80 per cent of total cattle in the Dairy group, the corresponding proportion was only 50 per cent in the Milk and Stores group, and 46 per cent in the Stores group. For every cow-equivalent unit of total cattle there was available, on average, approximately 2·9 acres of land in each of the three groups. It is important to note that, although both the store rearing groups carry the same number of cows per 100 acres, the considerable amount of milk sold off farms in the Milk and Stores group has resulted in a reduction in the number of followers, compared with the Stores group, of only 12 per cent in numbers and 7 per cent in terms of stock units; the introduction of milk selling on these farms has been only to a very limited extent at the expense of beef store cattle rearing, a conclusion that is confirmed by the evidence of the value of sales of store cattle per 100 acres presented later.

VALUATIONS:

Valuation of Cattle:

In Table 14 the average valuation of cattle, at conservative market values ruling at October, 1953, is set out for each group.

The outstanding feature of this table is the substantially higher capital investment in stock in the two store rearing groups, resulting from the large number of followers which must, of necessity, be carried. The average capital value of

TABLE 14

Average Valuation of Cattle per 100 Acres: October, 1953

	AVERAGE PER 100 ACRES					
	Dairy		Milk and Stores		Stores	
	No.	£	No.	£	No.	£
Cows and heifers in-milk and in-calf	25.3	1,351	19.1	949	21.0	1,138
Bulls	0.3	11	0.3	14	0.8	75
<i>Store Cattle:</i>						
2 years and over:						
Steers	—	—	1.3	82	0.5	24
Heifers	1.5	72	2.2	99	1.6	70
Total	1.5	72	3.5	181	2.1	94
1-2 years:						
Steers	—	—	8.0	308	8.9	353
Heifers	7.4	231	7.9	270	9.5	375
Total	7.4	231	15.9	578	18.4	728
6-12 months:						
Steers	—	—	4.1	105	3.0	78
Heifers	3.2	64	4.4	105	4.8	128
Total	3.2	64	8.5	210	7.8	206
Under 6 months:						
Steers	0.1	2	3.1	52	6.2	125
Heifers	3.9	41	5.0	77	4.8	94
Total	4.0	43	8.1	129	11.0	219
Total Steers	0.1	2	16.5	547	18.6	580
Total Heifers	16.0	408	19.5	551	20.7	667
Total Store Cattle	16.1	410	36.0	1,098	39.3	1,247
TOTAL CATTLE.	41.7	1,772	55.4	2,061	61.1	2,460

cattle in the Dairy group, at £1,772 per 100 acres, was nearly £300 less than in the Milk and Stores group, and nearly £700 less than in the Stores. This fact illustrates one of the difficulties facing a new entrant into farming who contemplates store rearing rather than milk production. To stock up only with breeding cows will involve a capital outlay not much less than for dairy cows, and, whereas in the latter case the farm will be fully stocked with cattle and a regular source of income immediately established, in the case of beef cows up to three

years will elapse before the farm is fully stocked with cattle, and before any material income emerges. If, on the other hand, in order to avoid understocking in the first two years, and the period of waiting before store cattle are available for sale, the farm is stocked at the outset with breeding cows plus a full complement of followers in regular age groups, then the capital outlay on stock will be nearly 40 per cent greater than that necessary to stock the same acreage as a dairy unit.

Another marked difference between the groups relates to the distribution of capital between the various classes of stock. Cows and heifers accounted for 76 per cent of the total valuation in the Dairy group, compared with 46 per cent in each of the other two groups. In the two store rearing groups, store cattle are fairly evenly balanced in numbers between those 1 to 2 years old, and under one year old, and between steers and heifers: the number of stores two years old and over however is much lower.

The average valuation per head of cows and heifers in-milk and in-calf was highest in the Stores group at £54.3, compared with £53.4 in the Dairy group, and £49.5 per head for the mainly cross-bred cows in the Milk and Stores group. Values per head for store cattle were distinctly higher for the beef stores in the two store rearing groups than for the dairy replacement stores in the Dairy group, and were rather higher for the pure-bred Devon cattle in the Stores group than for the cross-bred stores in the Milk and Stores group.

Valuation of Cattle Equipment:

Table 15 sets out the average valuation per 100 acres, at current realization prices, of the specific cattle equipment found in each group.

Cattle equipment includes only those items that would normally be considered tenant's capital; it excludes therefore such equipment as barn threshers and permanently installed corn bins. Where some equipment is utilized also for stock other than cattle the valuation has been apportioned on the basis of relative usage. Total dairy equipment, per 100 acres, averaged £129 in the Dairy group, but only £26 in the Milk and Stores group where the barest minimum of equipment is found. Indeed, if the one farm in the latter group which possesses a milking machine is excluded, the average valuation of dairy equipment is only £13 per 100 acres. However, the simple equipment that exists on these farms, allied to cleanly habits and careful personal attention in shippon and dairy is fully

TABLE 15

Cattle Equipment: Average Valuation per 100 Acres

	Dairy	Milk and Stores	Stores
	£	£	£
<i>Dairy Equipment:</i>			
Milking Machines	97	13	—
Buckets	3	3	2
Wash troughs	5	2	—
Coolers	15	6	—
Sterilizers	5	2	—
Gas Cylinders	4	—	—
Total Dairy	129	26	2
<i>Other Cattle Equipment:</i>			
Grinding mills, pulpers, etc.	17	21	31
Barn engines	5	3	15
Feeding bins, troughs, etc.	9	2	13
Electric fences	14	1	—
Dung barrows	4	3	3
Loose tools	10	6	6
Total Other	59	36	68
Total Equipment	188	62	70
Total Cattle	1,772	2,061	2,460
TOTAL CATTLE AND EQUIPMENT	1,960	2,123	2,530

adequate for the production of milk of the highest hygienic standard: indeed, a minimum of equipment can be kept scrupulously clean quite easily, and is possibly more likely to lead to the production of milk of good keeping quality than more elaborate equipment requiring much greater care and attention.

Milking machines were found on six of the twelve farms in the Dairy group, and on these six farms the total valuation of equipment averaged £201 per 100 acres, of which the machine accounted for £138. Average herd size for these farms was 21 cows, with an average of 92 acres per farm devoted to cattle, which compares with 10 cows per herd and 38 acres per farm on the remaining six dairy farms without milking machines, where total equipment averaged £155 per 100 acres.

Apart from milking machines, coolers were the only major item of dairy equipment. All farms in the Dairy group, and seven out of ten in the Milk and Stores group, possessed a cooler, but by no means all of them are in regular use. Producers often preferred to cool milk by immersing the churns in

a stone trough let into a stream of running water, which, at this altitude, is cold all the year round; by this means, not only is effective cooling obtained, but the milk is kept cool, and the possibility of contamination by the use of a surface cooler is avoided. Equipment listed under sterilizers would be more accurately described as boilers of the domestic type; one farm only possessed an orthodox steam chest, but several farms in both milk producing groups had open topped boilers, in which buckets, strainers, etc. can be completely immersed in vigorously boiling water. In most cases heat is raised by wood or other solid fuel, but in a number of cases Calor gas is used. Dairy equipment as such is not used in the Stores group, and is represented only by the buckets used to contain milk for domestic purposes, or for the production of cream for sale. Cream pans, scalders, separators and other equipment used in the manufacture of cream have been excluded from the valuation of equipment.

The valuation of equipment other than dairy equipment was highest in the Stores group where barn machinery is more numerous and more elaborate; other equipment was appreciably higher in the Dairy group than in the Milk and Stores, due mainly to the higher valuation of electric fencing equipment, storage bins, and loose tools in the former group. Eight farms in the Dairy group had electric fences, used mainly for folding kale, but to a lesser extent for strip grazing, compared with only one farm in the Milk and Stores group, and none at all in the Stores.

Total equipment averaged £188 per 100 acres in the Dairy group, where the valuation of dairy equipment is high, £62 in the Milk and Stores group, where only the minimum of such equipment is provided, and £70 per 100 acres in the Stores group where, although no dairy equipment is needed, the valuation of barn machinery is considerably higher than in the two milk producing groups. Even when the relatively high valuation of equipment in the Dairy group is taken into account however, total capital investment in stock and equipment combined in this group averaged less than £2,000 per 100 acres, some £160 less than in the Milk and Stores group, and £570 per 100 acres lower than in the Stores group.

Production of the Cattle Enterprise

The total production of the cattle enterprise falls into two distinct categories, the production of cattle as such, and other items of output associated with cattle, the most important of which is milk, but which includes such receipts as Attested and T.T. premiums, Calf and Hill Cow Production Grants, bull premiums, and service fees received. The production of cattle, as here defined, is the amount by which the closing valuation of cattle together with sales of cattle differs from the opening valuation plus purchases. In the case of "flying" herds of dairy cattle, production of cattle may be a negative quantity, but in the case of self-contained herds it will, in all normal cases, be a positive item. In point of fact one herd only among those included in the sample, a flying herd in the Dairy group, had a negative production of cattle.

Where valuations are brought into the calculation of production the basis of valuation becomes a matter of some considerable importance, especially during a period when values are rising or falling. In the case of this investigation average values of cattle rose considerably over the period of the survey: the average market value of breeding cows in the two store rearing groups was higher at the time of the closing valuation by over £3 per head, and store cattle in the 1- to 2-year-old category by slightly less; calves under six months old were higher by more than £4 per head. As far as breeding stock is concerned these higher values represent an increase in capital: this increase cannot be realized unless the stock are sold, and breeding stock cannot be disposed of unless the enterprise is to be terminated.

A similar consideration however does not apply to the store stock being reared for sale which can be sold at any time without effect upon the continuing nature of the enterprise as a whole. Therefore, in order to isolate the capital appreciation experienced by the breeding herd from the measurement of current production of cattle, all breeding cows, together with that proportion of the female followers in all age groups essential for herd maintenance purposes, have been valued separately, and on a different basis from store stock reared for sale.

Cows and essential female followers have been valued at the same figure per head in both opening and closing valuations, a figure which is the mean of the per head valuations at each period: other store cattle, i.e. all steer cattle and heifers surplus to normal replacement requirements, have been valued according to market values ruling at the time the valuations were made.

In Table 16 the total production of the cattle enterprise is set out in summary form.

TABLE 16
Production of the Cattle Enterprise: Average per 100 Acres

	Dairy	Milk and Stores	Stores
	£	£	£
<i>Production of Cattle:</i>			
Closing valuation	1,772	2,061	2,460
Sales of cattle	416	859	975
Total	2,188	2,920	3,435
Opening valuation	1,614	1,853	2,295
Purchases of cattle	220	93	146
Total	1,834	1,946	2,441
Production of Cattle	354	974	994
<i>Other Production:</i>			
Milk	1,997	835	125
Premiums	143	119	105
Production Grants	13	103	247
Miscellaneous	—	—	17
Total Other Production	2,153	1,057	494
TOTAL PRODUCTION	2,507	2,031	1,488

Production of cattle in the two store rearing groups, at just under £1,000 per 100 acres, was nearly three times as great as in the Dairy group, but the latter group has a production of milk which, at almost £2,000 per 100 acres, is very nearly as high as total production in the Milk and Stores group, and considerably higher than total production in the Stores group. The Milk and Stores group has a production of milk more than £1,100 per 100 acres below that in the Dairy group, but a production of cattle £620 greater: compared with the Stores group it has an equal production of cattle, but £710 per 100 acres more in the form of milk sales. Premiums payable in

respect of T.T. milk and Attestation were highest in the Dairy group, at £143 per 100 acres, but were above £100 in all groups. Production Grants paid under Calf and Hill Cow Schemes were considerably higher in the Stores group, where all cows and calves are eligible for Production Grants; in the Milk and Stores group most calves are eligible for grants, but only a very few cows, while in the Dairy group no cows and only a few calves were eligible. Miscellaneous Other Production, which relates mainly to bull premium payments and service fees received, is a small item, and occurs only in the Stores group.

Total Other Production averaged rather over £2,000 per 100 acres in the Dairy group, just over £1,000 in the Milk and Stores, and just under £500 in the Stores group. As a percentage of the total production of the cattle enterprise, Other Production accounted for 86 per cent, 52 per cent and 33 per cent respectively in the three groups, while milk accounted for 80 per cent of total production in the Dairy group and 41 per cent in the Milk and Stores group. Production grants amounted to less than 1 per cent of total production in the Dairy group, 5 per cent in the Milk and Stores group, and to nearly 17 per cent in the Stores group. Total production of the cattle enterprise averaged £2,507 per 100 acres in the Dairy group, £2,031 in the Milk and Stores group, but only £1,488 per 100 acres in the Stores group. Total production in the Dairy group is thus £1,019 per 100 acres, or 68 per cent, greater than in the Stores group, and £476, or 23 per cent, higher than in the Milk and Stores group. If production is expressed as a percentage of the total valuation of cattle the position is still more striking: in the Dairy group total production equals 141 per cent of the valuation of cattle, 99 per cent in the Milk and Stores group, and 60 per cent in the Stores group. These figures illustrate the contrast between the high rate of turnover associated with a Dairy enterprise and the very low rate in a beef store cattle rearing enterprise, and demonstrate pointedly one of the main economic weaknesses of store rearing. Dairy cows produce a commodity, milk, which leaves the farm daily, and is paid for monthly. Beef cows produce a commodity in the form of store cattle which must be retained on the farm for two years or more before being sold, locking-up during this period an ever increasing amount of working capital: hence, not only is the capital investment required considerably higher than for dairying, but the rate of turnover is less than one-half as great.

ANALYSIS OF PRODUCTION:

In this section of the report the various items of production that make up the total are analysed in detail.

Production of Cattle:

An alternative, and perhaps more readily understood, method of setting out the average production of cattle per 100 acres is given below:

	Dairy		Milk and Stores		Stores	
	No.	£	No.	£	No.	£
<i>Average per 100 acres:</i>						
Sales of Cattle	24.0	416	17.4	859	18.4	975
Purchases of Cattle	4.1	220	3.6	93	5.2	146
Net Sales	19.9	196	13.8	766	13.2	829
Valuation Increase	1.7	158	2.6	208	2.3	165
Production of Cattle	21.6	354	16.4	974	15.5	994

Numbers of cattle sold averaged 24 per 100 acres in the Dairy group, compared with 17 to 18 for the two store rearing groups: numbers of cattle bought were highest in the Stores group, and lowest in the Milk and Stores, but the cost of cattle per 100 acres is highest in the Dairy group where purchases take the form, in the majority of cases, of freshly calved cows. Purchases of cattle, as a percentage of sales of cattle plus valuation increase, averaged, in terms of value, 38 per cent in the Dairy group, 9 per cent in the Milk and Stores group, and 13 per cent in the Stores group.

Valuation increases were substantial in all groups, but arise from different circumstances. In the Dairy group, increases in the number of followers carried accounted for nearly 50 per cent of the total increase in valuation of cattle in that group, and an increase in their average value for 22 per cent; the remaining increase is accounted for by an increase in the average value per head of the cows, arising from the purchase during the year, by three producers in this group, of a few high priced cows of considerably better quality than the normal standard of their herds. In the Milk and Stores group 28 per cent of the total increase in valuation resulted from an increase in the number of stores retained, 51 per cent from an increase in their average value, while the remainder of the increased valuation

was accounted for equally by increases in the number and value of cows. In contrast, 68 per cent of the total increase in the Stores group came from the cows, and most of this from an increase in their numbers; cows and heifers in-calf were together about 8 per cent greater in numbers at the time of the closing valuation than at the beginning of the year, a direct result of the introduction of the Hill Cow Production Grant.

Calving Data:

Before considering the sales of cattle in detail, a brief glance at the distribution of calvings throughout the year is desirable. Most store cattle in this area are sold in the autumn, and the month of birth will determine the age attained by cattle at the time of the autumn store sales. An autumn born calf will be two years old at this period, while one born in spring and early summer will be around eighteen or thirty months old. Although store cattle are regularly sold at eighteen months old in some upland rearing districts, and a second and expensive wintering avoided, in the Brendon Hills district this age is considered too young, and most store cattle are sold in the autumn a year later at $2\frac{1}{4}$ to $2\frac{1}{2}$ years old, though a few, if in sufficiently forward condition, may be sold in the spring at about 2 years: in any case the great majority of store cattle spend two winters on the farm, and most have three summers there before being sold.

TABLE 17
Monthly Distribution of Calvings. Per cent of Total for Year

	Dairy	Milk and Stores	Stores
	%	%	%
October	14.2	6.3	5.9
November	5.3	4.9	2.6
December	9.5	7.0	7.9
January	5.9	2.8	1.3
February	7.1	7.7	5.2
March	6.5	10.5	7.9
April	7.1	11.2	15.0
May	5.9	9.0	15.7
June	9.5	8.4	17.0
July	5.9	9.8	7.8
August	9.5	9.8	5.2
September	13.6	12.6	8.5
YEAR	100.0	100.0	100.0

The peak month for calvings in the Dairy group was October, and the peak period August to October, during which 37 per cent of total calvings occurred; the remaining calvings were spread fairly evenly over the rest of the year, but with secondary peaks in December and June. In the Milk and Stores group September was the peak month, and July to September the peak period, with 32.2 per cent of annual calvings, but this is closely followed by the period March to May when 30.7 per cent of calvings took place. Calvings in this group were low from October to February inclusive, a circumstance which may be attributed to the great difficulty in feeding milking cows adequately in the winter months on farms heavily stocked with store cattle during a period when purchased concentrates were rationed. The distribution of calvings in the Stores group is heavily concentrated in the three months April to June, when nearly one-half of total calvings occurred, while nearly two-thirds fell within the period March to July. Thus, autumn calving is characteristic of the Dairy group, spring calving of the Stores group, while in the Milk and Stores group twin peaks occur, one in spring and the other in late summer.

Of total calvings during the year, first calving heifers accounted for only 10 per cent in the Dairy group, but for nearly 25 per cent in the two store rearing groups. Of total calves born, just over 6 per cent in both the store rearing groups were born dead, but less than 1 per cent in the Dairy group, although subsequent losses of calves in this group averaged 7 per cent of the total born compared with 2 to 3 per cent in the other two groups, a difference that may be significant in relation to the method of bucket rearing commonly adopted only in the Dairy group. In all groups calves born dead, or dying at less than six months old, together averaged between 8 and 10 per cent of total calves born.

Calves, mostly sold at a few days old, accounted for more than one-half of the total number of cattle sold in the Dairy group, but sales of cattle under one year of age were rare in the other two groups, and almost invariably limited to calves sold with freshly calved cows. Sales of cows, at £186 per 100 acres, accounted for 45 per cent of total sales of cattle in the Dairy group, but for only about £120 per 100 acres, equal to 13 per cent of total sales, in the two store rearing groups. Approximately two-thirds of all cows sold in each group were sold as stores, with the remainder divided fairly evenly between those graded off the farm, and those sold for further milking or breeding.

Sales of Cattle:

TABLE 18

Average Number and Value of Cattle Sold per 100 Acres

	Dairy		Milk and Stores		Stores	
	No.	£	No.	£	No.	£
<i>Cows:</i>						
Breeding	0.9	43	0.6	36	0.5	23
Store and Fat	3.8	143	1.7	82	2.2	97
Total Cows	4.7	186	2.3	118	2.7	120
<i>Bulls</i>	—	—	—	—	0.4	47
<i>Store Cattle:</i>						
<i>2 years and over:</i>						
Steers	—	—	6.0	340	7.1	435
Heifers	1.8	90	6.6	380	2.8	170
Total	1.8	90	12.6	720	9.9	605
<i>1 to 2 years:</i>						
Steers	—	—	0.2	11	2.0	113
Heifers	2.3	86	—	—	1.6	80
Total	2.3	86	0.2	11	3.6	193
<i>Under 1 year:</i>						
Steers	7.2	24	0.3	3	0.3	3
Heifers	5.7	27	0.4	5	—	—
Total	12.9	51	0.7	8	0.3	3
Total Stores	17.0	227	13.5	739	13.8	801
Casualties	2.3	3	1.6	2	1.5	7
TOTAL CATTLE	24.0	416	17.4	859	18.4	975

Sales of store cattle two years old and over amounted to £720 per 100 acres in the Milk and Stores group, equal to 84 per cent of total sales of cattle, and for £605 per 100 acres, 62 per cent, in the Stores group. In the latter group, store cattle between one and two years of age averaged £193 per 100 acres, but were of negligible importance in the former group. These cattle sold at under two years old in the Stores group represent calves dropped in late winter and early spring, and sold at 20 to 22 months old. Only a very few clean cattle were graded, and two farms, one in each of the store rearing groups, accounted for all the fat steers and heifers sold. One farm fed out a few cattle on some good meadow land and the other fed

out a bunch of steers and heifers indoors during the early winter months, a quite exceptional procedure occasioned by the fact that these cattle, having been sold as stores in the autumn, could not be moved owing to Foot and Mouth restrictions in the purchaser's area.

Of the total number of cattle disposed of during the year between 8 and 10 per cent in each group either died, or were casualties, and there was a marked tendency for heavy losses to occur on one or two farms in each group. One farm accounted for over one-quarter of all deaths and casualties in the Dairy group, and one farm in the Milk and Stores group for over one-half of total losses in that group. In both cases these losses occurred among calves and yearlings, and in both cases an outbreak of husk was responsible. In general however the Brendon Hills district is a very healthy one for cattle, deaths are low, and a high proportion of herds are attested. The turnover of cows was low in all groups, amounting to only 19 per cent per year in the Dairy group, and as little as 12 per cent in the Milk and Stores, and 8 per cent in the Stores group; these figures compare with a rate of turnover of 20 to 30 per cent commonly found in dairy herds in lowland areas.

The average price per head realized by the main classes of cattle sold are set out below:

Average Sale Price Realized per Head

	<i>Dairy</i>	<i>Milk and Stores</i>	<i>Stores</i>
	£	£	£
Cows: Breeding	48·3	60·9	54·5
Store and Fat	37·3	48·8	43·4
All Cows	39·3	52·0	45·1
Stores:			
Two years and over			
Steers	—	56·8	61·1
Heifers	50·6	57·6	61·8
Total	50·6	57·2	61·3
1-2 years			
Steers	—	—	55·8
Heifers	37·4	—	50·3
Total	37·4	—	53·3

The average price realized for cows was under £40 in the Dairy group, £52 in the Milk and Stores, and £45 in the Stores group where, however, a considerably higher proportion of cows sold were aged. For stores two years old and over the pure-bred Devons in the Stores group averaged just over £61 per head, only £4 per head higher than the cross-bred stores in the Milk and Stores group. Further, owing to the somewhat different seasonal distribution of calvings in the two groups, the average age of steers and heifers in this category in the case of the Stores group was probably nearly $2\frac{1}{2}$ years, whereas in the case of the Milk and Stores group a considerable proportion would be barely turned two years old at the time of sale. The average estimated gross liveweight, and the price realized per live cwt., by store cattle two years old and over is set out below:

	Milk and Stores		Stores	
	Live-weight	Price per cwt.	Live-weight	Price per cwt.
	cwt.	s. d.	cwt.	s. d.
<i>Store Cattle:</i>				
<i>Two years old and over:</i>				
Steers . . .	9.08	125 1	9.11	134 2
Heifers . . .	8.85	130 2	9.18	134 7

Both steers and heifers were very slightly heavier in the Stores group, but the difference in the average price per live-cwt. is more marked, 9s. per cwt. higher in the case of steers, and about half that amount for heifers. When allowance is made for the fact that the average age of these cattle is probably up to four months greater in the Stores group it is reasonably clear that, age for age, the stores produced by a Devon bull on the type of cross-bred cows kept in the Milk and Stores group are heavier, but of rather lower quality, than the pure-bred Devon stores in the Stores group. It must be borne in mind however that, at this time, when fixed prices were determined for fat cattle by the Ministry of Food, quality cattle earned only a relatively small premium. However, having regard to the differences that exist in breeding and rearing of store cattle in the two groups, the difference in the average value of the store animal produced is surprisingly small.

The monthly distribution, by value, of total sales of cattle is set out in Table 19.

TABLE 19

Monthly Distribution of Cattle Sales: by Value

	Dairy	Milk and Stores	Stores
	%	%	%
December . . .	1.6	2.2	3.9
January . . .	2.5	—	1.3
February . . .	4.8	—	1.2
March . . .	8.0	1.4	0.6
April . . .	4.8	6.0	12.1
May . . .	8.2	0.9	0.9
June . . .	6.3	0.2	2.2
July . . .	4.2	1.1	4.4
August . . .	3.7	14.3	4.3
September . . .	29.7	29.1	14.5
October . . .	16.0	36.6	44.5
November . . .	10.2	8.2	10.1
YEAR . . .	100.0	100.0	100.0

The figures illustrate the well-known concentration of store cattle sales in the autumn months: 80 per cent of total annual sales in the Milk and Stores group are concentrated into the three months August to October, and nearly 70 per cent in the Stores group in the period September to November, although, in this group, appreciable sales of store cattle occurred in April, amounting to 12 per cent of total annual sales. Sales of cattle in the Dairy group are somewhat more evenly distributed over the year, but again with a pronounced peak in the autumn and early winter, which is the main period for the sale of culled cows and heifers. Culled cows are mainly sold in the period August to October in the Milk and Stores group, and are restricted almost entirely to the months October to January in the Stores group. Over 80 per cent of total sales of store steers and heifers takes place in the three months August to October in both the store rearing groups, but, whereas most of the remaining sales of stores takes place throughout the winter months in the Milk and Stores group, further sales of store cattle do not occur on an appreciable scale in the Stores group until the spring, a circumstance which, in conjunction with the sale of cull cows considerably later in the year in this group, indicates that the adjustment of food supplies to cattle numbers during the winter is much tighter on the milk selling farms than is the case where the more extensive system of store cattle rearing is followed.

If the distribution over the year of milk and cattle sales combined are considered, it is found that in the Dairy group no month of the year accounts for less than 6.1 per cent of the annual total, and none for more than 11.9 per cent: the period of maximum income is the three months September to November, when high milk sales are reinforced by relatively heavy sales of cattle, and one-third of annual income falls in this period. In the Milk and Stores group sales of cattle are heavily concentrated in the three months August to October, and milk sales are also highest at this period, when nearly 58 per cent of annual income accrues. The period of minimum income is the three months May to July, with less than 11 per cent of the annual total, while only 12 per cent falls in the period January to March.

Purchases of Cattle:

An analysis of average purchases of cattle per 100 acres is shown in Table 20.

TABLE 20
Average Number and Value of Cattle Purchased per 100 Acres.

	Dairy		Milk and Stores		Stores	
	No.	£	No.	£	No.	£
Breeding Cows	3.1	212	0.5	30	0.1	6
Stock Bulls	—	—	—	—	0.4	54
Store Cattle:						
2 years and over:						
Steers	—	—	—	—	—	—
Heifers	—	—	—	—	0.3	22
Total	—	—	—	—	0.3	22
1 to 2 years:						
Steers	—	—	0.5	21	0.2	9
Heifers	—	—	0.5	23	—	—
Total	—	—	1.0	44	0.2	9
Under 1 year:						
Steers	—	—	0.5	5	1.9	20
Heifers	1.0	8	1.6	14	2.3	25
Total	1.0	8	2.1	19	4.2	45
Total Stores	1.0	8	3.1	63	4.7	86
TOTAL CATTLE	4.1	220	3.6	93	5.2	146

Total purchases of cattle in the Dairy group, at £220 per 100 acres, were 50 per cent greater than in the Stores group, and well over twice as great as in the Milk and Stores: there are also very marked differences between the groups in the type of animal purchased. In the Dairy group, purchases of in-milk and in-calf cows accounted for virtually all the purchases of cattle, with the exception, on two farms, of the purchase of one or two dairy-type heifer calves to rear as herd replacements. In the Milk and Stores group less than one-third of total expenditure was in respect of cows, and nearly one-half was for yearling cattle; numerically the purchase of calves was most important in this group, accounting for nearly 60 per cent of the total number of cattle bought. The great majority of calves purchased were obtained at one to three weeks old, and in the proportion of three heifer calves to one steer calf. Most of the heifer calves, and yearlings, were of the Shorthorn \times Devon type, and destined for herd replacement purposes. In the Stores group, calves purchased accounted for 80 per cent of all animals bought, but purchases of bulls absorbed over 35 per cent of the total outlay; purchases of female breeding stock is rare in this group and was limited during the year to a few pedigree animals, spread over several farms, and all obtained at the same farm dispersal sale. Four bulls were bought during the year, three adult bulls at an average price of over £160, and one bull calf for twenty-five guineas. Calves purchased in this group are obtained partly to replace home-bred calves born dead or dying at an early age, and partly as additional calves to rear on a milkier type of Devon or cross-bred cow.

The average price paid for 24 cows bought, in-milk or in-calf, in the Dairy group was just under £70 per head, while an average of £63 was paid for the four cows bought in the Milk and Stores group. Purchased calves averaged about £8 per head in the Dairy group, £8½ in the Milk and Stores, and £11¼ in the Stores group.

Cattle purchased in the Dairy group are thus virtually limited to cows bought for herd replacement; in the Milk and Stores group, replacements in the form of cows, together with heifer calves and yearlings, account for two-thirds of total expenditure upon cattle. In the Stores group the purchase of female replacement stock is exceptional, and expenditure upon cattle is fairly evenly divided between stock bulls, and calves for rearing as beef stores.

OTHER PRODUCTION:

Milk:

Production of milk includes sales of milk and cream, together with the estimated value of milk utilized for household consumption, or given as a perquisite to farm workers: it represents therefore the cash value of milk actually withdrawn from the cattle enterprise, and excludes any value for milk fed to calves, either by bucket, or suckled. Milk used for cream production for sale is valued at the wholesale price of milk for the month during which the cream was produced, and no manufacturing charges for cream have been included on the cost side. Perquisite milk, and milk used for domestic consumption, have been valued at *2s. 0d.* per gallon. The average production of milk, per 100 acres, is set out below for the three groups.

	Average per 100 Acres		
	<i>Dairy</i>	<i>Milk and Stores</i>	<i>Stores</i>
	£	£	£
Wholesale milk . . .	1,942	757	—
Other sales	2	17	—
Sold as cream	—	12	24
Perquisite milk	6	3	5
Household	47	46	96
	1,997	835	125

Wholesale milk accounts for over 97 per cent, by value, of total milk production in the Dairy group, and for 90 per cent in the Milk and Stores group. Other milk sales, and sales as cream, are of small importance on average, and perquisite milk still less so. The value of milk used in the household was twice as great in the Stores group as in the milk selling groups, illustrating the well-known circumstance that where milk has no cash value there is much less incentive to limit its use for domestic purposes.

Estimates of the total quantity of milk produced over the year are available for the two milk selling groups: no estimate is possible for the Stores group in which the great majority of cows are employed in suckling calves.

Total milk produced in the Dairy group, at 14,482 gallons per 100 acres, was nearly twice as great as in the Milk and Stores group, and, whereas 90 per cent of total production was sold in the former group, the corresponding figure in the latter group was only 68 per cent of total production, with 25 per cent fed to calves. Production of milk per 100 acres in the

Average Annual Production
per 100 Acres

	<i>Dairy</i>		<i>Milk and Stores</i>	
	Galls.	%	Galls.	%
Wholesale	13,015	89.9	5,037	65.7
Other sales	11	0.1	106	1.4
Sold as cream	—	—	95	1.2
Perquisite milk. . . .	61	0.4	30	0.4
Household	468	3.2	459	6.0
Fed to calves	927	6.4	1,945	25.3
<hr/>				
Total Production	14,482	100.0	7,672	100.0
<hr/>				
Total Production per cow per year	614 galls.		487 galls.	

Dairy group ranged from 9,600 gallons to 26,200 gallons: three herds out of twelve had an average production of less than 10,000, and two herds more than 20,000 gallons per 100 acres. The average yield per cow, calculated on the average monthly numbers of cows over the year, was 614 gallons in the Dairy group, ranging from 424 gallons to 807 gallons per cow per year. Two herds stood alone from the yield angle with yields of around 800 gallons: the next highest was 683 gallons per cow, and seven herds in all exceeded the 600 gallons per year mark; three herds averaged less than 500 gallons per cow. The three lowest yielding herds all had an average production of milk per 100 acres of less than 10,000 gallons, but, of the two herds with a yield of about 800 gallons, one, a flying herd, had a production of 26,200 gallons, and the other, with a slightly higher yield but an over-abundant complement of followers, had an average of only 15,300 gallons per acre. In the case of the herd with the third highest yield, 683 gallons per cow, although no followers were maintained on this farm, it had, owing to a policy of excessive reliance upon home-grown foods for production as well as maintenance, a production of milk per 100 acres of only 12,400 gallons; in the case of another herd with a yield nearly 100 gallons per cow lower, but where a considerably larger quantity of purchased concentrates were fed per cow, the production per 100 acres was over 20,000 gallons. Thus, although yield per cow is one of the most important determinants of the level of production per 100 acres, the degree of self-sufficiency practised in followers and food-stuffs are both factors of the greatest importance.

The much lower production of milk per 100 acres in the Milk and Stores group is due both to lower average yields per cow and to the fewer cows carried per 100 acres consequent upon the much greater number of store cattle maintained. Yield per

cow averaged 487 gallons per year in this group, with a range from 320 to 655 gallons. Only three herds out of the ten averaged over 600 gallons per cow, while two herds, both of pure-bred Devons, averaged under 400 gallons per cow. Three herds exceeded 10,000 gallons per 100 acres, but none of these reached the average level of production per 100 acres attained in the Dairy group: three herds averaged less than 6,000 gallons, and one of these under 4,000 gallons per 100 acres.

Table 21 sets out, for both milk selling groups, the monthly distribution of milk sales, of milk fed to livestock, and of total milk production.

TABLE 21
Monthly Distribution of Milk Sales, of Milk Fed to Livestock, and of Total Milk Production: per cent of Annual Totals

	MILK SALES		FED TO LIVESTOCK		TOTAL PRODUCTION	
	Dairy	Milk and Stores	Dairy	Milk and Stores	Dairy	Milk and Stores
October	% 9.5	% 10.3	% 11.1	% 8.6	% 9.6	% 9.6
November	7.7	6.3	7.7	9.7	7.7	7.2
December	8.1	6.3	7.4	7.5	8.0	6.6
Quarter	25.3	22.9	26.2	25.8	25.3	23.4
January	8.0	6.6	7.6	5.3	7.9	6.3
February	6.9	6.1	6.7	6.6	6.9	6.2
March	7.9	7.2	8.3	8.5	7.9	7.6
Quarter	22.8	19.9	22.6	20.4	22.7	20.1
WINTER	48.1	42.8	48.8	46.2	48.0	43.5
April	8.4	6.9	7.0	8.9	8.3	7.5
May	10.4	9.8	7.2	8.6	10.1	9.5
June	9.7	10.1	8.0	7.9	9.6	9.5
Quarter	28.5	26.8	22.2	25.4	28.0	26.5
July	8.3	9.7	7.9	8.6	8.3	9.6
August	7.6	10.0	10.3	9.5	7.9	9.9
September	7.5	10.7	10.8	10.3	7.8	10.5
Quarter	23.4	30.4	29.0	28.4	24.0	30.0
SUMMER.	51.9	57.2	51.2	53.8	52.0	56.5
YEAR	100.0	100.0	100.0	100.0	100.0	100.0

Total production over the year was rather more evenly distributed in the Dairy group, where 48 per cent occurred during the winter six months, compared with 43·5 per cent in the Milk and Stores group. In the latter group however, as a result of the high proportion of calvings occurring in the late summer, peak monthly production was reached in September, compared with the much more usual month of May in the Dairy group: quarterly production was highest for the months April to June in the Dairy group, but for July to September in the Milk and Stores group, while quarterly sales were lowest for both groups in January to March. The monthly distribution of milk fed to livestock follows a similar pattern in both groups, reaching a peak in late summer and autumn, but showing a fairly even spread throughout the year. However, whereas milk consumed by calves accounts for only a small proportion of total production in the Dairy group, it absorbs 25 per cent of total production in the Milk and Stores group. Winter sales in the Dairy group averaged 48·1 per cent of annual sales, but only 42·8 per cent in the Milk and Stores group, where the winter food requirements of the large numbers of store cattle carried militates against winter, and especially late winter, production.

Among the upland Dairy farms the seasonal distribution of milk sales is rather more level than for England and Wales as a whole, but where milk selling is combined with store rearing there is a more pronounced tendency for summer production to prevail. There are, however, some marked differences between farms in the Milk and Stores group in this respect: at one extreme over three-quarters of total annual sales were made during the summer months, but only 41 per cent at the other. Six herds out of the ten in this group sold between 53 and 58 per cent of summer milk.

In spite of the higher proportion of winter sales in the Dairy group, the average price received for wholesale milk, including Production Bonus but excluding T.T. and Attested premiums, at 35·8*d.* per gallon was slightly lower than in the Milk and Stores group where the average was 36·1*d.* per gallon: this higher average level of receipts in the latter group arises from the greater influence of the Production Bonus on the smaller monthly sales per farm in this group, an influence that more than outweighs the effect upon average price of higher winter sales in the Dairy group.

Premiums:

Production in the form of Premiums takes into account

receipts in respect of designated milk, and for attestation. No producer in either milk selling group held an Accredited licence but six out of twelve producers in the Dairy group held T.T. licences, and, although none of these particular herds were Attested, a further four herds in this group were. T.T. milk accounted for 51 per cent of total sales in this group, and milk from Attested herds for a further 28 per cent; only 21 per cent of milk sales was non-designated milk from non-attested herds. All ten herds in the Milk and Stores group were Attested, and two produced T.T. milk: attestation payments were on the headage basis in all cases but one. In the Stores group nine of the twelve herds were Attested.

The average premiums received for T.T. milk and Attestation are shown below:

	Premiums: Average per 100 Acres		
	<i>Dairy</i>	<i>Milk and Stores</i>	<i>Stores</i>
Attested Premium:	£	£	£
Headage basis .	16	105	105
Gallonage basis .	16	4	—
Total .	32	109	105
T.T. Premium .	111	10	—
Total Premiums .	143	119	105

Attested premiums averaged over £100 per 100 acres in the two store rearing groups, but less than one-third of this amount in the Dairy group: in the latter group however T.T. premiums averaged £111, and total premiums, at £143 per 100 acres, were £24 per 100 acres higher than in the Milk and Stores group, and £38 higher than in the Stores group.

Production Grants:

During the period covered by the investigation a production grant was payable on steer and heifer calves suitable for beef production at the rate of £5 per head, and also a Hill Cow grant, payable at £10 per head, on cows on upland farms suitable for the breeding and rearing of beef stores. Where milk is sold however, payment for Hill Cows is reduced by £10 for every 200 gallons of milk sold during the year, and this limitation had the effect of eliminating 90 per cent of the grant that would otherwise have been payable in the Milk and Stores group. Herds on farms in the Dairy group are not eligible for this grant, but all cows in the Stores group qualified, with the exception of a few dairy-type animals kept as house cows.

**Production Grants:
Average per 100 Acres**

	<i>Milk and</i>		
	<i>Dairy</i>	<i>Stores</i>	<i>Stores</i>
	£	£	£
Calf Grant	13	87	91
Hill Cow Grant	—	16	156
	<hr/>	<hr/>	<hr/>
Total Grants	13	103	247
	<hr/>	<hr/>	<hr/>

In the Stores group virtually all calves, and nearly all cows qualified for the appropriate production grant; total grants averaged £247 per 100 acres, of which the Hill Cow Grant accounted for approximately two-thirds. In the Milk and Stores group, receipts under the Calf Grant were nearly as high as in the Stores group, but only about one-tenth as high for Hill Cows: this grant, owing to the effect of the stipulations relating to the sale of milk, was paid on two farms only in the Milk and Stores group, in one case on half the cows in the herd, and on about two-thirds of the total number of cows in the other case: over the group as a whole less than 10 per cent of cows qualified.* Production grants in the Dairy group were of negligible importance, totalling only £13 per 100 acres, and limited to payment on a few heifer calves of dual purpose type retained for herd replacement purposes. Some of the calves born in this group however are sired by a Devon bull, and eventually will in most cases qualify for Calf Grant, a fact which has a considerable influence upon the price received for these calves even when sold at a week or two old.

Miscellaneous Production:

This category of production covers bull service fees received, together with Premium Bull grants. Difficulties associated with the rapid spread of attestation in this district, together with the increased use of A.I., have somewhat reduced the importance of the Premium Bull Scheme in recent years, but bull grants were paid on three of the eleven farms in the Stores group

* In some other counties in England and Wales it appears that a rather different basis of calculation was used to ascertain eligibility for this grant, namely, a reduction of £10 for every 400 gallons of milk sold during the year, and this more favourable standard is being applied in Somerset in 1954. Had this standard of 400 gallons of annual sales been applied in 1953, six of the ten herds in the Milk and Stores group would have been eligible for some payment of Hill Cow Grant: over the group as a whole just over 30 per cent of total cows would have been eligible, with an average of £48 per 100 acres payable, instead of the £16 actually received under the 200 gallons qualifying standard in force in Somerset in 1953.

during the year, and these three farms, together with one other in the same group, were also in receipt of income from service fees. On the three farms, bull grant and service fees together averaged just over £40 per 100 acres, but over all farms in the Stores group Miscellaneous Production averaged only £17 per 100 acres; there was no production at all under this heading in either of the other two groups.

Premiums, Production Grants, and Miscellaneous Production together averaged £369 per 100 acres in the Stores group, more than £200 greater than in the Dairy group, and nearly £150 per 100 acres greater than in the Milk and Stores group. These items of production, together with the production of cattle, averaged approximately £1,360 per 100 acres in the Stores group, £1,200 in the Milk and Stores, and £500 in the Dairy group. However, when the production of milk is brought into account the picture is changed entirely: total production of the cattle enterprise averaged just over £2,500 per 100 acres in the Dairy group, not far short of £500 greater than in the Milk and Stores group, and more than £1,000 per 100 acres greater than in the Stores group.

Although an evaluation of the relative economy of different methods of organization of the cattle enterprise must take into account the level of production costs in relation to the level of production, yet a consideration of production alone has revealed three outstanding economic weaknesses associated with an enterprise limited to the raising of beef store cattle. Firstly, the level of production per 100 acres for store rearing is only 59 per cent of that attained by dairy farms in the same district. Secondly, the average capital investment in cattle is 39 per cent greater for store rearing than for milk production. Thirdly, and arising directly out of the two previous conditions, the turnover of capital is very much lower: production per £100 of capital invested in cattle averaged only £60 in the Stores group compared with £141 in the Dairy group, a rate of turnover more than twice as great for milk production.

Beef store cattle rearing thus starts with formidable disadvantages on the production side, disadvantages which could only be offset, if at all, by a very low level of production costs. On the other hand, it is hardly conceivable that the much higher level of production, and the more rapid rate of turnover in the two milk selling groups, and especially in the Dairy group, is not accompanied by substantially higher costs. The next section of the report is therefore devoted to an examination, in some detail, of the overall level of production costs,

and of the various constituent items of cost, incurred in the achievement of the level of production noted for the three groups in this section.

Production Costs:

Method of Costing:

A detailed account of the methods adopted for the assessment of the various items of cost is given in Appendix B. Here it will be sufficient to note that purchased foods and paid labour are charged at cost, family labour at the same rates as employed labour, home-grown foods at the average cost of production ascertained for a proportion of farms included in the sample, while actual grazing costs were obtained on all farms. Details of average production costs of home-grown foods and grazing are given in Appendix C. Costs omitted are (1) General Farm Overheads; (2) Management; (3) Interest on Capital.

The average costs per ton arrived at for home-grown foods are summarized below:

			<i>Per ton</i> £
<i>Corn:</i>			
Threshed.	. . .	In barn	20.03
Sheaf	. . .	In rick	16.61
<i>Feeding Straw:</i>			
Threshed.	. . .	In rick	3.34
Sheaf	. . .	In rick	2.77
<i>Hay:</i>			
Temporary:	Baled .	In hay-barn	6.09
	Loose .	In rick	4.36
Permanent:	Baled .	In hay-barn	7.31
	Loose .	In rick	5.58
<i>Roots and Green Fodder:</i>			
Mangolds	. . .	In clamp or root house	2.73
Swedes and Turnips	. . .	In ground	0.93
Kale	. . .	In ground	1.08
Cabbage	. . .	In ground	1.61

Average Production Costs per 100 acres are presented in summary form in Table 22.

Average Total Production Costs in the Dairy group, at £1,771 per 100 acres, are £340 higher than in the Milk and Stores group, and £560 per 100 acres greater than in the Stores group. The cost items most directly affected by the incidence of milk sales are purchased foods, manual labour, and miscellaneous costs. Purchased foods averaged £290 per 100 acres

TABLE 22
Average Production Costs per 100 Acres

	Dairy	Milk and Stores	Stores
<i>Foods:</i>	£	£	£
1. Purchased	290	187	69
2. Home-grown:			
(a) Corn	82	162	158
(b) Straw	12	22	21
(c) Hay	188	196	254
(d) Roots, etc.	197	133	112
Total Home-grown	479	513	545
<i>Grazing:</i>	277	227	213
Total Foods and Grazing	1,046	927	827
<i>Labour and Power:</i>			
(a) Manual	516	375	276
(b) Tractor and Lorry	34	36	35
(c) Horse	6	7	2
Total Labour and Power	556	418	313
Miscellaneous Costs	169	84	71
TOTAL COSTS	1,771	1,429	1,211

in the Dairy group, £187 in the Milk and Stores, but only £69 in the Stores group. Manual labour cost at £516 per 100 acres in the Dairy group was £141 greater than in the Milk and Stores, and £240 per 100 acres higher than in the Stores group: the high level of labour costs in the Dairy group is, however, subject to an important qualification to be discussed later. Miscellaneous costs at £169 per 100 acres in the Dairy group were more than twice as high as in the two store rearing groups, but accounted for less than 10 per cent of total costs in all groups.

The total cost of home-grown foods is rather lower in the Dairy group but the cost of grazing is higher, and total home-grown foods, together with grazing, are closely comparable in all three groups, varying only from £740 per 100 acres in the Milk and Stores group to £758 in the Stores group. Although total foods and grazing averaged £1,046 in the Dairy group, more than £100 per 100 acres higher than in the Milk and Stores, and £200 greater than in the Stores, as a proportion of total costs they are equal to only 59 per cent in the Dairy group, compared with 65 to 68 per cent in the other two groups.

Comparing the Dairy group with the Stores group, total production costs in the former are £560 per 100 acres greater. Of this extra cost purchased foods account for £221, grazing for £64, labour and power for £243, and Miscellaneous Costs for £98. The cost of home-grown foods is alone lower in the Dairy group, by £66 per 100 acres. In respect of all the main items of cost the Milk and Stores group holds an intermediate position: total production costs at £1,429 per 100 acres are £342 lower than in the Dairy group, and £218 per 100 acres greater than in the Stores group.

Purchased Foods:

Total expenditure upon purchased foods is constituted as follows:

	Purchased Foods per 100 acres					
	Dairy		Milk and Stores		Stores	
	cwt.	£	cwt.	£	cwt.	£
<i>Concentrates:</i>						
Dairy cake	121	216	32	57	7	16
Calf nuts	7	15	28	55	12	24
Calf starter and meal	4	14	6	28	$\frac{1}{2}$	1
Other concentrates	7	12	4	9	$\frac{1}{2}$	1
Total Concentrates	139	257	70	149	20	42
<i>Other Purchased:</i>						
Hay	31	20	25	11	—	—
Straw	7	2	11	3	32	12
Grass Keep	—	11	—	24	—	15
Total Other	—	33	—	38	—	27
TOTAL PURCHASED FOODS	—	290	—	187	—	69

Total purchased concentrates averaged £257 per 100 acres in the Dairy group, of which 84 per cent was for dairy cake, £149 in the Milk and Stores group, with 38 per cent for dairy cake, and £42 per 100 acres in the Stores group. Dairy cake was bought by only three cream selling farms in the Stores group, compared with all farms in the Dairy group and half the farms in the Milk and Stores group. The average price paid for cake was approximately 36s. per cwt. in the two milk selling groups but, for various reasons, was considerably higher in the Stores group. Concentrates purchased for calves, including calf-starter and meal, averaged £83 per 100 acres in the Milk and Stores group, but only £29 in the Dairy group, where few calves

are reared, and £25 per 100 acres in the Stores group, where calves are reared mainly by single suckling. Other purchased concentrates consist of small quantities of Flaked Maize, Bran, and Grass Meal in the Dairy group, of corn in the Milk and Stores group, and of Fish Meal, bought in small quantities by one farm, in the Stores group.

Purchased foods other than concentrates are relatively unimportant, and, in total, vary only from £27 per 100 acres in the Stores group to £38 in the Milk and Stores group. Hay accounted for 60 per cent of expenditure under this head in the Dairy group, and the cost of summer grass keep for most of the remainder: grass keep accounted for more than one-half in the two store rearing groups, and hay and straw for the balance. Purchases of hay and straw were limited to a small minority of farms, but summer grass keep for cattle was bought by four farms in the Dairy group, by six in the Milk and Stores, and by three farms in the Stores group. The average price paid per ton for hay averaged £13 in the Dairy group and £9 in the Milk and Stores, while feeding straw cost, on average, £6 9s. 0d. per ton in the Dairy group, £5 11s. 0d. in the Milk and Stores, and £7 15s. 0d. per ton in the Stores group.

The significant features of expenditure upon purchased foods in the groups is thus the high overall cost in the Dairy group, nearly all on account of the milking cows, and the low cost of calf nuts and meal; in the Milk and Stores group, where much less milk is sold, and considerably more home-grown corn is available, expenditure upon dairy cake is only about one-quarter as great, and, although outlay upon calf nuts and meal is much greater, total purchased foods are one-third lower than in the Dairy group. In the Stores group, expenditure upon dairy cake is very slight indeed, and but little greater on concentrates for calves: total purchased foods in this group cost not much more than one-third as much as in the Milk and Stores group, and less than one-quarter the cost in the Dairy group.

HOME-GROWN FOODS:

Corn:

The average cost and quantities of corn fed per 100 acres in the three groups is set out on page 346.

Total quantities of home-grown corn fed per 100 acres was approximately twice as great in the two store rearing groups as in the Dairy group. All farms in the Milk and Stores group fed some home-grown corn, but two farms in the Stores group and three in the Dairy group fed none. Oats accounted for two-

**Home-grown Corn:
Average per 100 Acres**

	<i>Milk and</i>		
	<i>Dairy</i>	<i>Stores</i>	<i>Stores</i>
	£	£	£
Total cost of corn	82	162	158
Quantities fed:	cwt.	cwt.	cwt.
Barley	15	14	36
Oats	46	134	108
Dredge corn	23	26	16
	<hr/>	<hr/>	<hr/>
Total	84	174	160
	<hr/>	<hr/>	<hr/>
Per cent of total fed in sheaf	10·2	39·9	6·8

thirds to three quarters of total corn in the store rearing groups, but for only just over one-half in the Dairy group where dredge corn accounted for nearly 28 per cent of the total. In the Stores group, barley accounted for 22 per cent, and dredge corn for only 10 per cent. Corn was fed unthreshed on two farms in each of the Dairy and Stores groups, and on four farms in the Milk and Stores group, where corn in sheaf accounted for 40 per cent of total corn fed to cattle.

Feeding Straw:

Feeding straw forms only a small item of cost in all groups, averaging £12 per 100 acres in the Dairy group and just over £20 in the other two. Total quantities fed per 100 acres were 3·4 tons in the Dairy group, 7·1 tons in the Milk and Stores group, and 6·7 tons in the Stores group. Oat straw accounted for well over 80 per cent of total feeding straw in all groups, and for 98 per cent in the Dairy group. Unthreshed straw accounted for nearly 44 per cent of the total in the Milk and Stores group, but for less than 10 per cent in the other two.

Hay:

	Hay:		
	<i>Average per 100 acres</i>		
	<i>Milk and</i>		
	<i>Dairy</i>	<i>Stores</i>	<i>Stores</i>
	£	£	£
<i>Total Cost:</i>			
Seeds hay	135	142	182
Meadow hay	53	54	72
	<hr/>	<hr/>	<hr/>
Total	188	196	254
	<hr/>	<hr/>	<hr/>
<i>Total Quantities:</i>	Tons	Tons	Tons
Seeds hay	25·9	27·9	35·3
Meadow hay	8·3	8·7	12·0
	<hr/>	<hr/>	<hr/>
Total	34·2	36·6	47·3
	<hr/>	<hr/>	<hr/>
<i>Baled Hay:</i>			
Per cent of total:	%	%	%
Seeds hay	49	41	45
Meadow hay	46	37	28
Total hay	48	40	41

The total cost of hay fed in the Stores group, at £254 per 100 acres, was between £55 and £70 higher than in the other two groups, and the quantity fed 10 to 13 tons per 100 acres greater. In all groups seeds hay, i.e. hay from temporary pastures, accounted for about three-quarters of the total, and baled hay for about 40 per cent in the two store rearing groups, and nearly 50 per cent in the Dairy group: the proportion of baled hay is higher in the case of seeds hay in all groups, and markedly so in the Stores group.

Roots and Green Fodder:

The average quantities fed, and costs, per 100 acres, for the various root and green fodder crops are detailed below.

Roots and Green Fodder: Average per 100 acres

	Dairy		Milk and Stores		Stores	
	Tons	£	Tons	£	Tons	£
Mangolds and Fodder Beet	13	34	16	44	14	38
Kale	63	69	18	20	—	—
Cabbage	9	15	21	34	12	19
Swedes and Turnips	20	18	11	10	16	15
Mixed roots	15	14	13	12	—	—
Arable silage	4	19	—	—	—	—
Grass silage	10	28	5	13	14	40
Total	134	197	84	133	56	112

The importance of root and green fodder crops increases with increasing emphasis upon milk production; total cost averaged £197 per 100 acres in the Dairy group, £133 in the Milk and Stores, and £112 in the Stores group. In the Dairy group the quantity of kale fed averaged 63 tons per 100 acres, nearly half the total weight of roots and green fodder fed in the group, and more than the total quantity of all foods of this type fed in the Stores group. No crop in the Milk and Stores group occupies the outstanding position held by kale in the Dairy group: cabbage was fed in greatest quantity in this group and accounted for 25 per cent of the total, with mangolds and kale accounting for just under and just over 20 per cent, and swedes and turnips, together with mixed roots, for 29 per cent. The relatively small quantity of total roots and green fodder fed in the Stores group is spread fairly evenly over the four crops which are alone represented in this group, i.e.,

mangolds, cabbage, turnips with swedes, and silage: all the silage fed in this group however was made on one farm.

Total Home-grown Foods:

Total cost of home-grown foods varied relatively little between the groups, from £479 per 100 acres in the Dairy group to £545 in the Stores group: within these overall totals there are, however, substantial differences between the groups in the relative importance of different types of foods. Corn accounted for about 30 per cent of the total cost of home-grown foods in the two store rearing groups, but for only 17 per cent in the Dairy group: in the Stores group hay is responsible for not far short of 50 per cent of total costs, compared with 38 to 39 per cent in the two milk selling groups. Total cost of roots and green fodder is closely related to the incidence of milk selling, and accounted for 41 per cent of total home-grown foods in the Dairy group, 26 per cent in the Milk and Stores, and for 21 per cent in the Stores group.

Total Foods:

The average quantities of total foods consumed, both purchased and home-grown, per 100 acres, and the costs, are set out below.

Total Foods: Average per 100 acres						
	Dairy		Milk and Stores		Stores	
	Tons	£	Tons	£	Tons	£
Concentrates:						
(a) Purchased	6.95	257	3.50	149	1.00	42
(b) Home-grown	4.20	82	8.70	162	8.00	158
Total Concentrates	11.15	339	12.20	311	9.00	200
Feeding Straw	3.8	14	7.7	25	7.9	33
Hay	35.8	208	37.9	207	47.3	254
Roots and Green fodder	134.0	197	84.0	133	56.0	112
Grass keep	—	11	—	24	—	15
Total Foods	—	769	—	700	—	614

Although the consumption of purchased concentrates is considerably higher in the Dairy group, total concentrates are highest, by weight, in the Milk and Stores group: even in the

Stores group the total is more than 80 per cent of the level reached in the Dairy group, a fact which seems to indicate that considerable scope exists in the Dairy group for the profitable utilization of increased quantities of purchased concentrates, now that these are de-rationed. The figures also indicate the relatively great reliance placed upon bulky dry fodder foods in the Stores group: the combined weight of straw and hay fed in this group is very nearly as high as for all root and green fodder crops, whereas, in the Dairy group, the weight of green fodder crops is more than three times the weight of the bulky dry fodders, and in the Milk and Stores group nearly twice as great.

Grazing Costs:

The acreage of grazing utilized by cattle is almost identical in all three groups at 61 to 62 acres per 100 acres, but, owing to differences between the groups in the per acre cost of grassland, the average cost of grazing per 100 acres devoted to cattle was £277 in the Dairy group, £227 in the Milk and Stores, and £213 per 100 acres in the Stores group.

Average per acre costs for pasture and mowing land are set out in detail for the three groups in Appendix C, and are only briefly analysed here.

	Grassland: Average Cost per Acre					
	<i>Dairy</i>		<i>Milk and Stores</i>		<i>Stores</i>	
	£	s. d.	£	s. d.	£	s. d.
Pasture land	4	3 5	3	8 2	3	2 4
Mowing land	5	17 4	5	3 2	5	6 3
Grazing land	4	8 9	3	11 6	3	6 0

Pasture land consists of grassland grazed throughout the year, mowing land of grassland cut for hay or silage, while the area of grazing land is a calculated figure, comprising the area of pasture land, together with the aftermath of mowing land converted to an equivalent area of full-year pasturage: it represents, therefore, the total grazing available during the year from pasture and aftermath, in terms of pasture land.

The average annual cost of growing grass on pasture fields in the Dairy group was £4 3s. 5d. per acre, some 15s. per acre higher than in the Milk and Stores group, and 21s. per acre greater than in the Stores, differences accounted for mainly by higher charges for rent and for the cost of ley establishment in the Dairy group. The actual cost of establishing one acre of ley was, on average, no higher in the Dairy group, but the proportion of maiden leys was greater.

The average annual cost of growing grass on mowing land (excluding all harvesting costs) was appreciably higher than for pasture land in all groups, due chiefly to the greater cost of manures and of ley establishment in the case of mowing land. Temporary grass, which carries the cost of ley establishment, averaged 75 to 85 per cent of the total area of mowing land in all groups, compared with about 50 per cent for pasture land in the two milk selling groups, and only 28 per cent in the Stores group. The average cost per acre of mowing land in the Dairy group was again higher than in the other two groups, but the difference is less than for pasture land. In this case however, per acre costs were higher in the Stores group than in the Milk and Stores group, due mainly to a higher cost of ley establishment in the former group where, although the overall proportion of leys is lower, the proportion of leys established by the more costly method of direct seeding is considerably higher.

The cost of grazing land in the Dairy group averaged £4 8s. 9d. per acre, 17s. 3d. more than in the Milk and Stores group and 22s. 9d. per acre more than in the Stores group. Most of the higher cost relates to rent and ley establishment on both pasture and mowing land: rather surprisingly, in view of the extractive nature of milk production, expenditure upon manures for grassland was no higher in the Dairy group and, in fact, for mowing land it was distinctly lower than in either of the store rearing groups. It appears therefore that there is considerable scope in the Dairy group, and possibly in the other groups as well, for increasing output economically by promoting more intensive production from the grassland by a rather greater expenditure upon manures.

Although the per acre cost of grazing is highest in the Dairy group, the stocking of the grazing land was appreciably lower than in the Stores group, especially during the summer months.

Cow-equivalent Weeks per Adjusted Acre of Grazing Land

	<i>Milk and</i>		
	<i>Dairy</i>	<i>Stores</i>	<i>Stores</i>
	<i>No.</i>	<i>No.</i>	<i>No.</i>
Winter . . .	9.5	9.2	13.7
Summer . . .	13.7	14.7	20.9
Year . . .	23.2	23.9	34.6

Cost of Grazing per Cow-equivalent Week

	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Winter . . .	2 0	1 8	1 6
Summer . . .	5 6	4 2	3 8

The higher rate of stocking in the Stores group is closely connected with the considerably higher proportion of sheep carried in this group, but the big difference between this group and the other two raises some doubts as to the validity of the scale of stock equivalents commonly used when farms of different types are compared. As a result of the higher cost per acre of grazing and the lower density of stocking in the Dairy group, the cost of maintaining the equivalent of one cow at grass day and night for one week during the summer was 5s. 6d., compared with 4s. 2d. in the Milk and Stores group, and 3s. 8d. in the Stores group.

The fact, however, that the density of stocking was equal to 20.9 cow-equivalent weeks per acre during the summer in the Stores group and only 13.7 per acre in the Dairy group means merely that the grazing land was required to accommodate these relative levels of stocking, which clearly have little or no relationship to the amount of grass provided; in other words, density of stocking does not measure production of grass. It can be taken as very highly probable that, in the Dairy group, where a higher proportion of leys and of maiden leys is found on slightly better land with a lower density of stocking, that the amount of nutrients available for grazing per stock-unit week will be higher than in the Milk and Stores group, and very considerably higher than in the Stores group. Thus, although the cost of grazing per cow per week is higher in the Dairy group, it is quite impossible to say, in the absence of any direct measurement of the relative productivities of grassland in the groups, whether the cost of grazing per unit of food nutrients supplied is higher or lower in the Dairy group: and even if it were possible to do so there would still remain the further difficulty that the economic relationship between food input and resulting output may be much more favourable, even with a higher cost per unit of food, where the product is milk, than where it is store cattle. Indeed, in the determination of physical, and still more of economic input-output relationships, very little real progress has yet been made where grassland is concerned.

Total Foods and Grazing:

Total foods and grazing averaged £1,046 per 100 acres in the Dairy group, £927 in the Milk and Stores, and £827 in the Stores group. Compared with the Milk and Stores group, purchased foods in the Dairy group were £103 per 100 acres greater, grazing £50 higher, but home-grown foods £34 less. In the Stores group purchased foods were £118 per 100 acres

lower than in the Milk and Stores group, grazing £14 lower and home-grown foods £32 higher. Total cost of food and grazing per £100 of production averaged £41.7 in the Dairy group, £45.6 in the Milk and Stores group, and £55.6 in the Stores group. Thus, although the total cost of foods and grazing is considerably higher in the Dairy group, the relationship between food input and production is more favourable than in the Milk and Stores group, where total costs are lower, and much more favourable than in the Stores group, where the total cost of foods and grazing per 100 acres is over £200 lower.

Labour and Power:

Labour and Power: Average per 100 acres						
	Dairy		Milk and Stores		Stores	
	Hours	£	Hours	£	Hours	£
Manual . . .	3,585	516	2,612	375	1,929	276
Tractor . . .	170	34	141	28	175	35
Horse/Pony . . .	90	6	117	7	37	2
Car/Van . . .	—	—	—	8	—	—
Total . . .	—	556	—	418	—	313

Manual Labour:

The cost of manual labour directly utilized by cattle shows greater differences between the groups than for any other single item of cost; average costs were £516 per 100 acres in the Dairy group, £375 in the Milk and Stores and £276 in the Stores group. Evidence very strongly suggests however that the high cost of labour in the Dairy group is a reflection of the amount of labour available and utilized rather than the amount strictly necessary to conduct the enterprise.

The total regular labour force available on all the farms in the Dairy group has been ascertained, and an analysis of the farms in the group according to the number of man-equivalents available, per 100 acres of total adjusted farm area, yields the following results.

<i>Man-units per 100 adjusted acres of total farm area</i>	<i>Number of Farms</i>	<i>Average Farm Acreage</i>	<i>Direct labour on cattle: man-hours per 100 acres</i>
<i>Man-units</i>	<i>No.</i>	<i>Ac.</i>	<i>Hours</i>
Under 1.25 . . .	1	300	1,869
1.25 to 2.0 . . .	4	112	2,654
2.0 to 3.5 . . .	4	69	4,853
Over 3.5 . . .	3	43	6,514

One large dairy farm of 300 acres had a regular labour force of just under 1.25 man-units per 100 acres, while four other farms with an average area of 112 acres had between 1.25 and 2.0 units. As the size of farm decreased, labour available per 100 acres increased rapidly, and for three farms, averaging 43 acres, the labour force was equivalent to over 3.5 units per 100 acres. Thus, a close relationship exists between farm size and availability of labour, and an equally close association between labour available on the farm and the amount of direct labour utilized per 100 acres on the cattle enterprise. The one large dairy farm, where a definite shortage of labour exists, is producing milk for a direct labour input of only 1,869 man-hours per 100 acres—less, in fact, than the average for the Stores group. On the four farms where there is between 1.25 and 2.0 man-units available per 100 acres, and where labour and land are in an easier and probably a more economic relationship, 2,654 man-hours per 100 acres were directly utilized by cattle. The amount of labour utilized by cattle in the smaller farms, where much more labour is available, increased rapidly, averaging 6,514 man-hours per 100 acres for the three smallest farms, where over 3.5 man-units per 100 acres are available: for the two smaller farms in this group of three, both with less than 35 acres total adjusted farm area, man-hours devoted to cattle averaged no less than 8,430 per 100 acres, over three times as much as for the farms of 100–150 acres. Between the small farms and the larger in the Dairy group there is, apart from a somewhat greater intensity of grassland management, and a slightly greater concentration upon milking cows, no marked difference in the overall density of stocking with cattle per 100 acres, or in the general cropping plan; certainly no differences great enough to account for more than a very small proportion of the tremendous variation in labour inputs between the large and small farms.

It would perhaps be reasonable to suppose that a labour cost of about £400 per 100 acres represents all that is strictly necessary for milk production under these conditions, and that at least £100, and possibly rather more, of the average figure of £516 per 100 acres recorded for the Dairy group as a whole represents a superfluity of family labour on the smaller farms which is absorbed by cattle, not because it is required, but because it is there, and must be utilized in some way or other. This means that on some of the smallest farms in this group the labour available for cattle is at least twice as great as is really necessary for milk production, and three times as great

as would be required for beef store cattle production on traditional lines. This over-abundance of labour on many small family farms is perhaps the most compelling reason why an intensive system of cattle management, such as dairying provides, is of paramount importance in enabling the maximum amount of labour to be economically utilized.

The total number of man-hours directly employed upon cattle is analysed below according to the nature of the tasks upon which it is engaged.

Direct Labour: Average Man-Hours per 100 Acres

	Dairy	Milk and Stores	Stores
	Hours	Hours	Hours
Routine work	3,230	2,245	1,529
Other work:			
Hauling milk	44	77	—
Hauling fodder	225	210	273
Grinding and pulping	19	30	37
Moving electric fence	33	—	—
Miscellaneous	34	50	90
Total Other Work	355	367	400
Total Work	3,585	2,612	1,929

Of total labour employed on cattle over the year, more than 90 per cent in the Dairy group, 86 per cent in the Milk and Stores, and 79 per cent in the Stores group, was absorbed by the day to day routine work around the yard, or inspecting outlying cattle. The only other really significant labour requirement is involved in the hauling of fodder and bedding straw, accounting for over 200 man-hours per 100 acres in all groups. Hauling milk occupied 44 man-hours annually per 100 acres in the Dairy group and 77 in the Milk and Stores group; on the larger farms in the latter group the buildings are often separated from the parish road, where the pick-up point for milk is located, by several fields, and the milk from one farm in this group had to be transported several miles to a communal pick-up point, and in another case the distance involved was over one mile. Miscellaneous work includes time spent on such jobs as T.T. testing, calf certifying, attention to sick animals, dressing for warbles, etc.: in total these miscellaneous labour requirements were greatest in the Stores group, but even here accounted for less than 5 per cent of the total.

The monthly distribution of total annual man-hours is set out in Table 23.

TABLE 23

Monthly Distribution of Man-hours: per 100 Acres and as Per Cent of Total Annual Man-hours

	Dairy		Milk and Stores		Stores	
	Hrs.	%	Hrs.	%	Hrs.	%
November	355	9.9	212	8.1	146	7.6
December	398	11.1	301	11.5	233	12.1
January	400	11.1	306	11.7	271	14.1
February	352	9.8	273	10.4	250	13.0
March	370	10.3	295	11.3	277	14.3
April	325	9.1	266	10.2	255	13.2
WINTER	2,200	61.3	1,653	63.2	1,432	74.3
May	245	6.9	164	6.3	102	5.3
June	220	6.2	152	5.8	77	4.0
July	229	6.4	156	6.0	78	4.1
August	209	5.8	156	6.0	75	3.8
September	237	6.6	160	6.2	79	4.1
October	245	6.8	171	6.5	86	4.4
SUMMER	1,385	38.7	959	36.8	497	25.7
YEAR	3,585	100.0	2,612	100.0	1,929	100.0

In the two milk-selling groups, 61 to 63 per cent of total annual man-hours are incurred during the winter six months, November to April, and very nearly 75 per cent for the Stores group; full winter routine however is not reached in the latter group until January, compared with a month earlier in the other two groups. The average monthly labour requirements in the Stores group during the period January to April is more than three times as great as for the period June to September, but less than twice as great in the two milk selling groups, where the twice daily task of milking proceeds in winter and summer alike. Indeed, the outstanding feature of Table 23 is the wide margin between the summer and winter labour requirements for the single suckling system of store cattle rearing practised in the Stores group, and especially of the very low level of labour requirements from June to October inclusive. This low labour requirement for cattle during the summer months fits in very well with the demands of field work for crop production, haymaking, and corn harvest, and

to a lesser extent with the labour needs of sheep. Sheep management in this district is characterized, as far as labour requirements are concerned, by a much more level pattern of distribution over the year as a whole, but upon which is superimposed pronounced peak requirements at lambing and shearing time. Lambing, which occurs in March and April, clashes with the period at which the labour requirements of cattle are at their highest level.

It is possible, with the data available, to make a calculation of the number of hours of indirect manual labour required for crop production, including grassland, for cattle, and the figures are set out below.

Total Labour: Man-Hours per 100 Acres

<i>Labour Requirements:</i>	<i>Milk and</i>		
	<i>Dairy</i>	<i>Stores</i>	<i>Stores</i>
Directly for cattle	3,585	2,612	1,929
Indirectly: crop production and grazing	1,540	1,634	1,706
	<u>5,125</u>	<u>4,246</u>	<u>3,635</u>

Indirect labour, which includes the labour involved in producing all crops and grazing consumed by cattle, and labour requirements involved in the maintenance of hedges, banks, fences, gates, etc., but excluding maintenance labour on tractors and horses, shows only a relatively slight variation between the groups. It is highest per 100 acres in the Stores group where the additional quantities of hay and corn provided are only partially offset by the saving on the smaller quantities of roots grown for cattle. Indirect labour is also slightly higher in the Milk and Stores group than in the Dairy group, owing to the greater quantity of corn provided in the former group.

Total labour averaged 5,125 man-hours per 100 acres in the Dairy group, but nearly 900 hours less in the Milk and Stores group, and about 1,500 less per 100 acres in the Stores group. It is interesting to note that corresponding figures of labour requirements for the sheep enterprise in the Brendon Hills district are: direct labour 1,440 man-hours per 100 acres, indirect labour 970 man-hours, giving a total labour requirement of 2,410 man-hours per 100 acres, which is 25 per cent lower than for cattle in the Stores group for direct labour, 43 per cent for indirect, and 34 per cent lower for total labour. These figures illustrate clearly that on the larger farms in this area, where labour rather than land is the limiting factor, sheep and store cattle rearing, with their relatively low labour requirements, enables a limiting labour force to be spread over a larger area

of land than would be possible if dairying were to be practised. Whether a system of farming that enables a good fit of land and labour to be achieved is the most profitable system to follow, or whether it would be better to apply the labour force more intensively over a smaller area of land in a more profitable system of production is, however, another matter.

Power:

Tractor work directly involved with cattle is concerned mainly with the haulage of fodder and bedding, but also, on some farms, with the transport of milk, and with food preparation. Total tractor costs per 100 acres were slightly lower in the Milk and Stores group, but, in relation to the level of manual labour costs involved, are of slight importance in all groups; the cost of horses and riding ponies employed upon cattle work is negligible.

Miscellaneous Costs:

Not unexpectedly, many items of miscellaneous expenditure are considerably higher in the Dairy group, and particularly on account of veterinary fees and medicines, fuel, repairs and depreciation of equipment, detergents, etc.; payments on veterinary account, which include an unspecified amount for medicines supplied, were three times as great as in the Milk and Stores group, and nearly four times as great as in the Stores group. Fuel, used for heating water for washing up and sterilizing, averaged £24·0 per 100 acres in the Dairy group compared with only £6·4 in the Milk and Stores group, where dairy equipment is much less elaborate, and nil in the Stores group where domestic hot water supplies are adequate for the washing of odd milking and feeding buckets. The much higher charge for repairs and depreciation of equipment in the Dairy group is mainly connected with the milking machines utilized in that group. In fact, in all main items of cost except marketing expenses, and in most items of a minor nature, the average cost is appreciably higher in the Dairy group, and total Miscellaneous Costs in that group, at £169 per 100 acres, were more than double these in the other two groups.

TABLE 24
Miscellaneous Costs: Average per 100 Acres

	Dairy	Milk and Stores	Stores
	£	£	£
1. Veterinary Fees and Medicines:			
Vet. account	37.2	12.0	9.8
Other medicines	6.6	2.0	2.7
Total	43.8	14.0	12.5
2. Fuel, etc.:			
Petrol and oil	16.8	3.0	—
Coal, coke, wood	1.3	3.4	—
Calor gas	5.9	—	—
Total	24.0	6.4	—
3. Marketing Expenses:			
Transport of cattle	7.7	4.2	5.6
Tolls and Commission	5.9	19.5	11.9
Total	13.6	23.7	17.5
4. Bull Service:			
Service fees	1.0	3.0	2.0
A.I. fees	18.3	9.0	4.9
Total	19.3	12.0	6.9
5. Rental of buildings	16.6	11.0	12.9
6. Cattle equipment: repairs and depreciation	18.9	5.7	6.4
7. Detergents	5.2	0.8	0.4
8. Disinfectants	3.8	1.0	1.2
9. Small tools	2.8	3.2	2.7
10. Milking machine parts	3.8	0.2	—
11. Filter pads, cloths, etc.	2.7	1.8	0.1
12. Salt licks, minerals, etc.	0.9	0.5	1.8
13. Cattle insurance	7.9	2.8	5.2
14. Herd Book fees	0.5	0.7	1.6
15. National Milk Records	0.8	—	—
16. Bedding straw	3.6	—	2.2
17. Sundries	0.8	—	—
TOTAL MISCELLANEOUS COSTS	169.0	83.8	71.4

Production, Production Costs and Margin

The average total Production, Production Costs, and Margin per 100 acres are set out in Table 25.

TABLE 25

Production, Production Costs and Margin: Average per 100 Acres

	Dairy	Milk and Stores	Stores
<i>Production:</i>	£	£	£
Production of Cattle	354	974	994
Other Production:			
(a) Milk	1,997	835	125
(b) Premiums	143	119	105
(c) Production Grants	13	103	247
(d) Miscellaneous	—	—	17
Total Other Production	2,153	1,057	494
Total Production.	2,507	2,031	1,488
<i>Production Costs:</i>			
<i>Foods:</i>			
(a) Purchased	290	187	69
(b) Home-grown	479	513	545
(c) Grazing	277	227	213
Total Foods	1,046	927	827
Labour and Power	556	418	313
Miscellaneous Costs	169	84	71
Total Production Costs	1,771	1,429	1,211
MARGIN: Surplus	736	602	277

Total production in the Dairy group is £476 per 100 acres greater than in the Milk and Stores group, and £1,019 greater than in the Stores group: total production costs per 100 acres are also higher in the Dairy group, but less so than for total production, being £342 and £560 per 100 acres higher than for the two store rearing groups. Margin represents the amount available, after charging unpaid labour at the rate for agricultural workers, to meet the share of general farm overhead expenses pertaining to the enterprise, and to provide for the remuneration of management, and the capital invested in the enterprise. Margin per 100 acres averaged £736 in the Dairy group, £602 in the Milk and Stores, and £277 per 100 acres in the Stores group. The margin is thus 18 per cent lower in the Milk and Stores group compared with the Dairy group, and 62 per cent lower in the Stores group. Further, but for the

circumstance that, in the case of a considerable proportion of the farms in the Dairy group, the cattle are required to absorb, uneconomically, a large amount of surplus labour, the margin in this group would probably have been about £100 per 100 acres higher. It may be noted also that the margin per 100 acres in the Stores group is only slightly greater than the payments received for Hill Cow and Calf grants.

Production, production costs and margin may be set out in a number of different ways, each illustrating different aspects of the economic relationships involved. Some of the more important of these are shown in Table 26.

TABLE 26
Average Production, Production Costs and Margin

	Pro- duction £	Pro- duction Costs £	Margin	
			£	Index: Dairy Group = 100
<i>Per 100 Acres:</i>				
Dairy	2,507	1,771	736	100
Milk and Stores	2,031	1,429	602	82
Stores	1,488	1,211	277	38
<i>Per £100 of Production:</i>				
Dairy	100	71	29	100
Milk and Stores	100	70	30	103
Stores	100	81	19	66
<i>Per £100 Valuation of Cattle and Cattle Equipment:</i>				
Dairy	128	90	38	100
Milk and Stores	96	67	29	76
Stores	59	48	11	29
<i>Per £100 Total Foods and Grazing:</i>				
Dairy	239	169	70	100
Milk and Stores	219	154	65	93
Stores	180	146	34	49
<i>Per £100 Direct Labour:</i>				
Dairy	486	343	143	100
Milk and Stores	542	381	161	113
Stores	539	439	100	70
<i>Per £100 Total Labour:</i>				
Dairy	344	243	101	100
Milk and Stores	337	237	100	99
Stores	290	236	54	53

The first two sections of Table 26 reveal most clearly the relative strength of the Dairy system of production, and the economic weaknesses of store cattle rearing. Production per 100 acres is 23 per cent greater in the Dairy group than in the Milk and Stores, and 68 per cent greater than in the Stores group, and, for every £100 of production, £81 is absorbed in production costs in the Stores group compared with £70 to £71 in the two milk selling groups; margin per £100 of production in the Stores group is therefore only two-thirds that in the Dairy group. Thus, in the Stores group, there is a combination of a low level of production per 100 acres together with high costs per £100 of production, with the result that the margin per 100 acres is only 38 per cent of that in the Dairy group. In the Milk and Stores group, costs per £100 of production are very slightly lower than in the Dairy group, but this is more than offset by the lower level of production per 100 acres, and margin per 100 acres is only 82 per cent of the level attained in the Dairy group.

The relatively unfavourable relationship between overall production and production costs in the Stores group, together with the higher capital requirements in that group, is reflected in the figures of production and margin per £100 valuation of cattle and equipment. With production per 100 acres 41 per cent lower, and valuations 29 per cent higher in the Stores group than in the Dairy, production per £100 valuation is only 46 per cent, and margin 29 per cent, of the corresponding figures for the Dairy group: in the Milk and Stores group production and margin per £100 valuation are both about three-quarters of those in the Dairy group.

For every £100 of expenditure upon foods and grazing, production averaged £239 in the Dairy group, £219 in the Milk and Stores and £180 in the Stores group, while margin per £100 in the two store rearing groups was 93 and 49 per cent respectively of the level in the Dairy group. The high costs of direct labour in the Dairy group are reflected in the relatively lower level of production per £100 direct labour, which is 10 per cent below that in the two store rearing groups: margin per £100 direct labour however, although 13 per cent higher in the Milk and Stores group than in the Dairy group, is 30 per cent lower in the Stores group than in the Dairy group. If the calculation is made based upon total direct and indirect labour, both production and margin per £100 total labour is very slightly higher in the Dairy group than in the Milk and Stores group, while production is rather higher in these two groups than in

the Stores group, and the margin per £100 total labour nearly double.

If the results attained by the dairy farms in this upland marginal farming area are taken as a standard, the economic weaknesses of store cattle rearing may be summarized as follows:

- (1) An unfavourable relationship in the Stores group between production and costs, leading to a margin per £100 of production only two-thirds that from dairying.
- (2) A level of production per 100 acres only 59 per cent of that obtained from dairying.
- (3) As a consequence of the two conditions above, the margin per 100 acres from store rearing is only 38 per cent of that from dairying, and the existence of the margin in the Stores group is almost entirely dependent upon special Production Grants for calves and cows.
- (4) A capital investment in cattle 39 per cent greater than for dairying, and 29 per cent greater for cattle and cattle equipment combined.
- (5) As a result of the higher level of capital investment per 100 acres, and lower production, production per £100 capital for store rearing is only 46 per cent of that for dairying, and the margin only 29 per cent.
- (6) Although production per £100 direct labour is higher for store rearing, it is lower per £100 total labour, and the margin per £100 is 30 per cent lower based on direct labour, and 47 per cent lower on total labour.

From the point of view of the small family farm store rearing has especially marked disadvantages. Such farms are commonly characterized by a shortage of capital and a superabundance of labour. Not only is a considerably greater investment of capital for stock required for store rearing, but this system of production, with its low output per acre, enables only the minimum of labour to be economically employed. Dairying, on the other hand, not only makes less call upon scarce capital, and gives rise to a regular monthly income, but, with its much greater intensity of production per acre, and more favourable input-output relationship, enables a much greater quantity of labour to be profitably absorbed.

By every test therefore, level of production, ratio of production to cost, capital requirements, rate of turnover, margin on capital, and even margin per £100 labour costs, the results

from dairying are outstandingly more favourable than from store rearing. The position may perhaps be best illustrated by the fact that, to afford a margin per 100 acres from store rearing equal to that from dairying, the average price of all cattle sold would have to be 46 per cent greater than was in fact the case in 1953, while, to give an equal margin per £100 capital invested in stock and equipment, prices would need to rise 69 per cent: in the former case this would mean increasing the price of an adult store bullock from £61.3 to £89.5 per head, and in the latter case to £103.6 per head.

This analysis however does show clearly the great improvement in economic results that arises when the store rearing system is modified to permit of milk being sold. The results achieved by those farmers who carry on milk selling in conjunction with beef-store cattle rearing are remarkably encouraging. With only a negligible reduction, compared with the Stores group, in the production of store cattle, farms in the Milk and Stores group have increased total production by £543 per 100 acres with an increase of only £218 in costs, and, as a result, margin per 100 acres, at £602, is £325 greater than in the Stores group, and only £134 per 100 acres below that in the Dairy group. Compared with the Dairy group, production per 100 acres is 19 per cent lower, and margin 18 per cent lower, but margin per £100 production is 3 per cent higher, and 13 per cent higher per £100 direct labour. Capital requirements for stock however are 16 per cent greater than in the Dairy group, and the rate of turnover of capital, and margin per £100 capital invested in stock plus equipment are both about 25 per cent lower. This system of production, while maintaining the output of beef stores, does, however, enable total production and margin per 100 acres to be raised sufficiently to provide an adequate level of income from land devoted to cattle, especially upon the medium and larger sized farms, where labour supply rather than the area of land controlled is tending to be the limiting factor.

Cost of Milk Production

In the Dairy group, where sales of cattle are solely a by-product of milk production, the average net cost of producing a gallon of milk can be readily determined by deducting the production of cattle, together with the small amount of calf

subsidy received, from the total cost of production. This procedure gives a net cost of milk production for the Dairy group of £1,403 per 100 acres, which, related to a production of 14,482 gallons of milk per 100 acres, results in a net cost per gallon of $23\frac{1}{4}$ pence. In the case of the Milk and Stores group however, milk and cattle are joint products, with the production of cattle exceeding that of milk. Under these circumstances the calculation of production costs for each of the separate end-products must, of necessity, be arbitrary. The most reasonable basis for the apportionment of the joint cost appears to be on the assumption that, under this system of management, the margin per £100 of production is equal for milk and for cattle rearing, although, where milk production and store rearing are carried on separately, the margin is much lower for store rearing. In the case of store rearing however, the annual maintenance of the breeding herd is chargeable entirely to the store cattle, whereas in the case of milk selling and store cattle rearing carried out as a joint enterprise, only a quarter of this cost would, on average, be chargeable to store cattle. Based on an apportionment of total production costs in proportion to the production of cattle and milk respectively, the net cost of milk production in the Milk and Stores group averaged £669 per 100 acres, which, related to a production of 7,672 gallons per 100 acres, gives a net cost of production for milk of just under 21*d.* per gallon, $2\frac{1}{4}$ *d.* per gallon lower than for the Dairy group.

Milk production costs are available, for the period covered by this investigation, for two groups of lowland farms in this Province. The basis of costing however is different for the two investigations, and a direct comparison of the results is difficult. In the case of the present investigation, dealing with upland marginal areas, the whole cattle enterprise forms the unit for costings purposes, and production and costs are related to the area of land utilized by cattle. For the other investigation into costs on lowland dairy herds, the basis of costings follows that employed in the National Investigation into the Economics of Milk Production, namely, the milking herd alone, excluding the followers, and results calculated per cow forms the basis for comparison: although the amount of land required to support each cow can be calculated, the acreage utilized by the dairy enterprise as a whole cannot be determined. A high margin per cow does not necessarily imply a high margin per acre, since this depends also upon the density of stocking with cattle, and upon the proportion of followers carried per cow.

However, although one investigation yields production and costs per cow, but not per 100 acres, and the other per 100 acres, but not per cow, both yield a net cost of production per gallon, and, although this is the least satisfactory criterion, a comparison on this basis is worth making, especially in view of the suggestion, frequently encountered, that milk production in upland marginal farming areas is, of necessity, dear production.

TABLE 27

Cost of Production of Milk in Upland Marginal and Lowland Dairying Areas
Average Cost per Gallon 1952-53

	Upland Marginal Area		Lowland Dairying Areas	
	Dairy	Milk and Stores	Grass Farms	Mixed Farms
Number of Farms	12	10	17	16
Average Cost per gallon	d. 23·3	d. 20·9	d. 23·7	d. 24·0
Average Return per gallon sold	38·5	38·1	38·5	38·7
Average Margin per gallon sold	15·2	17·2	14·8	14·7
Annual Production per Cow	Galls. 614	Galls. 487	Galls. 748	Galls. 770

The average yield per cow is considerably higher for the lowland dairy farms than for the upland dairy farms, and very much higher than for farms in the upland Milk and Stores group: nevertheless, the average cost of production per gallon is lowest of all in the Milk and Stores group, and very slightly lower in the upland Dairy group than in either of the lowland groups. Average returns per gallon for milk sold were highest for the lowland mixed farms, and lowest for the upland Milk and Stores group, but the difference is only 0·6 pence per gallon, and the average margin per gallon of milk sold was higher by 2*d.* per gallon in the Milk and Stores group than in the upland Dairy group, and by roughly 2½*d.* per gallon than in the lowland groups.

It is, unfortunately, not possible to proceed beyond this very limited comparison, but it is sufficient to show that the cost of milk production, per gallon at least, is not necessarily any higher in upland marginal farming areas than in lowland dairying areas, and, where milk production is carried on in

conjunction with store cattle rearing, the cost of production per gallon may be materially lower in the marginal farming areas. This does not mean however that production and margin per 100 acres from milk production is as high in marginal areas as in lowland dairying areas; such a state of affairs is, in fact, almost inconceivable, although production and margin per £100 rent might well yield comparable results in the two types of farming areas.

Group Analyses

DAIRY GROUP: LARGE AND SMALL FARMS:

The Dairy group contains farms of varying size, and, as conditions governing economic milk production on small farms are usually somewhat different from those on larger farms, in, for example, the ability to provide feed from home-grown crops, an analysis of the farms in this group has been made according to size of farm. Although size of farm and size of herd are usually directly associated this is not invariably the case, and some of the small farms in this group carry larger herds of milking cows than some of the larger farms, where sheep and other enterprises are of greater relative importance.

The Dairy group as a whole has been divided into two groups, a Small Farm group consisting of seven farms, all of less than 85 acres total farm area in extent, and a Large Farm group containing five farms with an average total area of 174 acres per farm. Of total farm area, 14 per cent in the case of the Small Farm group consists of rough grazing, and 17 per cent in the Large Farm group. As a percentage of total crops and grass, cereals accounted for 11 to 12 per cent on average in both groups, and, although roots and green fodder averaged 12 per cent of the total in the Large Farm group, compared with 9 per cent for the Small Farm group, all the extra acreage of roots was on account of sheep, which were kept on four of the five farms in the former group but on only one out of seven in the latter. The most marked difference between the groups relates to the area of grassland set aside for mowing; this accounted for 37 per cent of total crops and grass on the small farms but for only 21 per cent on the large farms: conversely, pasture land accounted for 55 per cent of the total in the latter

case but for only 43 per cent in the former. Apart, however, from this difference in the proportion of grassland set aside for conservation, there is surprisingly little difference between the groups in the general pattern of cropping, despite the large difference in average farm size.

Average rental value per farm was £125 in the Small group and £228 in the Large; after allowing, on average, 16 to 17 per cent of total farm rent for farmhouses, cottages, and buildings, the average rental value per acre of crops and grass was 24s. 10d. for the large farms and 36s. 4d. for the small.

The average number of cows carried per farm was 12 in the Small group and 21 in the Large group, while other cattle averaged $4\frac{1}{2}$ and 19 head per farm respectively. Total stocking per 100 acres of total adjusted acreage was surprisingly close in the two groups, averaging 36.4 cow-equivalent units in the Small group, and 35.4 units per 100 acres in the Large: of total stocking, cattle accounted for 78 per cent in the former group, but for only 62 per cent in the latter group, where sheep were responsible for 29 per cent of the total.

With regard to breed of cattle there was no marked tendency for cattle of the specialized dairy breeds to be associated more with one group than the other, and the marked difference in the average yield, 677 gallons per cow in the Small group and 560 gallons in the Large group, cannot be attributed to this factor. Regarding herd replacement policy however, marked differences are found; five of the seven herds in the Small group purchased all their replacements, one farm purchased about one-half and reared the remainder, while the remaining herd was wholly self-maintained. Of the five herds in the Large group, all were wholly or partly self-maintained.

Acreage Devoted to Cattle:

Of the total farm area, the proportion devoted to cattle averaged 77 per cent in the Small group, and 62 per cent in the Large. Of the area devoted to cattle, 85 per cent in the former group and 82 per cent in the latter consisted of grassland, of which nearly one-half in the case of the small farms was cut for hay and silage, but only one-third in the case of the larger farms. Corn and straw accounted for 6.7 acres per 100 acres in the Small group and 7.7 acres in the Large, and roots and green fodder for 8.5 and 10.5 acres per 100 acres respectively in the two groups.

Stocking with cows averaged 26.4 per 100 acres in the Small group and 21.7 in the Large, but overall density of stocking

with cattle was similar in both groups. The much greater preponderance of cows in the Small group, 90 per cent of total cattle on a stock-unit basis compared with 76 per cent in the Large group, exercised a considerable influence upon the marked difference in the level of production in the two groups.

The main differences between the two groups, apart from the primary difference in farm size, relate to the considerably greater proportion of the farm devoted to cattle in the Small group, and the greater number of cows carried per 100 acres in this group, made possible by a policy of purchasing nearly all replacements required for the dairy herd. A slightly lower proportion of the area devoted to cattle is under arable crops in the Small group, but the proportion of grassland cut for hay and silage is considerably greater, while the proportion of kale grown in this group is appreciably higher.

Valuations, Production and Production Costs:

Valuations of total cattle averaged £1,818 per 100 acres in the Small group and £1,740 in the Large, and cattle equipment £250 and £145 per 100 acres respectively, giving a total valuation of £2,068 in the former case and £1,885 in the latter.

Average Production and Production Costs per 100 acres are summarized in Table 28.

Sales of cattle were considerably higher in the Large group, and purchases much lower, and production of cattle in this group, at £442 per 100 acres, was nearly twice as great as in the Small group where purchases of cows averaged over £300 per 100 acres. The average price paid for cows purchased in the Small group was £78 per head, some £20 per head greater than the corresponding figure in the Large group.

The average yield per cow in the Small group was 21 per cent greater than in the Large group, and the number of cows carried per 100 acres 22 per cent greater. As a result, the production of milk per 100 acres averaged nearly 18,000 gallons, some 47 per cent greater than in the Large group, while the value of milk produced in the Small group, at £2,543, was more than £900 per 100 acres greater. The proportion of winter milk averaged 49.1 per cent in the Small group, and 44.5 per cent in the Large. Of total milk produced over the year more than 92 per cent was sold in the former group compared with 88 per cent in the Large group. Premiums for T.T. milk and for Attestation were comparable in both groups, and Production Grants negligible in both cases.

Owing to the much higher level of milk production, total

TABLE 28

Average Production and Production Costs in the Dairy Group:
by Size of Farm

	Small Farms	Large Farms
	£	£
PRODUCTION:		
Production of Cattle	226	442
Other Production:		
(1) Milk	2,543	1,622
(2) Premiums	146	140
(3) Production Grants	14	13
Total Other	2,703	1,775
TOTAL PRODUCTION	2,929	2,217
PRODUCTION COSTS:		
<i>Foods:</i>		
(1) Purchased	403	213
(2) Home-grown:		
(a) Corn	84	81
(b) Straw	10	13
(c) Hay	188	188
(d) Roots, etc.	232	173
Total Home-grown	514	455
(3) Grazing	310	255
Total Foods and Grazing	1,227	923
<i>Labour and Power:</i>		
(a) Manual	740	362
(b) Tractor and Lorry	44	27
(c) Horse	6	5
Total	790	394
<i>Miscellaneous Costs</i>	210	141
TOTAL PRODUCTION COSTS	2,227	1,458
MARGIN	702	759

production in the Small group averaged nearly £2,930 per 100 acres, more than £700 per 100 acres greater than in the Large group. Total production, as a percentage of the valuation of cattle and equipment, averaged 142 per cent in the former group, and 118 per cent of a lower total valuation in the latter case.

The most marked difference in food costs between the two groups relates to purchased foods which, at £403 per 100 acres in the Small group were nearly twice as high as in the Large

group. Nearly all of this difference is accounted for by purchased concentrates. Purchased concentrates for cows accounted for 92 per cent of the total in the Small group, and averaged 6.7 cwt. per cow, and for 85 per cent of the total, equal to 4.3 cwt. per cow, in the Large group. The additional concentrates purchased in the Small group may have accounted for perhaps one-half of the extra yield per cow obtained in this group, the remainder coming from home-grown foods. The cost of corn and straw combined, and of hay, was identical in the two groups, but the cost of roots and green fodder was nearly £60 per 100 acres higher in the Small group. Grass silage, however, accounts for £70 per 100 acres of the total cost of roots and green fodder in this group, but for none in the Large group. Hay and grass silage combined thus average £258 in the Small group, and roots and green fodder, excluding grass silage, £162 per 100 acres, compared with corresponding figures of £188 and £173 per 100 acres respectively in the Large group.

The total cost of home-grown foods in the Small group, at £514 per 100 acres, is roughly £60 greater than in the Large group, due entirely to the extra proportion of grassland cut for silage, while the cost of grazing is also higher in this group by £55 per 100 acres. The cost per acre of pasture in the Small group averaged £4 15s. 2d., not far short of £1 per acre higher than in the Large group, and the difference in the case of mowing land was still greater, £7 10s. 8d. per acre in the Small group and £4 9s. 4d. in the Large: the cost of manures was 17s. 0d. per acre greater in the former group, rent 14s. 0d., and ley establishment 25s. 0d. greater. The proportion of total grassland in maiden leys was actually slightly greater in the Large group, 11.0 per cent compared with 9.6 per cent in the Small group, but nearly one-half of these leys were established by direct seeding in the latter group compared with less than one-quarter in the former; the cost of seeds mixtures used averaged 76s. per acre in the Large group, but over 100s. per acre in the Small.

The cost per acre of grazing, i.e. pasture plus aftermath, averaged £5 6s. 10d. in the Small group and £3 19s. 6d. per acre in the Large: the more intensive treatment of grassland in the Small group resulted in a cost per acre of grazing 34 per cent greater; but the stocking of the grassland over the year, measured by conventional methods, was only 12 per cent greater, and, in view of the better leys established in this group, and the considerably greater use of manures on grassland, it is

probably safe to assume that the amount of grazing available, per cow-equivalent week, was greater for the Small group than for the Large. It is, in fact, in the more intensive treatment of grassland, and the considerably greater proportion set aside for conservation in the Small group that the most important differences in land utilization and management between the groups are found.

Total foods and grazing cost was some £300 per 100 acres greater in the Small group, but production per 100 acres is over £700 per 100 acres higher. This higher production has been achieved by a greater concentration upon revenue earning cows, at the expense of followers, while the provision of extra feed in the form of purchased concentrates and more intensive production from grassland has enabled the average yield per cow to reach 677 gallons, compared with 560 gallons per cow in the Large group. In short, more cows per 100 acres and higher average yields per cow in the Small group have resulted in increased production of over £700 per 100 acres, and, although this increase is inevitably accompanied by increased food costs, the margin between production and the total cost of foods and grazing averaged £1,702 per 100 acres in the Small group, compared with £1,294 in the Large group.

The favourable relationship between production and feed costs in the Small group is transformed, however, in the overall cost/return relationship, when manual labour costs are brought into account. The cost of this item averaged £740 per 100 acres in this group compared with £362 per 100 acres in the Large group. Data has already been presented which indicates that labour costs on small family farms tend to represent, not so much labour requirements, as labour available and utilized. With more cows per 100 acres, and a higher yield per cow in the Small group, it is only to be expected that labour costs would be higher than in the Large group, but it is almost inconceivable that essential labour requirements should be more than twice as great in the Small group. An analysis of the regular labour force available indicates that the seven farms in the Small group carried a total of 11.6 man-units, all family labour, on an aggregate adjusted acreage of 404 acres: the five farms in the Large group, with a total of 750 adjusted acres, carried a regular labour force of 11.25 man-units, of which 7.75 units consisted of family labour, and 3.5 units of employees. Man-units per 100 acres average 2.87 in the Small group and 1.50 in the Large: in other words, the Small group carried the same regular labour force on 52 acres that the Large

group carried on 100 acres. It seems reasonable to suppose therefore, that, all things considered, the actual labour requirements for economic milk production on the farms in the Small group is not more than £500 per 100 acres, and may well be considerably less.

Miscellaneous Costs averaged £210 per 100 acres in the Small group and £141 in the Large; all major items of cost, with the exception of veterinary fees and medicines, were higher in the Small group, and more especially on account of rental of buildings, depreciation and repairs of equipment, bull and A.I. fees, and fuel.

Total production costs averaged £2,227 per 100 acres in the Small group and £1,458 in the Large group. To the total increase in costs of £769 per 100 acres in the Small group, purchased foods contributed £190, home-grown foods £59, grazing £55, manual labour £378, power £18 and miscellaneous costs £69 per 100 acres. To offset these increased costs the increase in production in the Small group averaged £712 per 100 acres, with the result that the margin in the Small group, at £702 per 100 acres, is nearly £60 less than in the Large group, where production and costs are at a markedly lower level. To leave the matter at this point would however be very misleading. The major problem on the small family farm is to utilize economically as great a proportion of the family labour force as possible, so that at least a tolerable standard of living results. To do this under conditions where land is the limiting factor inevitably involves a considerable intensification of production compared with larger farms where land and labour are in better balance. The "income" accruing to a farming family may be considered to consist of the margin, together with the cost charged for labour: the average "income" from the cattle enterprise, so defined, averaged £1,442 per 100 acres in the Small group compared with £1,121 per 100 acres in the Large group: these figures would be increased by approximately £200 per 100 acres for the Large group, and by rather more than this for the Small group, if indirect labour involved in crop production were brought into account, but it must also be remembered that the margin as calculated makes no allowance for the share of general farm overheads appropriate to the enterprise. However, an "income" of roughly £1,400 per 100 acres is equivalent, on a 50-acre farm entirely devoted to milk production, to over £13 per week, and to over £9 per week on a 35-acre farm, while £1,120 per 100 acres represents nearly £11 per week on 50 acres and £7 10s. per week on 35 acres.

Viewed in this way, the importance of intensifying production on the small family farm is clearly indicated.

This problem of intensification however, even when limited to a single enterprise such as the cattle enterprise, is far more complex than is often assumed, and goes far beyond the question of producing more from each acre and each unit of stock, although these are two basic elements involved in this problem. Other factors, possibly of equal or greater importance, relate to the optimum intensity of stocking of the land, of the proportion of followers to cows, of the extent to which home-produced foods should be relied upon for the production ration, which involves the further questions of to what extent it is justifiable to reduce the number of cows carried in furtherance of a policy of complete or partial self-sufficiency for feed, and for herd replacements. Some of these points have hardly been investigated at all, while the investigation of others in isolation may well have led to misleading results. For example, the importance of achieving a high profit margin per cow is often extolled, but if a high margin per cow is associated with a low stocking with cows per 100 acres, arising either from an undue reliance upon home-grown foods for production, or the maintenance of an excessive number of followers, or even any followers at all under some circumstances, then a lower margin per cow with more cows per 100 acres may well yield a considerably better margin per 100 acres.

As an illustration of this point the results for five farms in the Dairy group are shown below.

<i>Farm</i>	<i>Margin per cow</i>	<i>No. Cows per 100 acres</i>	<i>Margin per 100 acres</i>	<i>Av. Yield per cow</i>
	£	No.	£	Galls.
A	54·0	18·8	1,013	643
B	43·7	18·4	806	807
C	36·7	29·7	1,090	644
D	36·4	33·6	1,221	780
E	32·5	33·1	1,075	609

Farms A and B have the highest margin per cow, but carry less than 19 cows per 100 acres: the remaining farms, with considerably lower margins per cow, carry approximately 30 to 34 cows per 100 acres, and have margins per 100 acres higher than for Farm A and considerably higher than for Farm B. In the case of Farms A and B, all herd replacements are bred and reared on the farm, and both farmers practise a high degree of self-sufficiency in foodstuffs; although a considerable outlay upon replacements and purchased foodstuffs is thereby avoided,

this saving is more than offset by the inevitably lower stocking with cows, and, as a result, although margin per cow is high, per 100 acres it is relatively low. Farm D, in contrast, buys all herd replacements, and is heavily dependent upon purchased concentrates. Density of stocking with cows and yield per cow are both high, and although margin per cow is 33 per cent lower than for Farm A, margin per 100 acres is more than 20 per cent greater.

Although wide differences exist in the results achieved by individual farms in the Dairy group, yet these appear to fall broadly into two distinct groups: six of the twelve herds had margins of £1,000 or over per 100 acres, and five of £400 or less per 100 acres. The remaining farm, with the highest yield per cow in the whole group, but with a low density of stocking with cows, had a margin per 100 acres of approximately £800.

Of the six herds with the best margins per 100 acres, four had relatively high yields per cow and the other two had yields below average, and one much below. This particular farm had, however, by far the highest density of stocking of any in the group, and, in fact, five of the six herds were above average in density of stocking. Of these six herds, one half, all on small farms, were flying herds, while the other half, all on larger farms, were mainly or wholly self-contained for herd replacement purposes. Of the five farms with poor results, four had a low intensity of stocking, but the fifth, with a negative margin, combined a high density of stocking with a very high ratio of followers to cows, and a very low average yield per cow. Two herds had yields per cow above average, but the other three herds had the three lowest yields in the whole group.

It cannot be suggested that this superficial analysis of a very limited sample of farms goes very far in the solution of this vital but complex problem of intensification of production. It does however provide some tentative indications as to the relative importance of some of the factors involved. The most important appears to be the successful combination of a high average yield per cow, economically obtained, with a high rate of stocking with cattle per 100 acres; high yield or high stocking alone does not produce the most favourable result. On the larger farms, equally good results appear to be obtained whether the herd is self-maintained or maintained by purchased replacements, provided yield and density of stocking are at a satisfactory level. On the small farms however, the herds maintained solely by purchased replacements appear to yield better results than where replacements are reared: for this

type of farm a combination of high yield per cow and high density of stocking, wholly or very largely with revenue earning cows, appears to yield the best result.

On the question of the optimum degree of self-sufficiency for feed the sample of farms gives no clear indication. It may be noted however that the highest margin in the group was obtained by a farm heavily stocked with a flying herd, having a high average yield per cow, and heavily dependent upon purchased feeding stuffs for production purposes. Home-grown foods were limited to grazing, hay and kale, which provided little above maintenance requirements for the cows except during part of the grazing season. In so far as dependence upon home-grown foods for production ration must limit the number of cows which can be maintained on a given acreage, it is clearly a policy which can be easily carried to a point where overall returns are reduced: in fact, so far as the small dairy farm is concerned, the most economical policy may well be to seek to provide a maintenance ration from the farm resources for as many high-yielding cows as can be carried, and to rely upon purchased concentrates to provide all, or at least the major part, of the production ration. In this way intensity of production per 100 acres will be at a high level, and the potentiality for profit increased accordingly.

MILK AND STORES GROUP:

There is, within this group, a wide range between farms in the relative importance of sales of milk and of store cattle. Milk, as a percentage of total production, ranged from just over 60 per cent on one farm down to less than 20 per cent on another, and both the farms concerned had a low production and margin per 100 acres. The highest margin was recorded by a farm for which milk sales accounted for 55 per cent of total production, but the second highest margin was for a farm with only 20 per cent of milk sales. Three farms with between 50 and 60 per cent of total production as milk had an average margin of £772 per 100 acres, compared with £503 for four farms with between 30 and 35 per cent of milk sales. Thus, although there may perhaps be a general tendency for results to be better where milk production accounts for 50 per cent or more of total production, two farms with between 20 and 30 per cent of milk had an average margin of nearly £700 per 100 acres.

Average yield per cow is also an important consideration: four herds with yields of over 500 gallons, and averaging 623 gallons per cow, had an average margin of £698 per 100 acres,

compared with £547 for six herds averaging only 407 gallons per cow. But here again the position is not straightforward: the herd with the highest yield per cow had the highest margin per 100 acres, but the second and third highest margins were for herds with average yields below 500 gallons per cow.

The reason for these discrepancies appears to be that it is neither average yield per cow nor proportion of milk sales that is the most important factor determining margin per 100 acres in this system of production, but that density of stocking per 100 acres is the factor of overriding importance. Average density of stocking with cattle was 2.88 acres per cow-equivalent over the whole group, and ranged from 2.00 to 4.04 acres. Four herds had a density of stocking higher than the average for the group, and six a below average density, and the difference between the results achieved by these groups is striking. Stocking with cattle in the former case was nearly 40 per cent higher, and production per 100 acres was 60 per cent greater: the average margin in this group, at £1,092 per 100 acres, compares with a corresponding figure of £438 for the group of farms where the density of stocking is much lower. It is worth noting that these four farms with above average density of stocking have the four highest margins per 100 acres, and, equally striking, the three farms with the lowest density of stocking are the farms with the lowest margins per 100 acres, despite the fact that two of these farms have a high proportion of milk and above average yields per cow.

A more detailed examination of these four farms with a high margin per 100 acres is illuminating. They fall into two distinct classes: two farms have a high proportion of milk sales, and a yield per cow which is high for this system of management; the other two have a low proportion of milk sales and a relatively low average yield per cow.

	<i>Mainly Milk</i>	<i>Mainly Stores</i>
Acres per cow-equivalent	2.57	2.22
Milk sales as per cent of total production	54%	26%
Average yield per cow	649 Galls.	464 Galls.
Per cent of total milk produced fed to calves	17%	52%
<i>Average per 100 acres:</i>		
<i>Production</i>		
Cattle	£ 1,150	£ 1,577
Milk	1,683	678
Other	236	352
Total Production	<u>3,069</u>	<u>2,607</u>
Total Production Costs	1,920	1,580
Margin	<u>1,149</u>	<u>1,027</u>

Average production of milk was over £1,000 greater on the two mainly milk farms, but £543 less for cattle and other production combined: total production was higher by £462 per 100 acres. Total production costs were also greater for the mainly milk farms, by £340 per 100 acres, of which £236 was accounted for by purchased concentrates, £82 for home-grown foods and grazing, £15 for labour and power, and £7 for miscellaneous costs. Margin per 100 acres is slightly higher for the mainly milk farms.

These two pairs of farms represent the two extremes of difference in emphasis upon store cattle and milk production that occur in this system of management. In one case the emphasis is very largely on milk, with a relatively high yield per cow and a considerable expenditure upon purchased concentrates; in the other case the production of milk forms a much smaller proportion of total production, the yield per cow is relatively low, and expenditure upon purchased foods small. The only important factor that these two pairs of farms have in common, distinguishing them from the much less successful farms in the group, is a high density of stocking per acre. It seems reasonably clear therefore that in this system, where beef store cattle rearing and milk production are carried on simultaneously from the same herd of cows, that a high density of stocking with cattle is an essential feature of successful management, no matter what the relative emphasis placed upon milk sales as against store production may be, and that a low intensity of stocking will not yield a satisfactory margin per 100 acres even when a high proportion of milk is the objective, and where relatively high average yields per cow are achieved.

It should not be concluded however that the sure way to success under this system of management is merely to crowd more cattle on the land; the additional stock must be matched by greater production from the land, especially for the provision of winter keep. Also, where a high proportion of milk sales is the objective, as is likely to be the case on the smaller farms adopting this system, a further aim should be to obtain the maximum economic level of yield per cow, an aim which will involve expenditure upon purchased concentrates if the major necessity, a high density of stocking, is to be preserved. Granted these requisites, production and margin per 100 acres can be very satisfactory under this system of cattle management: indeed, the margin per 100 acres on the four most successful farms in the Milk and Stores group was much above the

average margin achieved in the Dairy group, and very little lower than that for the most successful farms in that group.

STORES GROUP:

The influence of density of stocking upon returns in the Stores group is also very marked. Apart from the numbers of stock-units carried per 100 acres, the only factor showing marked differences between farms in this group was in the number of followers carried per breeding cow, but, if this factor exerts any appreciable influence upon the level of profitability, it is completely masked by the overriding importance of the level of stocking. Thus, the farm with the highest margin per 100 acres had a high proportion of followers per cow, but the herds with the two poorest margins had a still higher proportion; in the former case however, density of stocking was high, but it was low for the two farms with poor margins per 100 acres.

The three farms with the highest density of stocking with cattle carried an average of 38·8 cow-equivalent units per 100 acres, 26 per cent greater than for the four farms with the lowest density of stocking, where the corresponding figure is 30·8 units. The average results, per 100 acres, for these two groups of farms are set out in Table 29.

Total production in the High Stocking group was some £600 per 100 acres greater than in the Low Stocking group, the increased production being divided almost equally between production of cattle, and other production. Production of cattle is higher in the former group due primarily to the greater number of stores available for sale—nearly 16 cattle per 100 acres compared with 12 in the Low group—but there is also a marked difference in the average age at which store cattle are sold in the two groups, a difference associated with differences in calving periods. Calvings in the Low group are heavily concentrated in the period May to July, and store cattle are mainly sold at around 2¼ to 2½ years old, having wintered twice on the farm. In the High group, the peak period for calving is March-April, with a secondary and much smaller peak in September-October. The early spring calves are most often sold at 18 to 21 months old, having spent only one winter on the farm; the autumn born calves winter at home twice, once as calves suckling their dams and once as yearlings, and they are sold off either in the spring at just over 18 months old, or, more often, in the autumn at just over 2 years old. Thus, in the Low Stocking group, over 95 per cent of stores sold were two years

TABLE 29

**Average Production and Production Costs per 100 Acres:
by Density of Stocking of Cattle Acreage: Stores Group**

	High Stocking	Low Stocking
Cow-equivalent Units per 100 acres	No. 38·8	No. 30·8
<i>Production:</i>	£	£
Production of Cattle . . .	1,206	891
Other Production	665	354
Total Production	1,871	1,245
<i>Production Costs:</i>		
<i>Foods:</i>		
1. Purchased	35	88
2. Home-grown:		
(a) Corn	247	81
(b) Straw	20	16
(c) Hay	326	154
(d) Roots, etc.	109	144
Total Home-grown	702	395
3. Grazing	185	238
Total Foods and Grazing	922	721
Labour and Power	327	252
Miscellaneous Costs	81	67
Total Costs	1,330	1,040
<i>Margin</i>	541	205

old or over, compared with only 31 per cent in the High group, where more than two-thirds of stores sold were under two years old. The average price in the High group for cattle one to two years old, most of which would not be much over 18 months of age, was £56·0 per head: for stores two years and over the average price per head was £60·6 in this group compared with £62·6 per head in the Low group, where, however, cattle in this age group would, on average, be about two to three months older.

By heavier stocking with cattle, total production has been increased in the High group by 50 per cent, while the impact of this heavier stocking upon winter food requirements has been mitigated by earlier calving, and the sale of store cattle at 18–21 months rather than at 2¼ to 2½ years of age which is the com-

mon practice in the Low group: by this adjustment stores winter only once on the farm instead of twice. However, the practice of early calving, often during a period before any grazing is available, means that provision must be made to hand feed newly calved cows in the late winter and early spring, a time of year when food supplies are at their most difficult. This fact, as well as the greater overall density of stocking, is reflected in the cost of foods per 100 acres: total home-grown foods average £702 per 100 acres in the High group, more than £300 greater per 100 acres, and although purchased foods and grazing are both roughly £50 per 100 acres lower, total foods and grazing were £200 per 100 acres higher. The main provision made for the extra food requirements in the High group relates to a very substantial increase in the acreage devoted to corn, over 16 acres per 100 in this group compared with less than 6 in the Low group, and the devotion of 40 acres per 100 acres for mowing compared with 32 acres in the Low group.

Labour and power costs, and miscellaneous costs are both higher in the High group, and total costs at £1,330 are £290 per 100 acres greater, but, with production £626 higher, margin per 100 acres at £541 is £336 per 100 acres greater in the High group. In short, density of stocking in the High stocking group is greater by 26 per cent, production by 50 per cent, production costs by 29 per cent, and margin by 164 per cent.

It is worth noting however that, even in the High group, over 85 per cent of the margin is accounted for by attestation premiums and production grants combined, while in the Low group production grants alone exceeded the margin. Further, even on the most successful farms in the Stores group, where considerable modifications of traditional practice, both with regard to cropping and stock management, have been made to bring about an intensification of production, the margin achieved per 100 acres is considerably below the average margin realized in the Milk and Stores group, and very much lower than would be achieved there by a standard of management comparable to that shown by the farms in the High Stocking group. In other words, a farmer can achieve, with only an average standard of management, a better margin per 100 acres devoted to milk selling and store rearing than can a farmer with a high standard of management whose activities, as far as cattle are concerned, are limited to the production of beef stores. Furthermore, in the former case the existence of the margin is much less dependent upon the uncertain continuation of such sources of revenue as production grants and attestation premiums.

INTENSIFICATION OF STOCKING:

Throughout these analyses, whether dealing with milk production or store rearing, or a combination of both, there runs as a constant thread the great importance of a high density of stocking as a major factor in the determination of margin per acre. Any increase in the density of stocking carries with it the inevitable requirement of increased production per acre from the land. The problem is of somewhat less importance where milk production is concerned, as in this case purchased concentrates can be economically utilized to supply the additional production ration needed where more cows are carried per 100 acres, but, even in this case, increased production from the land will be required to supply the increased maintenance rations of the additional stock. The much lower efficiency of conversion of foodstuffs in the case of store rearing precludes the economic utilization of purchased concentrates to all but a minor extent, and increased stocking is directly dependent upon increased production from the land involved.

In order to examine the order of magnitude of the increase in crop production per acre involved, the farms in the two store-rearing groups have been combined, and analysed into two groups according to the level of intensity of stocking of the land devoted to cattle; the average yields per acre for some of the more important crops for these two groups have been calculated as follows:

	Average Yield per Acre:	
	Higher Stocking cwt.	Lower Stocking cwt.
<i>Crop</i>		
Feeding corn	17.4	12.0
Seeds hay	26.8	24.6
Meadow hay	20.0	19.4
	<i>Tons</i>	<i>Tons</i>
Mangolds	21.7	14.6
Kale	17.7	12.8
<i>Grassland: Cost per acre</i>	<i>£</i>	<i>£</i>
Manures	0.55	0.36
Ley establishment . .	0.79	0.69
	<i>Cow-equivalent weeks per acre</i>	
Stocking of grassland .	32.0	20.4

The differences in yield are markedly greater for arable crops: the average yield per acre for hay is less than 10 per cent higher for the Higher Stocking group, but for feeding corn, which plays an important part in increased productivity in the farms devoted to store rearing without milk production, the difference in favour of the Higher Stocking farms is 45 per cent,

while for mangolds it is almost 50 per cent, and nearly 40 per cent for kale. If average expenditure upon manures and ley establishment is taken as an indication of the likely productivity of grassland, then, in the case of manures, the cost is over 50 per cent greater for the Higher Stocking group, and 14 per cent higher for leys: actual stocking of the grassland is 57 per cent greater in this group.

In view of the fact that under all systems of management of cattle, over 80 per cent of the area of land devoted to cattle consists of grassland, it is obviously here that most scope exists for intensification of production from the land: more grazing and grass conservation products and a longer grazing season are prime considerations, whether milk production or store rearing is the major objective. In the Dairy group, intensification also leads to the devotion of a larger proportion of the grassland area to conservation products, and, within the arable acreage devoted to cattle, the substitution of more productive green fodder crops for the traditional turnips, swedes, mangolds and cattle cabbage. Intensification on store rearing farms, where the additional feed supplies must come almost entirely from the land, appears to involve a considerably increased acreage of tillage, especially of feeding corn, as well as a higher proportion of grassland set aside for conservation: the reduction in the acreage available for grazing that results from these factors can be offset by increased production per acre, brought about by more adequate manuring, and an increased proportion of new leys.

Conclusion

The events of the last two years have once again revealed how narrow is the margin, for agricultural products, between scarcity and glut, and how important is the part played in the determination of this margin by largely unpredictable psychological factors whose operation can transform apparent scarcity into apparent glut almost overnight. In this country, although other commodities may give cause for more immediate concern, the potential surplus of milk seems likely to prove most intractable in the long run. The high degree of priority given to milk production during the war and post-war years

resulted in an enormous increase in milk sales; output is still increasing, and is likely to continue to do so. Much of this expansion, at least during the earlier years, came about owing to the entry into the liquid milk market of large numbers of producers in upland areas in northern, western and south-western England, and in Wales, as a result of which entirely new milk producing areas have been established in districts previously engaged mainly in store rearing.

It is perhaps not surprising that with a surplus of milk in prospect, and total beef supplies well below the pre-war level, the suggestion is frequently made that farmers in these new milk producing areas should now revert to their traditional products, thereby increasing the supply of beef stores while at the same time relieving the pressure upon the milk market. In this connection, the first thing which should be borne in mind is that the very fact that farmers in these districts, with no previous experience of milk production and rarely any liking for the job, have gone over to, and remained in, the production of milk for sale, does, in itself, constitute the strongest possible *prima facie* evidence that the returns from dairying are much more satisfactory than from store rearing. No matter what technical disadvantages may, or may not, attach to milk production in these upland areas, they are clearly outweighed by the economic advantages.

That the returns accruing to milk production are incomparably better than for store cattle rearing is shown by the results of the present investigation dealing with the relative economy of the two systems of production in the upland marginal farming area of the Brendon Hills in S.W. Somerset. The twelve-month period covered by the investigation was a very good season indeed for store cattle rearers; supplies of food were much above normal both for the winter feeding period and for the summer grazing season, stores were forward in condition at the time of the autumn sales, prices were high, and both Calf and Hill Cow Grants were payable during the year at rates which are unlikely to be exceeded in future. In short, store cattle rearing was much more profitable in 1952-53 than it has been for many years, and it seems unlikely that it will be any better in future. Yet, despite this favourable combination of circumstances, the results of this investigation show that store cattle rearing, compared with dairying, possesses almost every possible economic disadvantage. In part these disadvantages reflect underlying physical drawbacks associated with beef cattle, a slow rate of reproduction and growth to maturity, and

a much lower level of overall efficiency than for milk production in the conversion of animal feeding stuffs into human food. This unfavourable input-output relationship in physical terms is accentuated on the economic side by a relatively unfavourable price relationship between milk and beef, which is itself a legacy of the high priority given to milk during earlier years. By every economic test, level of production per 100 acres, ratio of production to costs, capital requirements, rate of turnover, etc., the results from dairying are outstandingly more favourable than from store rearing, while the concentration of income from store rearing into a few months of the year, with attendant credit problems at other periods, contrasts strongly with the regular monthly payments available to milk producers.

On the Brendon Hills, store-cattle rearing, unaccompanied by milk selling, is most commonly found upon the larger farms of 200 acres and over, where cattle are subsidiary to the sheep enterprise. On farms of this size, where labour supply is most frequently the limiting factor, sheep and store cattle rearing, carried out on extensive lines with production per man rather than per acre the main objective, yields, under present circumstances, a reasonably satisfactory margin: although production and margin per acre tend to be low in comparison with the system under which substantial amounts of milk are sold, the margin per acre extends over a sufficiently large acreage to permit of an adequate aggregate margin for the farm as a whole. At the present time the cattle themselves make some contribution to the overall margin, but, as this type of land cannot in any case be farmed with sheep alone, a proportion of cattle must be maintained even though, in more normal times, they have to be "carried" by the sheep.

On this type of farm store cattle rearing offers little opportunity for intensification, although it has been shown that to a certain limited degree this can be brought about by heavier stocking. This development is greatly facilitated if calvings are arranged to take place early in the spring, instead of May and June as is the more normal practice, and if the store cattle are sold in the autumn at 18 to 21 months of age, having wintered only once on the farm instead of twice as is normally the case. By the elimination of the winter food requirements of adult store cattle the additional requirements for winter feed which arise from heavier stocking and earlier calving is considerably mitigated, although the successful accomplishment of this policy still calls for additional production from the land itself in the form of a higher proportion of tillage crops, more

intensive grassland management, and a greater proportion of the grassland acreage set aside for conservation. However, both the actual margin per 100 acres for this system of store rearing, and the additional returns which arise from intensification along these lines, are both highly dependent upon the existence of special production grants paid for calves and hill cows.

Other methods of intensification sometimes proposed, such as multiple suckling, are quite out of the question for this type of farm. Multiple suckling would necessitate a complete break with the present system of management, involving the abandonment of the Devon beef cattle and their replacement by a flying herd of cows of high milking capacity, the feeding and management of which would be quite beyond the resources of these farms. Further, a dependable supply in the spring of suitable rearing calves from lowland dairying areas would, at the present time, be almost impossible to obtain at a price that would leave any hope of a margin at all; autumn and winter rearing, when suitable calves might be available more cheaply, is ruled out on grounds of winter food supplies alone. The single suckling system of rearing, with cows and calves running out together throughout the summer and autumn months, involves the absolute minimum of labour at a time when farm staffs are fully extended with the seasonal requirements of crop production and of the sheep flocks; it is probably the only system of cattle management that can be practised on farms in upland marginal areas where the labour force is spread thinly over a large area of land. On such farms the cattle must remain subordinate to the sheep, and, as far as can be arranged, complementary. The relative places occupied by cattle and sheep in the economy of farms of this type was very well summed up by a Brendon Hills farmer as follows: "I've been farming these hills for more than forty years and every year I've had to take from the sheep to put to the cattle. With cattle you spend the whole of the summer growing and harvesting crops and hauling them down to the yards; you spend the whole of the winter feeding the cattle in the yards and drawing the dung back up to the fields: there's no beginning to it and no end, and no profit in it, but you can't farm this land without them. Now with sheep it's quite different: they harvest the crops themselves where they grow, and leave the dung behind where it's wanted, in the fields, and there has always been some money in it at the end."

On the medium sized farms of from 100 to 200 acres the emphasis is somewhat different. Acres are no longer so plenti-

ful, labour and land are in better balance, and a high production and margin per man is dependent to a much greater extent upon higher production per acre. Sheep, although still important on farms of this size, and the more important the greater the acreage, do not occupy the predominant position they hold on the larger farms. On the medium sized farms the question of intensification of the cattle enterprise is of the greatest importance, and has been sought by the only really effective means, namely, the combination of store rearing with milk selling. In many cases the addition of milk selling has been accomplished so successfully that it has been accompanied by only a very slight fall in the number of store cattle produced, and by the minimum of disturbance to established cropping programmes. A modification of the breed of cattle maintained has proved necessary on most farms to enable milk to be released for sale in adequate quantities; most farmers practising this system keep a majority of Devon \times Shorthorn type cows which, mated to a Devon bull, produce larger but somewhat coarser stores than the pure Devon, but which are nevertheless still good beef-type animals.

This dual production of milk and stores, with a wide range in emphasis upon stores or milk sales, and upon sheep or cattle, permits of an extremely flexible system of farm organization and management, readily adaptable to all relationships of land and labour supplies. By variation of the proportions of cows devoted to milking and suckling, the labour requirements of the cattle enterprise can also be adapted, from season to season, to the competing needs of the other enterprises on the farm. On farms approaching the 200-acre limit, sheep will often be a more important enterprise than cattle, while within the cattle enterprise the main emphasis will usually be upon store rearing: as farm size falls the emphasis changes so that near the 100-acre limit sheep will be of relatively minor importance, while sales of milk may account for 50 to 60 per cent of the total production of the cattle enterprise. The economic results achieved by this system of production are, in fact, so satisfactory that it can, if bolstered by a subsidiary poultry or pig enterprise, be successfully practised on farms of less than 100 acres in extent. Compared with the Stores group, which had an average margin per 100 acres of well under £300, the average margin for the Milk and Stores group was just over £600, only some £130 per 100 acres lower than for the Dairy group. Moreover, on those farms in the Milk and Stores group where more intensive grassland management was practised, and a higher

proportion of grassland cut for hay and silage, the greater density of stocking that these developments made possible resulted in a level of production and margin per 100 acres that compared favourably with all but the most efficient producers in the Dairy group.

On all farms of less than about 150 acres in this district the production of at least a proportion of milk for sale seems to be essential if a reasonable level of output is to be achieved. The results of this investigation suggest that, although dairying can yield a satisfactory income on farms as small as 50 acres, this is only likely to be the case when the standard of grassland management is better than average; where the farm acreage is devoted to the provision of a maintenance ration, and part of the production ration during the grazing season, for the maximum number of cows that the holding will carry; that a satisfactory average yield per cow is economically obtained from grazing and purchased concentrates; and that the temptation to carry any young stock, except in exceptional circumstances, is resisted.

There can be no doubt that milk production has come to stay on the small farms and medium sized farms in upland marginal areas, and that its advent has brought greatly increased productivity and the possibility, which does not exist for store rearing alone on these farms, of becoming and remaining viable economic units. It cannot be too strongly stressed that the alternative to milk production on these numerous small farms is not store rearing but eventual extinction. It is sometimes argued, on economic grounds, that the best course would indeed be to bring about the amalgamation of these holdings into units sufficiently large to provide an adequate level of income when farmed extensively with store sheep and cattle. These matters are, however, not decided on economic grounds alone, nor is it by any means certain that this would be the correct solution even from an economic point of view. Farms of varying sizes in a district serve an economic purpose in enabling varying amounts of capital and labour to be fitted more closely to the appropriate area of land. From a social point of view, the small, and the very small farm, play an important part in permitting the entry into farming of men who are prepared to overcome, by ability and hard work, an initial shortage of capital: if only farms of an optimum economic size were available many successful farmers of today would never have started on their own.

Although the production of milk is essential on the small

farm if it is to continue in existence as a separate holding, milk production on these farms, and on many other small farms in lowland districts, is threatened today by the requirements of the Milk and Dairies Regulations with regard to the style and condition of buildings deemed necessary for clean milk production. This is no place to embark upon a discussion of the appropriateness of a measure that may require a producer with a perfectly satisfactory record of clean milk production extending over several years to incur, in the name of clean milk production, a heavy expenditure upon alterations to buildings in order to comply with somewhat arbitrary standards. It is sufficient to say that the expenditure involved will inevitably mean that some, perhaps a considerable proportion, of these small farmers, or their landlords, will be unable, unaided, to find the capital necessary to carry out the alterations to buildings, etc., and will be compelled to cease milk production. Even now, however, farms with a fairly high proportion of milk sales in their total farm production have been brought within the scope of the Livestock Rearing Act if they also produce store cattle and sheep, but milk selling farms, too small to carry stock of this type economically, are not eligible. It would surely be more realistic, and more equitable, to recognize the vital part that milk production must always play in the economy of upland marginal farms of limited acreage, and extend to them the benefits now made available to store rearers under the Livestock Rearing Act. To insist that these marginal areas, irrespective of the size of farm concerned, are suited only to the rearing of the traditional products of store sheep and cattle is not only to overlook the clear evidence to the contrary implicit in the present widespread incidence of milk production in these areas, but also to forget the great technical and economic changes that have occurred since the establishment of the traditional systems of farming in these areas.

The most important of these changes is undoubtedly the development of reliable and cheap motor transport. Before the advent of the motor lorry milk production was of necessity localized in districts in close proximity to the large urban consuming areas, and in the vicinity of the main railway lines serving these areas. As a result, a large dairying industry was developed in arable areas in the Home and Eastern counties and in southern England on land which, owing to limitations imposed upon the growth of grass by low rainfall, was often not naturally well suited to economic milk production. Upland areas in the wetter and more pastoral districts developed

a tradition of store rearing for the inexorable reason that no possible means then existed whereby milk produced in these then remote areas could be transported to a consuming centre; any production undertaken was, of necessity, limited to store stock which could, at yearly intervals, be walked to market on its own legs. The development of motor transport has changed this situation radically and permanently, and few areas in the country are now beyond the reach of the milk lorry.

If, as is suggested here, milk production on the small farms and medium sized farms in upland marginal areas should be actively fostered rather than discouraged, then the number of beef-store cattle coming from these districts is likely to decrease rather than increase, although, in any case, it appears doubtful whether any marked expansion in these areas can be anticipated. There does not seem to be much doubt that if any appreciable expansion in beef-store rearing is to take place, it is to the lowland areas, and especially to the arable and mixed farming areas, that we must, and should, look. And the evidence available indicates that, in the West of England at least, it is mainly on the lowland mixed farms, and on the larger dairy farms that such expansion as is at present taking place is to be found. The use of colour-marking inseminations is widespread throughout the West on dairy farms of all sizes and types, and although the small dairy farms almost invariably sell off the resulting calves for rearing elsewhere, it is clear that on a significant number of the mixed farms, and on the medium sized and larger sized dairy farms, a proportion of these colour-marked calves are being reared on the farms where they are bred.

The present swing to beef is based only to a very limited extent upon an increase in the number of pure-bred beef cattle, and although colour-marked calves, adequately reared, should produce fair quality beef, it will certainly not reach the standard of prime meat from pure-bred beef animals: the nation's supply of home-produced beef, although it will be larger than before the war, seems likely to be generally of rather lower quality. This circumstance may however prove to be in accordance with present-day demand. It seems to have been almost universally assumed that, following the derationing of meat, a pattern of demand similar to that prevailing in pre-war years would emerge. This view however tends to overlook the fact that since 1939 the country has undergone social and economic changes of very great magnitude, one of the most important of which, in this context, is the considerable measure

of equalization of incomes that has been brought about, with the result that those sections of the community which, in pre-war years, were responsible for the better class trade in meat, now command, relatively, a considerably reduced level of purchasing power.

It seems open to serious doubt whether any really sizeable market will be established for high quality beef at a price premium adequate to make its production an economic proposition. Although it is too early yet for a settled pattern of demand for meat to have emerged, the present rather inadequate premium offered for quality beef in the market suggests that it may have become, in the economic circumstances of the 1950's, a product which it will not pay to produce. Conversely, however, the overall demand for beef has probably extended among large numbers of consumers in the lower income groups who, in pre-war years, purchased only limited quantities. It seems probable, therefore, that the demand for beef in the country at the present time may be potentially larger per head of population than in 1939—though this is by no means certain—but that it will be very largely a demand for lean meat from somewhat plainer and more mature cattle, rather than for quality beef from cattle of the pure beef breeds slaughtered at an early age. In this event, the type of store animal now being produced in increasing numbers, the colour-marked cross-bred arising as a by-product of the dairy herd, may prove to be the beast most sought after by butchers, and the most profitable animal for the rearer and feeder. If this should indeed prove to be the case, then the way is clear for the extension of beef-store rearing on the lowland mixed and arable farms, and for the consolidation of milk production in the new dairying districts in upland marginal areas. Be that as it may, it is impossible to escape the conclusion that milk, and milk alone, holds out any hope for the survival, as separate holdings, of the small farm in these upland areas. Such farms simply cannot afford to engage in the production of a commodity with such a formidable list of economic handicaps as that shown by store cattle rearing unaccompanied by milk production.

Appendix A

Store Cattle Rearing: Exmoor Hill Farms

Results for the cattle enterprise are available for ten Exmoor hill farms. Although Hill Sheep and Cattle Production Grants are payable over the whole of the Exmoor area, the farms in this area would perhaps be better described, in many cases, as high lying marginal farms with a relatively large area of rough grazing attached, rather than as hill farms proper as the term is understood over large areas of Scotland, Wales and Northern England.

Although Exmoor and the Brendon Hills together form one continuous upland plateau, yet in all aspects of soil, climate, and topography, conditions are distinctly less favourable on Exmoor. General elevation is from 1,000 to 1,400 feet, and as, unlike the Brendon Hills, Exmoor directly borders on the sea, it is considerably more exposed, and has an average rainfall of 50 to over 60 inches per annum: as a result soils are generally thin and subject to heavy leaching. Nevertheless, most Exmoor farms have a considerable area of better quality inground situated mainly in the bottoms and along the sides of the river valleys. Store stock rearing is virtually the sole occupation of these farms, although a very slight amount of milk selling and some farmhouse manufacture of clotted cream for sale is encountered. There is, among Exmoor farms, a much greater emphasis upon sheep than is found upon even the large store rearing farms on the Brendon Hills: cattle are subsidiary to sheep and, to a considerable extent, complementary, although they can be strongly competitive, especially for foodstuffs during late winter and early spring.

The average total farm area of the ten Exmoor farms was 566 acres, of which 214 acres are inground crops and grassland, and 352 acres rough grazings. The rough grazings generally consist of an enclosed allotment of moorland in sole occupation, but may also be represented by grazing rights shared with others on one of the several commons in the area. In either case the rough grazing is usually contiguous with the inground, although in some cases it may be some distance away. The importance of this large proportion of rough grazing in determining the potentiality for production of these farms, and in

moulding the system of farming practised is such that the farms in this district cannot be regarded as comparable to the marginal farms in the Brendon Hills: it is for this reason primarily that the results for these Exmoor farms have been presented as a separate appendix, rather than in the main body of the report.

Some 18 per cent of the inground is under tillage crops, of which two-thirds consists of roots, mostly grown for sheep keep, and the rest is corn: some farms however, on more exposed parts of the moor, grow no corn at all. Grassland set aside for mowing averaged 15 per cent of total crops and grass, and total grassland 82 per cent. The general pattern of cropping on the inground is thus somewhat similar to that in the Stores group in the Brendon Hills, although there is a higher proportion of corn and mowing land, and a smaller proportion of roots and green fodder on the Brendon farms. However, whereas rough grazings are small in extent, and of little importance in the Brendon Hills, they are of very great importance on Exmoor, and this fact gives rise to considerable difficulty in the calculation of an adjusted farm acreage for farms in this group. According to the relative values placed upon inground and rough grazing, a fairly wide range of figures for adjusted farm area can be obtained: taking the evaluation made by the farmers concerned in this investigation, the rental value assessed for the inground averaged 12*s.* 11*d.* per acre and 2*s.* 7*d.* per acre for the rough grazings, a ratio of 5 to 1, giving an average adjusted acreage for the ten farms of just over 284 acres. Evidence provided by those few farms where rough grazings are separately rented, and by figures of stock carried per acre on inground and rough grazings, suggest, however, that the relative values are rather closer than 5 to 1, and if this is in fact the case, the average adjusted acreage should be rather greater than that based upon the appraisal of the farmers concerned. The main conclusion to be drawn from this uncertainty however is that any direct comparison of results calculated per 100 adjusted acres between this group of hill-type farms, and any other group where the complication of a large proportion of a rough grazing does not exist, should only be made with the greatest circumspection.

The average number of cattle carried per farm was 49 head, of which approximately 13 were breeding cows, and the remainder followers, roughly divided in regular age groups. Sheep, of which one-half are breeding ewes, averaged over 500 per farm, horses, mainly ponies, nearly 7, pigs 11, and poultry

130 per farm: in terms of cow-equivalent units cattle accounted for 33 per cent, and sheep for 58 per cent of total stock carried.

Cattle are almost entirely pure-bred Devons in this group, with a fair proportion of pedigree stock: one or two Devon × Shorthorn cows are kept on some farms as house cows, or to provide milk for the manufacture of cream. Of the ten herds all but one held an Attested licence. Breeding is invariably to a Devon bull, and seven of the ten farms in this group kept their own bull, two drove to a neighbour's bull, and the remaining farm, a rather isolated one, used A.I. exclusively. Rearing of calves, other than those belonging to cows required for milking, is by the natural method, the calves running out with their own dams throughout the summer. Cows and calves in past years summered on the hill, but now that the Hill Cow Grant is payable irrespective of whether they run on the hill or not, there will probably be a tendency to keep them inground to a greater extent; some farmers contend that conditions on the hill land are too hard on both cows and calves to enable calves to be reared to the best advantage. Indeed, it was characteristic of both the old Hill Sheep and Cattle subsidies that, in this district, where relatively large areas of inground exist, the forcing of a heavy concentration of stock on to the hill land during the summer months left the inground relatively understocked, and the rough grazings overstocked, to the detriment of both.

Calving takes place on Exmoor farms mainly between March and June, with a peak in April: some early calvings occur in February and later ones in July. Calvings between August and January are infrequent and are mainly concerned with the maintenance of domestic milk supplies. There is much less tendency on Exmoor for calves born later in the summer to continue to suckle after the cattle are housed: the usual practice is for all calves to be weaned together when housing becomes necessary in the early winter, irrespective of whether they have had nine months on the cow or only five.

ACREAGE DEVOTED TO CATTLE:

The average acreage of crops and grassland devoted to cattle, per 100 adjusted acres, is set out on page 394.

Grassland, in the form of grazing or for conservation, accounted for nearly 93 per cent of the total area devoted to cattle. Of this total area of grassland, 23.4 acres represents the adjusted acreage equivalent of hill grazing, and the 100 adjusted acres devoted to cattle represents, in fact, 76.6 acres

Acreage Devoted to Cattle	<i>Per 100 Adjusted Acres</i>
<i>Grassland:</i>	
(1) Hay and aftermath	26.5
(2) Silage and aftermath	0.3
(3) Pasture	65.9
	<hr/>
Total Grassland	92.7
<i>Crops:</i>	
(1) Corn and straw	6.6
(2) Roots and Green fodder:	
(a) Mangolds	0.3
(b) Swedes	0.3
(c) Cabbage	0.1
	<hr/>
Total Roots and Green fodder	0.7
	<hr/>
Total Crops	7.3
	<hr/>
TOTAL ADJUSTED ACREAGE	100.0
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of inground and 90.0 acres of rough grazings. Cattle accounted on average for 40 per cent of total inground grassland, but for only 29 per cent of the hill grazings.

Only very small quantities of roots are grown for cattle, and less than 1 per cent of the cattle acreage is devoted to this purpose; winter feeding of cattle consists very largely of hay, with some corn and straw, a practice which leaves the farms in the district highly vulnerable to weather conditions at haymaking time. Although bulk rather than quality is the chief attribute sought in the hay crop, yet it is rather surprising to find that, despite the small quantities of corn and roots provided for cattle, a smaller proportion of the total area devoted to cattle is set aside for hay than is the case for the farms on the Brendon Hills. Satisfactory wintering of cattle under these conditions must be a very precarious business, but its vulnerability could be reduced considerably if the present negligible provision of grass silage were to be considerably increased.

Cattle carried per 100 acres averaged 45, of which 13.5 were cows. Density of stocking with cattle averaged 28.6 cow-equivalent units per 100 acres.

VALUATIONS:

The average valuation for all cattle was £1,683 per 100 acres, of which breeding cows and heifers in-calf accounted for £822, bulls for £45, and store cattle for £816. Cattle equipment, mostly barn machinery, averaged £34 per 100 acres, and cattle and equipment together totalled £1,717. The average value per

head for cows in the Exmoor group was £48·2; £45·2 for stores two years old and over, and £38·0 for yearling store cattle.

PRODUCTION:

Production	<i>Average per 100 acres</i>
<i>Production of Cattle:</i>	
Sales of cattle	£ 836
Purchases of cattle	91
	<hr/>
Net sales	745
Valuation increase	63
	<hr/>
Production of Cattle.	808
	<hr/>
<i>Other Production:</i>	
Milk	112
Premiums	80
Production Grants	257
Miscellaneous	15
	<hr/>
Total Other Production	464
	<hr/>
TOTAL PRODUCTION	1,272
	<hr/>

Total production averaged £1,272 per 100 acres, of which production of cattle, at £808, accounted for 64 per cent, and Production Grants, at £257, for over 20 per cent of the total. Of total Production Grants, £79 per 100 acres was in respect of calves, £127 for Hill Cows, and £51 per 100 acres for Hill Cattle other than cows. Production of milk averaged £112 per 100 acres, of which £39 represented the value of milk manufactured into cream for sale, the remainder being for domestic consumption, less a very small amount of perquisite milk. Premiums, consisting entirely of payments under the Attested Herds Scheme, were received by nine of the ten farms, and averaged £80 per 100 acres. Miscellaneous production represents service fees received, bull premiums, and receipts for "keepers", i.e. cattle taken in for summer grazing; these items together averaged £15 per 100 acres.

Of total sales of cattle, averaging £836 per 100 acres, £132 was for culled cows, £28 for bulls, £673 for stores, and £3 per 100 acres for casualty cattle. Store cattle two years old and over accounted for 81 per cent by value of total store sales, and for 65 per cent of sales of all cattle; six of the ten farms sold store cattle of this age only, three farms sold equal proportions of stores two years and over and of one to two years, and the remaining farm sold about equal numbers of yearling cattle

and weaned calves, and no adult stores at all. The average price per head received for store cows was £52; for clean stores of two years old and over, most of which would be $2\frac{1}{4}$ to $2\frac{3}{8}$ years old at the time of sale, the average price was £62.5 for steers, and £56.8 for heifers, and steers of about 18 months old realized an average of £47.7 per head. Of total cattle sales, over 93 per cent by value occurred in the two months September and October, and 64 per cent in the single month of September.

Purchases of cattle averaged £91 per 100 acres, and this figure would have been halved but for the quite exceptional purchase, by one farm in the group, of a bunch of adult store cattle to utilize surplus grazing. Normal purchases of cattle in this area are limited to stock bull replacements, and the occasional purchase of calves for rearing in replacement of home-bred calves that are born dead, or die at an early age.

PRODUCTION COSTS:

Production Costs	Average per 100 Acres £
<i>Foods:</i>	
(1) Purchased	29
(2) Home-grown:	
(a) Corn	76
(b) Straw	14
(c) Hay	180
(d) Roots, etc.	20
Total Home-grown	290
(3) Grazings	187
Total Foods and Grazing	506
(4) Labour and Power	
(a) Manual	202
(b) Tractor	12
(c) Horse	2
Total	216
(5) Miscellaneous Costs.	54
TOTAL PRODUCTION COSTS	776
TOTAL PRODUCTION	1,272
MARGIN	496

Purchased foods averaged only £29 per 100 acres; two-thirds were for concentrates, mainly calf nuts and meal, and the remainder for small purchases of hay and feeding straw, and for some winter keep incurred by one farm in the group. Total

home-grown foods averaged £290 per 100 acres, of which hay accounts for £180 and corn for £76, but roots and green fodder for only £20 per 100 acres: total foods, together with grazing, which averaged £187, give a total cost for foods and grazing of only £506 per 100 acres. The costs of Labour and Power, £216, and Miscellaneous expenses, £54 per 100 acres, were both low in this group, and total production costs averaged only £776 per 100 acres, leaving a margin of production over cost of £496 per 100 acres.

Even under the semi-ranching system of cattle management practised on Exmoor there still appears to be a very close connection between density of stocking and margin per 100 acres. The average density of stocking for the group as a whole was 28.6 cow-equivalent units per 100 acres; five farms with an above average density averaged 39.1 units, and the remaining five farms 23.6 units per 100 acres. Total production for the more heavily stocked farms averaged £1,862, production costs £1,125, and margin £737 per 100 acres; the corresponding figures for the low stocking group were £1,045, £678 and £367 per 100 acres. In the more heavily stocked group a considerably higher proportion of grassland was cut for hay, and rather less use was made by cattle of the hill grazings, while the in-ground grassland contained a larger proportion of leys, and of maiden leys.

An analysis of the in-ground grassland costs for the two groups yields some interesting, and surprising, results. The average cost per acre incurred on mowing land was £5.76 in the low stocking group, more than £1 per acre greater than in the high stocking group, and this difference was entirely accounted for by the much heavier dressings of dung applied to grassland in the Low group, which more than offset the higher cost of ley establishment in the High group. In the latter group, not only is a greater proportion of grassland cut for hay, but temporary grass accounts for 56 per cent of total grassland and 69 per cent of mowing land, compared with corresponding figures of 45 and 35 per cent respectively in the Low group. Maiden leys, about three-quarters of which in both groups are established by direct seeding with rape, accounted for 11.0 per cent of total grass in the High group and 6.9 per cent in the Low group. Thus, whereas farms in the Low stocking group rely mainly upon heavy dunging of fields of permanent grass, which are often permanent hay fields, those in the High group rely for their hay crop much more upon relatively lightly manured fields of temporary leys. As a result,

the average cost for mowing land was more than £1 per acre higher in the former case, but the average yield, at 21 cwt. of hay per acre, was 6½ cwt. lower than for the High group, a striking testimony of the superiority of temporary grass for hay production over even heavily dunged permanent meadows. For pasture land the average cost per acre in the High group was slightly greater; manuring costs were comparable in both groups but the proportion of leys, and the cost of ley establishment, was higher on the more heavily stocked farms.

In the High group the dung saved on the hay land was utilized for the production of root crops, and, whereas in the Low group the winter ration of cattle was virtually limited to hay, straw and corn, in the High group it was enlivened by a proportion of roots: root crops averaged 2.0 acres per 100 in the latter group compared with only 0.1 acres per 100 acres in the Low group.

On the production side, one outstanding result of the heavier stocking in the High group is the effect that this has upon the level of production grants and attested bonuses. The former averaged £401 per 100 acres, and the latter £136, a total of £537 in this group, compared with a corresponding total of £260 per 100 acres in the Low group. Production of cattle accounted for less than 60 per cent of total production in the High group, and three-quarters of the additional margin per 100 acres in this group is accounted for by higher production grants and attested premiums.

There is no evidence in the figures available for this group of Exmoor farms that the farmhouse manufacture of cream results in any very material economic benefit, apart from that conferred by a regular, if small, source of cash income throughout the summer months. Four out of ten farms sold some cream, but only two in significant quantities. The average production of cream on these two farms was £186 per 100 acres, and the total margin £820 per 100 acres, but both these farms had a very high density of stocking with cattle, and a production of cattle nearly £300 greater than the average for the other three farms in the High stocking groups. It is certainly significant also that on these two farms alone the cattle do not go on the hill land to any material extent.

The need to bring cows in regularly for milking, and to hand feed the calves both arise when cream manufacture is undertaken, and both add considerably to summer labour requirements compared with the more general system under which cows and calves run out together all the time, a system

which involves the absolute minimum of attention. Where the labour available is relatively ample, as it may be on a minority of farms where several members of the family are of working age, the manufacture of cream may be worth-while as a means of utilizing this labour economically, but it is unlikely to be either feasible, or economically justified where, as is the case on most Exmoor farms, labour supply is the main limiting factor.

The future prospects for farmhouse cream do not, in any case, seem very bright. In S.W. Somerset, in the summer of 1953, 10s. to 12s. per lb. was being asked as the retail price of clotted cream, and farmhouse producers were being paid 7s. to 8s. per lb. The number of farmhouse cream producers, and the quantity of cream produced, were both below the pre-war level, but, in spite of this, the demand for cream at the prices prevailing in 1953 was not sufficient to absorb even this reduced supply. A producer's price of 7s. 6d. per lb. is equivalent to a gross return of approximately 30d. per gallon for the milk utilized, while the scald milk remaining on the farm often has a value for calf rearing, or other purposes. This gross price of 30d. per gallon, which takes no account of the costs of manufacture, packing, or transport compares with the regional producer's price for wholesale milk of 27 $\frac{3}{4}$ d. to 38d. per gallon for the months of July to September, the period during which the great bulk of cream sales takes place. Since 1953, however, milk has been released for the factory manufacture of cream at a greatly reduced price, and the price of this type of cream to the consumer has been considerably reduced; the effect of this cut-price cream upon farmhouse manufacture cannot help but be serious. Unless farmhouse manufacturers of cream receive a rebate upon milk used equivalent to that afforded to factory manufacturers, as is done in the case of farmhouse cheese-makers, then farm produced clotted cream is likely to become a rare luxury product, of even less significance than at the present time in the economy of upland marginal and hill-farming areas.

This analysis has served to show that store cattle rearing under semi-ranching conditions on the large Exmoor farms is a profitable enterprise under present conditions of high store cattle prices and heavy subventions in the form of calf and hill cattle production grants, and that while these special payments continue, a considerable increase in the density of stocking with cattle, accompanied by appropriate changes in cropping of the acreage devoted to cattle, will bring substantially

increased returns. The analysis also shows however that the present profitability of cattle rearing, and the possibilities of intensification, are both highly dependent upon the continuation of these special production grants, and that the cattle enterprise thus has a vulnerability not shared by the more profitable sheep enterprise. Cattle on this type of farm have traditionally always been, and are likely to remain, therefore, of secondary importance to sheep.

Appendix B

Method of Costing

The methods adopted for the assessment of the various cost items involved in this investigation have been as follows:

PURCHASED FOODS:

All purchased foods, including keep taken, have been entered at actual cost.

HOME-GROWN FOODS:

Records of production costs for all home-grown foods were obtained on a sample of the farms included in the investigation: the average costs ascertained are set out in detail in Appendix C. Average cost of production figures have been applied to all farms alike. Although this procedure has the effect of obliterating any differences in cost that arise between farms as a result of different levels of efficiency in the production of crops, it greatly facilitates the comparison of costs more directly associated with the cattle enterprise.

As no question of the transfer of manurial residues from livestock to cash cropping enterprises arises in the case of upland livestock rearing farms, no deduction has been made from the cost of foods fed to cattle on account of the manurial residues of the foods. An allowance for bedding straw has been made in determining the acreage required for the maintenance of the cattle, but no charge has been entered in respect of home-grown straw used for bedding.

GRAZING:

Grassland costs have been determined for every farm in the sample, for pasture land and mowing land separately. The cost of aftermath grazing, where only one cut has been taken from the mowing land, has been assessed as equal to one-third of the annual cost of the fields laid up for hay or silage. The ascertained cost of ley establishment has been spread at a flat rate per acre over the area of temporary grass on each farm, and is apportioned between pasture and mowing land according to the proportion of temporary grass in each category.

Four-fifths of the total annual cost of grazing has been charged to the summer six months, and one-fifth to the winter, and the cost of grazing thus ascertained apportioned between the various classes of stock according to the following scale of grazing equivalents.

	<i>Winter and Summer:</i> <i>Cow-equivalent units</i>	
<i>Cattle:</i>		
Cows	1.00	
Other cattle 2 years old and over	0.75	
1 to 2 years	0.50	
Under 1 year	0.25	
<i>Horses:</i>		
Work horses	1.00	
Other horses and ponies	0.75	
<i>Pigs:</i>		
Over 6 months	0.17	
2 to 6 months	0.10	
<i>Poultry:</i>		
Geese	0.06	
Other poultry	0.01	
<i>Sheep:</i>		
Over 1 year old	<i>Winter</i>	<i>Summer</i>
6 to 12 months	0.25	0.17
2 to 6 months	—	—
		0.09

Where Exmoor Horn sheep are kept, the grazing equivalent for all age groups of sheep have been taken at 80 per cent of the above values. Sheep folded on roots, and running back to grass, have been regarded as obtaining the equivalent of one-quarter of full-time grazing. Grazing by day only has been taken as equal to two-thirds of full-time grazing.

MANURES AND LIME:

In the determination of the net cost of manures applied to crops, allowance has been made for manurial residues brought and carried forward: in the case of grassland however, no such allowance has been made, and the gross cost of manures applied to grass has been charged in the year of application. Where leys have been established by direct seeding, and, as is frequently the case, a heavy dressing of manure applied, two-thirds of the cost of the manure has been transferred from the cost of ley establishment to grassland manuring costs.

The cost of liming has been regarded as a general field overhead cost: the average annual quantity of lime applied to each farm has been ascertained for the past three years, and the cost of this dressing, together with the cost of applying, has been calculated at 1952-53 prices. The total cost of liming,

thus obtained, has been charged to crops and grassland on a flat rate per acre basis for each farm.

UPKEEP OF HEDGES, ETC. :

The total annual cost of hedging, ditching, guttering, upkeep of fences, gates, etc., has been ascertained for about one-half of the farms in the sample, and charged to home-grown foods and grazing on a flat rate per acre basis. On farms where this information was not obtained average figures have been used.

IMPLEMENT REPAIRS AND DEPRECIATION :

An estimated charge, based on data obtained from other investigations, has been made against crops and grassland. This charge excludes repairs and depreciation connected with tractors, which appears under the cost of tractors.

REPAIRS AND DEPRECIATION OF CATTLE EQUIPMENT :

A valuation, based upon current realization values, was made for all farms, covering equipment directly connected with the cattle enterprise. The value of equipment such as mills, barn engines, root-pulpers, etc., used also for stock other than cattle has been apportioned on the basis of relative usage. Depreciation has been charged at 10 per cent of the valuation figure, and the cost of repairs ascertained for the year, apportioned where necessary, charged in addition.

LABOUR AND POWER :

(a) *Manual Labour*

All manual labour hours, both paid and unpaid, concerned directly with cattle, or indirectly with crop production, have been converted, where necessary, into an equivalent number of hours for adult male labour according to relative wage rates, and charged at a rate per hour $12\frac{1}{2}$ per cent above the minimum wage rate for adult male workers. This addition to the minimum rate is designed to allow for holidays, short periods of sickness for which wages are not stopped, farmers' share of insurances, and payments made at above the minimum rate. All work undertaken in over-time periods has been charged, for both paid and unpaid workers, at the appropriate rate.

(b) *Horses*

Working horses have been charged at 1s. 3d. per hour and riding ponies at 8d. per hour.

Tractors

The charge made for tractor work, exclusive of the driver's wage, is as follows:

Medium-wheeled tractor ..	4s. 0d. per hour
Heavy-wheeled tractor ..	4s. 9d. per hour
Crawler tractor	5s. 6d. per hour

COSTS OMITTED:

Costs not accounted are as follows:

- (1) General Farm Overheads.
- (2) Management.
- (3) Interest on Capital.

The fact that these items are not covered on the cost side must be borne in mind when the level of Margin is considered.

Appendix C

Home-grown Foods: Average Cost of Production 1952 Crops. Feeding Corn

TABLE A
Average Cost per Acre of Feeding Corn.
Marginal and Hill Farms. 1952 Crop

	Marginal Farms	Hill Farms
Number of farms	16	6
Number of fields	25	9
Total acreage	149	55
<i>Average Cost per Acre:</i>	£ s. d.	£ s. d.
(1) <i>Operational Costs:</i>		
(a) <i>Cultivations:</i>		
Ploughing	16 7	19 10
Working down	16 2	18 4
Applying manures	4 5	6 4
Sowing seed	7 5	6 3
Harrow and roll	6 0	7 0
Total Cultivations	2 10 7	2 11 9
(b) Weeding	11	1 8
(c) <i>Harvesting:</i>		
Cutting	1 8 10	1 14 5
Stooking, etc.	11 7	11 3
Saving	1 5 7	1 13 10
Total Harvesting	3 6 0	3 19 6
(d) Thatching	11 9	15 6
(e) Threshing*	3 4 4	2 19 0
Total Operational Costs	9 13 7	10 7 5
(2) <i>Other Costs:</i>		
(a) <i>Manures:</i>		
Residues B/F	1 15 2	1 16 11
Dung	6 0	—
Artificial	10 3	10
Gross Cost	2 11 5	1 17 9
Residues C/F	13 2	12 1
Net Cost	1 18 3	1 5 8
(b) <i>Field Costs:</i>		
Rent	1 0 0	13 8
Lime	3 9	5 9
Hedging, etc.	13 3	10 8
Total	1 17 0	1 10 1
(c) Seed	3 18 2	3 17 6
(d) Implements: repairs and depreciation	1 10 0	1 10 0
Total Other Costs	9 3 5	8 3 3
TOTAL COST	18 17 0	18 10 8
<i>Average Yield per Acre:</i>	cwt.	cwt.
Corn	15.85	14.38
Straw	17.86	18.82
<i>Average Cost per Ton:</i>	£ s. d.	£ s. d.
Corn	20 0 5	21 3 3
Straw	3 6 8	3 10 6

* Average cost per acre actually threshed.

TABLE B

Feeding Corn: Analysis of Operational Costs. Average Cost per Acre

	Marginal Farms		Hill Farms	
	Hrs.	£ s. d.	Hrs.	£ s. d.
<i>Average per Acre:</i>				
<i>Labour and Power:</i>				
(a) Man	35.08	4 15 8	40.78	5 12 5
(b) Horse	1.30	1 8	3.10	3 11
(c) Tractor	11.57	2 6 3	11.85	2 7 5
Total		7 3 7		8 3 9
Contract work		1 8 10		1 5 11
Cord		17 11		14 5
Thatching:				
Reed		1 10		10
Spars		9		1 3
Cord		8		1 3
Total Operational Costs		9 13 7		10 7 5

TABLE C

Feeding Corn: Analysis of Labour and Power Requirements. Average per Acre

	MARGINAL FARMS			HILL FARMS		
	Man	Horse	Tractor	Man	Horse	Tractor
<i>Average per Acre:</i>						
<i>(a) Cultivations:</i>						
Ploughing	2.49	—	2.49	2.99	—	2.99
Working down	2.44	—	2.44	2.88	1.06	2.35
Applying manures	0.89	0.03	0.50	0.04	—	0.04
Sowing seed	1.63	0.07	0.76	1.59	0.44	0.38
Harrow and Roll	0.95	0.28	0.80	1.06	0.09	1.02
Total Cultivations	8.40	0.38	6.99	8.56	1.59	6.78
<i>(b) Weeding</i>						
(c) Harvesting:	0.35	—	—	0.62	—	—
Cutting	3.66	—	1.46	5.93	—	1.75
Stooking, etc.	4.17	—	—	4.04	—	—
Saving	6.28	0.65	1.74	8.40	1.25	2.10
Total Harvesting	14.11	0.65	3.20	18.37	1.25	3.85
<i>(d) Thatching</i>						
(e) Threshing	2.76	0.13	0.19	4.10	—	0.30
	9.46	0.14	1.19	9.13	0.26	0.92
TOTAL	35.08	1.30	11.57	40.78	3.10	11.85

Of the 149 acres of feeding corn costed in the Marginal group, 69 per cent consisted of oats, 23 per cent of dredge corn, and 8 per cent of barley: for the Hill group, where corn is less frequently grown, and where on some of the more exposed farms it cannot be grown at all with any worth-while prospect of success, 55 acres, all oats, were costed. On the sixteen Marginal farms for which cost records were obtained seven different varieties of oats were grown, the most popular being Star, and Ayr Bounty, which shared almost equally one-half of the total acreage costed; next in importance came Golden Rain, and Richland Iowa, each with approximately 16 per cent of the total, followed, in order, by Victory, Supreme, and S147. Barley costed consisted entirely of Abed Kenia and Dredge Corn of Abed Kenia with one or other of the varieties of oats mentioned above, Ayr Bounty being the chosen variety in most cases. On the Exmoor farms, Ayr Bounty accounted for nearly two-fifths of the oats costed, the remainder being spread more or less evenly between Star, Victory, Golden Rain and Black Tartar. All corn costed in the Exmoor group followed either ley or folded roots; only one field received any manure at all for the corn crop, and in this case only a small top dressing was applied. For the Brendon marginal farms over two-thirds of the total corn costed also occupied a place in the rotation necessitating little direct application of manures: one worn out ley however received a dressing of dung in preparation for the following corn crop, while artificial manures applied consisted entirely of slag.

All main operational costs were higher for the Exmoor hill farms, especially for cutting and saving the crop, but higher operational costs are more than offset by lower costs for other items, especially manures and rent. The saving in overall costs per acre for the hill farms is, however, more than counter-balanced by an average yield per acre of grain nearly $1\frac{1}{2}$ cwt. lower than for the marginal farms, and the average cost per ton of grain was nearly 23s. higher in the hill group.

It is interesting to compare these results with the average costs obtained for the same season, on a group of lowland mixed dairy farms. Average cost per acre for these lowland farms, for feeding corn, was £18 1s. 7d. per acre, with an average yield of 22.03 cwt. per acre of grain, and 19.7 cwt. of straw. Total manual labour costs were some 35s. per acre lower for the lowland farms than for the upland marginal farms, and tractor costs 14s. per acre lower, but the net cost of manures was nearly 20s. higher per acre, and the lowland farms also had

higher costs for rent, seeds, and machinery repairs and depreciation. On balance, however, the average total cost is some 15s. per acre lower for the lowland farms, while the yield is over 6 cwt. per acre greater, and the average cost per ton for grain is £20 for the marginal farms and £16 2s. 0d. per ton for the lowland farms.

Hay

TABLE D

Average Cost per Acre of Meadow and Seeds Hay. 1952 Crop

	MARGINAL FARMS		HILL FARMS	
	Meadow Hay	Seeds Hay	Meadow Hay	Seeds Hay
Number of farms	8	16	6	8
Number of fields	12	27	8	11
Total acreage	66	177	40	80
<i>Average Cost per Acre:</i>	£ s. d.	£ s. d.	£ s. d.	£ s. d.
(A) <i>Cost of growing grass</i> . .	3 10 11	2 18 8	3 1 8	2 15 5
(B) <i>Haymaking Costs:</i>				
(1) <i>Operational Costs:</i>				
(a) <i>Cutting</i>	10 10	9 7	9 7	9 2
(b) <i>Making</i>	7 8	7 10	11 10	11 2
(c) <i>Saving</i>	1 1 0	1 2 1	1 7 11	1 10 5
Total Harvesting	1 19 6	1 19 6	2 9 4	2 10 9
(d) <i>Thatching</i>	4 6	5 8	4 8	3 5
Total Operational Costs.	2 4 0	2 5 2	2 14 0	2 14 2
(2) <i>Implements: repairs and depreciation</i>	19 6	19 6	19 6	19 6
Total Haymaking Costs	3 3 6	3 4 8	3 13 6	3 13 8
TOTAL COST	6 14 5	6 3 4	6 15 2	6 9 1
 Average yield per acre	 cwt. 24·1	 cwt. 28·3	 cwt. 21·5	 cwt. 27·4
 Average cost per ton	 £ s. d. 5 11 7	 £ s. d. 4 7 2	 £ s. d. 6 5 9	 £ s. d. 4 14 3
<i>Labour and Power Costs:</i>				
(a) <i>Man</i>	1 7 9	1 7 10	1 14 11	1 16 6
(b) <i>Horse</i>	1 10	1 7	2 9	1 11
(c) <i>Tractor</i>	12 11	12 5	14 6	14 3
Total	2 2 6	2 1 10	2 12 2	2 12 8

TABLE E

Hay: Analysis of Labour and Power Requirements. Average per Acre

	MEADOW HAY			SEEDS HAY		
	Man	Horse	Tractor	Man	Horse	Tractor
<i>Average per Acre:</i>	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.
MARGINAL FARMS:						
Cutting . . .	2.15	—	1.30	1.89	0.27	1.05
Making . . .	1.77	0.47	0.58	1.85	0.45	0.58
Saving . . .	5.37	0.98	1.21	5.75	0.53	1.37
Total . . .	9.29	1.45	3.09	9.49	1.25	3.00
Thatching . .	1.05	—	0.14	0.82	—	0.08
TOTAL . . .	10.34	1.45	3.23	10.31	1.25	3.08
HILL FARMS:						
Cutting . . .	2.10	0.51	0.84	1.94	0.20	0.94
Making . . .	2.99	0.63	0.78	2.98	0.83	0.55
Saving . . .	7.09	1.01	1.87	7.98	0.51	2.00
Total . . .	12.18	2.15	3.49	12.90	1.54	3.49
Thatching . .	0.89	—	0.13	1.42	—	0.07
TOTAL . . .	13.07	2.15	3.62	14.32	1.54	3.56

From the point of view of weather conditions at harvest, the 1952 year was a favourable one for this district, and particularly for the hay crop. Above average yields of hay were secured in good condition, at a lower cost per ton than are the lighter crops of poorer quality hay made in a more normal season.

Of the total area of seeds hay costed in the Marginal group, 37 per cent was accounted for by leys in their first year, 14 per cent by those in their second year, 33 per cent by those in their third, and 12 per cent by fourth year and older leys: one field only, equal to 4 per cent of the total area costed, was a one year hay ley.

For both Marginal and Hill groups the average cost per acre of growing grass for mowing was higher for meadow than for seeds hay, and in both cases the cost of the much heavier dressing of manures applied to meadow land more than counterbalanced the cost of ley establishment on the temporary grass. Total haymaking costs per acre were similar for both seeds and meadow hay, but higher in both cases for the hill farms than for the marginal farms. Total cost of hay per acre averaged £6 14s. 5d. for meadow hay in the Marginal group

and £6 3s. 4d. for seeds hay: corresponding costs for the Hill group were slightly higher. The average yield per acre was higher for both types of hay in the Marginal group, although in the case of seeds hay the difference was slight. In both groups seeds hay out-yielded meadow hay; by 4 cwt. per acre in the Marginal group and by nearly 6 cwt. in the Hill group. The average cost per ton of seeds hay was considerably lower than for meadow hay in both groups, and lower for both types of hay in the Marginal group.

Baling of hay is growing rapidly in popularity in this district; baling from the rick is the general practice, ricks being baled at intervals during the winter as the hay storage facilities at the farmstead come in need of replenishment. Of the total hay costed in both groups, nearly 40 per cent was baled from the rick, at an average cost per ton of £1 14s. 8d. Of this total, contractors' charges amounted to £1 2s. 8d., manual labour for 8s. 9d. for 3.17 man-hours, and tractor labour utilized in hauling home the bales for 3s. 3d. per ton. In spite of this fairly high additional cost a rapidly growing number of farmers consider that the advantages of the much greater convenience of handling of baled hay, and the greater control over the quantities fed that it permits, are well worth the extra costs.

The part played by overtime hours in the haymaking process in these upland areas is considerable. Roughly 12 per cent of total man-hours employed upon cutting the crop, 15 per cent in making, over 40 per cent in saving, and 30 per cent for the whole haymaking process were engaged during periods when overtime rates were payable. It may be noted also, in passing, that the corresponding figure for corn harvesting is approximately 20 per cent. Both the heavy dews experienced in this district, and the daily routine attention required by sheep and cattle combine to render a late start in the day for hay harvesting and corn harvesting operations inevitable, while the uncertain weather conditions make it prudent to continue work as late as possible in the day when conditions are suitable.

Figures are also available for the average cost of production per acre for a mixed sample of meadow and seeds hay for a group of lowland farms for the 1952 crop. The average cost for baled hay, mostly done by pick-up baler, was just over £8 per acre for an average yield of 29 cwt. per acre, giving an average cost per ton of £5 11s. 7d.: the corresponding figure for the Marginal group is about £6 14s. 0d. per ton, and £7 4s. 8d. per ton for the Hill group.

In upland areas the hay crop is of central importance in the

problems both of winter feeding and in the provision of summer grazing. It is characteristic of these districts that spring and early summer coincides with the peak demand from the breeding ewes, and cows, for supplies of good grazing, so that suckling offspring can be adequately nourished, and this imposes a sharply defined limit on the proportion of grassland that can be set aside for conservation. As the summer proceeds the falling demand for breeding stock for grazing is offset by the increasing demands of the rapidly growing store stock, and by the seasonal decline in productivity of the pastures, so that, except in an exceptionally grassy season, there is little prospect of obtaining a late hay cut with much prospect of saving it successfully at a time when the days are shortening, and the morning dews becoming heavier and persisting longer. In such circumstances, should a surplus of grass result, it is allowed to accumulate *in situ*, and is available immediately should a late season drought or some other circumstance bring about an early cessation of growth.

This natural limitation upon the proportion of grassland that can be set aside for conservation, and the heavy reliance upon hay for the winter feeding of cattle has the inevitable result that bulk is a much more important consideration than quality in the hay crop, and grass intended for hay is normally cut at an advanced stage of maturity: not only is maximum bulk thereby ensured, but mature grass is considerably easier to make into hay under difficult conditions than is young grass. It is obviously true that hay of better quality than is normally produced is desirable, but, if the smaller bulk of hay that would result from cutting at an earlier stage proved sufficient to fill the stock for only four months out of the six during which hand feeding is required, winter feeding would become even more difficult than it is at present. Nevertheless, the high degree of dependence upon hay renders the whole economy of these upland areas very vulnerable to unfavourable weather conditions during the haymaking season; a bad season means that either hay must be purchased in a year when it is likely to be dear, or store cattle must be thrown upon the markets in the autumn, depressing a price level already liable to be affected by a reduced demand from lowland farmers. It is surprising, therefore, that in these circumstances silage making has not been eagerly adopted by farmers in this district, but, although the practice has been extensively tried out over the last ten years, it has failed to take any real hold, and most farmers appear to regard the making of silage as a salvage

operation, to be put into effect only when the hay crop, the sheet-anchor of the economy, looks like failing. The quality of the silage made in these circumstances is, inevitably, such as to confirm producers in their belief that it is far better to make hay if at all possible. There can however be little real doubt that a policy of increased grassland production, based upon more frequent establishment of leys, the provision of an early bite, and a higher general level of manuring of the grassland, would enable a greater density of stock to be carried, and, allied to a policy of substituting silage for a proportion of the hay crop, alleviate the difficulty and anxiety of providing adequate wintering for sheep and cattle.

Root and Green Fodder Crops

Root and green fodder crops for feeding to cattle are only grown to a limited extent on the Exmoor hill farms, and costing of these crops was confined to the Brendon Hills marginal farms.

TABLE F
Average Cost per Acre of Root and Green Fodder Crops: Marginal Groups.
1952 Crops

	Mangolds	Kale	Flatpoll Cabbage	Turnips Swedes and Mixed Roots
Number of farms	16	6	9	13
Number of fields	16	6	9	13
Total acreage	16½	10½	19	82
<i>Average Cost per Acre:</i>	£ s. d.	£ s. d.	£ s. d.	£ s. d.
(1) <i>Operational Costs:</i>				
(a) <i>Cultivations:</i>				
Ploughing	1 14 9	1 16 1	1 6 3	1 2 1
Working down	1 19 4	1 14 11	1 14 3	1 1 5
Applying manures	4 14 0	2 9 3	4 6 11	9 10
Sowing seed/ Planting	16 6	6 3	3 13 11	3 8
Harrow/Roll	9 8	7 0	8 4	6 0
Total Cultivations	9 14 3	6 13 6	11 9 8	3 3 0
(b) Hoeing/Singling	9 15 6	2 12 2	3 13 4	13 1
(c) Pulling and clamping	13 19 10	—	—	—
Total Operational Costs	33 9 7	9 5 8	15 3 0	3 16 1
(2) <i>Other Costs:</i>				
(a) <i>Manures:</i>				
Residues B/F	1 0 7	19 10	5 11	4 2
Dung	7 5 9	3 2 10	6 18 5	2 7
Artificials	7 15 0	6 1 6	4 7 2	4 5 1
Gross Cost	16 1 4	10 4 2	11 11 6	4 11 10
Residues C/F	4 17 3	3 0 7	3 14 6	1 8 0
Net Cost	11 4 1	7 3 7	7 17 0	3 3 10
(b) <i>Field Costs:</i>				
Rent	1 0 11	1 2 11	18 10	19 7
Lime	3 9	3 9	3 9	3 9
Hedging, etc.	13 3	13 3	13 3	13 3
Total	1 17 11	1 19 11	1 15 10	1 16 7
(c) Seed/Plants	1 8 5	10 0	4 12 6	8 10
(d) Implements: repairs and depreciation	1 4 0	1 4 0	1 4 0	1 4 0
Total Other Costs	15 14 5	10 17 6	15 9 4	6 13 3
TOTAL COST	49 4 0	20 3 2	30 12 4	10 9 4
<i>Average:</i>	Tons	Tons	Tons	Tons
Yield per acre	18.03	18.67	19.00	11.21
Cost per ton	£ s. d. 2 14 7	£ s. d. 1 1 7	£ s. d. 1 12 3	£ s. d. 18 8

TABLE G

Root and Green Fodder Crops: Analysis of Labour and Power Requirements. Average per Acre

	MANGOLDS			KALE			FLATPOLL CABBAGE			TURNIPS, SWEDES, ETC.		
	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor	Man	Horse	Tractor
	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.
<i>Average per Acre:</i>												
(a) Cultivations:												
Ploughing	5.23	—	5.23	5.43	—	5.43	3.95	—	3.95	3.34	0.39	3.19
Working down	6.03	0.98	5.54	5.33	0.19	5.14	5.16	—	5.16	3.28	0.47	3.05
Applying manures	23.57	1.48	7.45	11.52	2.48	3.91	20.42	0.84	7.95	2.16	0.60	0.85
Sowing seed/Planting	4.25	2.03	0.68	1.72	0.76	0.19	21.25	—	4.42	1.00	0.40	0.13
Harrow/Roll	1.66	1.05	0.98	1.33	0.95	0.57	1.32	0.53	1.05	1.00	0.33	0.72
Total Cultivations	40.74	5.54	19.88	25.33	4.38	15.24	52.10	1.37	22.53	10.78	2.19	7.94
(b) Hoeing/Singling	71.57	1.54	0.12	18.19	3.24	—	26.74	1.37	0.21	3.73	0.70	0.59
(c) Pulling and clamping	74.70	3.44	17.35	—	—	—	—	—	—	—	—	—
Total	187.01	10.52	37.35	43.52	7.62	15.24	78.84	2.74	22.74	14.51	2.89	8.53
<i>Labour and Power:</i>	Hrs.	£ s. d.		Hrs.	£ s. d.		Hrs.	£ s. d.		Hrs.	£ s. d.	
(a) Man	187.01	25	6 5	43.52	5	15 2	78.84	10	8 8	14.51	1	18 5
(b) Horse	10.52		13 2	7.62		9 7	2.74		3 5	2.89		3 7
(c) Tractor	37.35		7 10 0	15.24		3 0 11	22.74		4 10 11	8.53		1 14 1
TOTAL		33	9 7		9	5 8		15	3 0		3	16 1

The average total cost per acre for the mangold crop relates to the harvested crop in the cave or root house, while, for the other three crops, the cost relates to the mature crop ready for harvesting, but still standing in the field. The cost of cutting or pulling, and carting, for kale, cabbage, and turnip and swede crops is charged in the direct labour costs on cattle, as is also the cost of carrying mangolds from store to the cattle, either in the steading or out in the fields.

The total cost of cultivations was highest for the cabbage crop, followed by mangolds, and very low for the turnips, swedes and mixed roots: roots in this last group consist mainly of turnips, or mixtures of turnips and swedes. The high cost of cultivations for the cabbage and mangold crops is due mainly to the cost of applying dressings of dung, which was much more frequently used for these crops, and, in the case of the cabbage crop, to the heavy cost of putting out the plants. Hoing and singling averaged nearly £10 per acre for mangolds, £2 to £4 for kale and flatpoll, but only 13s. per acre for the turnips and swedes: apart from a small proportion of clean swedes the roots in this last group were mainly sown broadcast, usually by seed-box or through a fertilizer distributor, so that not only is the cost of sowing low, but subsequent hoing operations cannot be undertaken. The cost of pulling and clamping mangolds averaged nearly £14 per acre.

The net cost of manures averaged over £11 per acre for the mangold crop, £7 to £8 for kale and flatpoll, and just over £3 per acre for turnips; three-quarters of the mangold acreage and only a slightly smaller proportion of the flatpoll acreage received an average dressing of 13 tons of dung per acre, at a cost of roughly £7 per acre: the cost in the case of the kale crops was less than one-half this figure, while for turnips the average cost was only 2s. 7d. per acre. The cost of artificial fertilizers was also highest for the mangold crop, and lowest for turnips, but the difference is much less than for dung. The average dressing given per acre, calculated over all crops costed in each group, was approximately as follows:

	Dung Tons	Compound Fertilizer Cwt.	Slag or Super Cwt.	Nitrochalk or Sulphate of Ammonia Cwt.
Mangolds . . .	10	5	4½	½
Kale . . .	4	5	2	¼
Flatpoll . . .	9	2	5	1/10
Turnips, etc. . .	Neg.	1	8	¼

The cost of seeds averaged some 28s. per acre for the mangold crop compared with 9s. to 10s. for the turnips and kale:

the cost of flatpoll cabbage plants, purchased at a price around 14s. 6d. per 1,000, and planted at the rate of approximately 6,500 per acre, on average, came to £4 12s. 6d. per acre.

Total costs averaged over £49 per acre for mangolds in cave or root house, or about £35 per acre in the ground: the average cost for kale in the ground was just over £20 per acre, nearly £31 for cabbage, but only £10½ per acre for turnips. The average yield per acre was 18 to 19 tons for mangolds, kale and cabbage, and 11 tons per acre for turnips and mixed roots. The lowest cost per ton, 18s. 8d., was for the turnips, but the kale averaged not much more at 21s. 7d. per ton, while flatpoll cabbage averaged £1 12s. 3d., and mangolds £2 14s. 7d. harvested, or £1 19s. 1d. per ton in the ground.

Flatpoll cabbage has long been a favourite crop in this district for the winter feeding of cattle, and sheep to a lesser extent, and the area grown appears to be on the increase. At a cost per acre considerably less than for mangolds it produces less dry matter but rather more starch equivalent, and considerably more protein equivalent per acre. Turnips, although a cheap crop to grow per ton, and still more so per acre, have a low yield per acre and a still lower production of food nutrients. Kale is undoubtedly the outstanding crop for winter feeding, although, apart from the milk producing farms, it is still not widely grown in this district. With a yield per acre only fractionally less than for cabbage, it has a cost per acre only two-thirds as high, but produces roughly 20 to 35 per cent more dry matter and food nutrients per acre at this level of yield. Compared with cabbage, which is available well into the New Year, kale, or at least marrowstem kale, has a more restricted feeding period, and, where it cannot be folded to cattle, an increasingly common practice, it is more expensive and more unpleasant to cut and cart. There does not seem to be any reason however why a succession of marrowstem, thousand-head, and hungry-gap kale could not be made to last throughout the entire winter feeding period, while it seems at least probable that, with a considerably greater top dressing with nitrogenous fertilizer, the average yield per acre both for kale and flatpoll could be considerably, and economically, increased.

From the point of view of cost, and particularly of manual labour requirements, the mangold crop does not show in a very favourable light, and there are probably few farmers in this district who would be prepared to suggest that the crop is a particularly suitable one to grow in an upland area of thin,

poor soils, with a high rainfall. Mangolds, although grown on nearly all farms in this area, are invariably restricted to small areas, often to only a fraction of an acre, and rarely exceed 1 to 2 acres even on the largest farms.

The general policy on store rearing farms with regard to the allocation of roots between sheep and cattle is extremely elastic, and depends mainly upon the overall position with regard to winter food supplies. Turnips, swedes, and mixed roots are grown primarily for the sheep, but if these crops are good and cattle fodder short, substantial quantities, especially of swedes, may be pulled from the field and carted to cattle. If, on the other hand, the turnip crop is poor, cattle other than calves are unlikely to get any swedes or turnips at all, while much of the cabbage crop and even the kale may be diverted for sheep keep, and all the mangolds reserved for sheep during the inevitable "hungry-gap" in the winter and early spring. It is because mangolds provide such an invaluable and convenient stand-by crop at lambing time that they are unlikely to be eliminated entirely from the cropping policy of these upland farms, despite the very high cost of production involved.

Grassland Costs: 1952-53

The average costs per acre for pasture-land, i.e. land devoted solely to grazing, and for mowing land, during the period November 1952 to October 1953 is set out in Table H; mowing land relates to any grassland laid up for hay and/or silage, but the cost of haymaking or silage making is excluded, and the cost refers only to the cost of grass production.

TABLE H
Grassland: Average Cost per Adjusted Acre. 1952-53

	BRENDON HILLS MARGINAL FARMS			Exmoor* Hill Farms
	Dairy	Milk and Stores	Stores	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
PASTURE-LAND:				
(1) Labour and Power:				
(a) Man	3 11	5 0	3 7	4 2
(b) Horse	—	—	—	1
(c) Tractor	1 6	2 4	1 8	1 6
Total	5 5	7 4	5 3	5 9
(2) Contract	11	4	7	—
(3) Manures: net cost:				
(a) F.Y.M.	—	—	11	4
(b) Artificials	7 6	6 3	5 1	8 9
Total	7 6	6 3	6 0	9 1
(4) Field Costs:				
(a) Rent	1 10 7	17 3	18 2	12 9
(b) Lime	5 8	6 6	4 11	4 0
(c) Hedges	14 6	13 8	15 2	11 6
Total	2 10 9	1 17 5	1 18 3	1 8 3
(5) Machinery: repairs and depreciation	4 9	4 8	4 10	4 11
(6) Ley Establishment	14 1	12 2	7 5	16 3
Total Cost of Pasture-land	4 3 5	3 8 2	3 2 4	3 4 3
MOWING-LAND:				
(1) Labour and Power:				
(a) Man	4 6	6 10	5 4	10 3
(b) Horse	—	3	1	2
(c) Tractor	3 4	3 11	3 5	5 1
Total	7 10	11 0	8 10	15 6
(2) Contract	1 5	1	4	1
(3) Manures: net cost:				
(a) F.Y.M.	7 3	8 5	5 5	1 5 9
(b) Artificials	13 5	17 9	19 8	8 10
Total	1 0 8	1 6 2	1 5 1	1 14 7
(4) Field Costs:				
(a) Rent	1 11 11	18 2	18 3	13 3
(b) Lime	6 5	6 9	5 4	4 5
(c) Hedging, etc.	14 4	14 11	15 3	11 4
Total	2 12 8	1 19 10	1 18 10	1 9 0
(5) Machinery: repairs and depreciation	4 11	5 0	5 0	5 0
(6) Ley Establishment	1 9 10	1 1 1	1 8 2	1 0 10
Total Cost of Mowing Land	5 17 4	5 3 2	5 6 3	5 5 0

* For the Exmoor Hill farms the costs refer only to inground grassland. The average cost per actual acre for the hill grazings was 3s.5d., of which 2s. 8d. was for rent, and 9d. per acre for various minor labour costs.

TABLE I
Ley Establishment. Average Cost per Acre Established

	BRENDON MARGINAL FARMS			Exmoor Hill Farms
	Dairy	Milk and Stores	Stores	
NURSED LEYS:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Share of nurse crop costs, sowing and covering seeds	2 15 3	2 18 10	2 17 0	2 18 3
Cost of seeds	3 14 11	4 4 7	3 5 1	4 13 11
Total Cost	6 10 2	7 3 5	6 2 1	7 12 2
DIRECTLY-SOWN LEYS:				
(1) Labour and Power:				
(a) Man	1 4 1	1 14 8	1 5 3	1 3 4
(b) Horse	7	—	10	9
(c) Tractor	1 7 10	2 3 10	1 10 5	1 9 0
Total	2 12 6	3 18 6	2 16 6	2 13 1
(2) Manures: net cost:*				
(a) F.Y.M.	—	—	—	—
(b) Artificials	1 1 9	1 2 3	17 6	1 1 6
Total	1 1 9	1 2 3	17 6	1 1 6
(3) Field Costs:				
(a) Rent	1 14 1	12 3	16 11	13 3
(b) Lime	6 11	9 0	4 3	4 6
(c) Hedging, etc.	15 8	12 11	13 9	10 1
Total	2 16 8	1 14 2	1 14 11	1 7 10
(4) Machinery: repairs and depreciation	1 3 11	1 5 2	1 4 0	1 4 0
(5) Seeds	5 2 0	4 2 1	5 0 4	4 11 4
Total Cost	12 16 10	12 2 2	11 13 3	10 17 9
Average cost: direct and nursed	8 12 10	8 3 7	9 6 8	10 1 9
Percentage of leys nursed	66%	80%	42%	24%
Average Cost of Ley Establishment:	£	£	£	£
(a) Per acre of total temporary grass	1.82	1.30	1.52	1.73
(b) Per acre of total grass-land	1.02	0.71	0.60	0.86

* Only one-third of actual net cost of manures has been charged to ley establishment and the remaining two-thirds transferred to the cost of grass-land.

TABLE J

Pasture and Mowing Land: Analysis of Labour and Power* Requirements.
Average per Acre

	BRENDON HILLS MARGINAL FARMS						EXMOOR HILL† FARMS	
	Dairy		Milk and Stores		Stores		Man	Tractor
	Man	Tractor	Man	Tractor	Man	Tractor		
	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	
PASTURE-LAND:								
Rolling	—	—	—	—	0·02	0·02	0·01	0·01
Harrowing	0·07	0·07	0·10	0·10	0·05	0·05	0·05	0·05
Watering meadows	0·15	—	0·13	—	0·20	—	0·13	—
Applying F.Y.M.	—	—	—	—	0·06	0·02	0·02	Neg.
Applying artificials	0·07	0·04	0·14	0·09	0·06	0·05	0·13	0·07
Cutting weed	1·03	0·24	1·39	0·38	0·81	0·30	1·18	0·31
TOTAL	1·32	0·35	1·76	0·57	1·20	0·44	1·52	0·44
MOWING-LAND:								
Rolling	0·14	0·14	0·05	0·05	0·23	0·23	0·06	0·06
Harrowing	0·16	0·16	0·24	0·24	0·17	0·17	0·25	0·25
Stone picking	0·10	0·02	—	—	0·29	0·14	—	—
Watering meadows	0·36	—	0·17	—	0·60	—	0·67	—
Applying F.Y.M.	0·70	0·36	1·42	0·41	0·26	0·09	2·46	0·93
Applying Artificials	0·17	0·14	0·43	0·28	0·25	0·19	0·26	0·13
TOTAL	1·63	0·82	2·31	0·98	1·80	0·82	3·70	1·37

* Horse labour employed on grassland is of negligible importance for all operations in all groups and has been excluded from the analysis.

† Refers to inground grassland only.

Of total grassland, 56 per cent consisted of temporary grass in the Dairy group, 55 per cent in the Milk and Stores, 39 per cent in the Stores group, and 49 per cent for the Exmoor group. Of the temporary grass, maiden leys accounted for 21 per cent in the Dairy group and 16 to 17 per cent in the other three groups: of maiden leys, 34 per cent in the Dairy group and 20 per cent in the Milk and Stores group were established by direct seeding, compared with 58 per cent in the Stores group, and 76 per cent in the Exmoor group. The average cost of ley establishment, per acre of total grassland, was just over 20s. per acre in the Dairy group, approximately 14s. in the Milk and Stores group, 12s. in the Stores group, and 17s. per acre of grassland in the Exmoor group. The proportion of temporary grass in the total acreage shut up for mowing was much higher than for pasture-land in all groups except the Exmoor Hill group, where the difference was only slight: over 75 per cent

of mowing land in all the Marginal groups consisted of temporary grass, rising to nearly 85 per cent in the Stores group, compared with only 55 per cent in the Exmoor group. Temporary grass, as a proportion of total pasture-land, was as low as 28 per cent in the Stores group, but varied from 46 to 52 per cent in the other three groups, with the highest proportion in the Dairy group.

The average cost per acre for pasture-land was highest for the Dairy group at £4 3s. 5d. per acre, roughly £1 per acre higher than in the Stores and Exmoor groups, and 15s. per acre higher than in the Milk and Stores group. Rent and ley establishment were the two main items accounting for the higher costs in the Dairy group. For mowing land the average cost per acre was again highest in the Dairy group, but the difference in this case was rather less, and the cost of manures for this group was actually the lowest for all groups.

The average cost per acre, over this same period, for a group of lowland grass and mixed farms on which milk production is the major enterprise was £5 11s. 6d. per acre for pasture-land, and £7 12s. 5d. for mowing land. Lowland pasture costs were, on average, some 28s. 0d. per acre higher than in the Marginal Dairy group, and more than £2 per acre higher than for the other upland marginal groups. The average cost of manures was over 21s. 0d. per acre for the lowland farms compared with 6s. 0d. to 9s. 0d. for the upland farms: labour and power costs were also higher for the lowland farms, and the average cost of rent in this group was 13s. per acre greater than for the Marginal Dairy group, and 26s. greater per acre than for the Milk and Stores group. Only with regard to the cost of ley establishment was the average cost per acre of pasture-land higher for most of the upland groups, and the difference is relatively small. The average cost for mowing land was roughly 35s. 0d. per acre greater for the lowland farms than for the upland Dairy group, and more than 45s. 0d. per acre greater than for the other upland groups: the cost of manures and rent again accounted for most of the higher costs on the lowland farms, but the cost of ley establishment was again slightly higher for the upland farms.

Appendix D

TABLE I

Per cent Distribution of Cattle by Type: England and Wales and Five West of England Counties for 1947 and 1953

	Hereford		Worcester		Gloucester		Somerset		Wiltshire		England and Wales	
	1947 %	1953 %	1947 %	1953 %	1947 %	1953 %	1947 %	1953 %	1947 %	1953 %	1947 %	1953 %
1. <i>Breeding Cows:</i>												
Cows and Heifers in-milk and Cows in-calf:												
(a) Dairy*	} 29.4	16.8	} 31.4	24.9	} 37.8	32.5	} 46.6	43.2	} 50.6	43.1	} 38.5	32.1
(b) Beef†		13.5		6.1		3.7		3.3		2.4		4.9
Heifers in-calf		5.7		5.4		9.3		7.8		11.2		8.9
Total Cows and Heifers	35.1	35.7	40.7	38.8	49.0	45.1	55.9	55.4	63.6	56.4	47.7	45.2
2. <i>Total Bulls</i>	2.1	1.8	1.9	1.4	2.2	1.2	2.4	1.3	2.6	1.6	2.1	1.4
3. <i>Store Cattle:</i>												
(a) Two years and over: Male	8.1	7.8	6.8	8.2	3.0	5.3	2.0	2.7	1.5	3.2	6.2	7.0
Female	7.5	6.8	10.1	8.9	9.0	8.5	9.9	8.6	6.4	6.8	9.1	8.3
Total	15.6	14.6	16.9	17.1	12.0	13.8	11.9	11.3	7.9	10.0	15.3	15.3
(b) One to two years: Male	10.5	10.6	5.7	7.5	3.0	5.5	1.5	2.4	0.6	2.8	4.1	5.6
Female	14.0	12.7	14.2	12.8	15.0	13.5	13.1	12.8	11.9	12.4	13.0	12.3
Total	24.5	23.3	19.9	20.3	18.0	19.0	14.6	15.2	12.5	15.2	17.1	17.9
(c) Under one year: Male	9.1	10.6	5.7	8.1	3.3	6.3	1.7	3.1	0.7	3.5	3.9	6.4
Female	13.6	14.0	14.9	14.3	15.5	14.6	13.5	13.7	12.7	13.3	13.9	13.8
Total	22.7	24.6	20.6	22.4	18.8	20.9	15.2	16.8	13.4	16.8	17.8	20.2
Total Store Cattle	62.8	62.5	57.4	59.8	48.8	53.7	41.7	43.3	33.8	42.0	50.2	53.4
Total Cattle	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Stores: (a) Male	27.7	29.0	18.2	23.8	9.3	17.1	5.2	8.2	2.8	9.5	14.2	19.0
(b) Female	35.1	33.5	39.2	36.0	39.5	36.6	36.5	35.1	31.0	32.5	36.0	34.4

* For producing milk or calves for the dairy herd.

† Mainly for producing calves for beef.

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Appendix D

TABLE II

Cost Structure of the Cattle Enterprise: Average per 100 Acres

	AVERAGE COSTS PER 100 ACRES				PER CENT OF TOTAL			
	BRENDON HILLS MARGINAL FARMS			EXMOOR HILL FARMS	BRENDON HILLS MARGINAL FARMS			EXMOOR HILL FARMS
	Dairy	Milk and Stores	Stores		Dairy	Milk and Stores	Stores	
	£	£	£	£	%	%	%	%
(A) <i>Labour and Power:</i>								
(1) <i>Manual Labour:</i>								
(a) Directly for Cattle	516	375	276	202	29.1	26.2	22.8	26.0
(b) Indirect: Crop Production:								
Hay and Silage	69	66	94	68	3.9	4.6	7.8	8.8
Grazing	61	62	61	48	3.4	4.3	5.0	6.2
Corn and straw	26	51	51	28	1.5	3.6	4.2	3.6
Roots and Green Fodder	58	48	31	8	3.3	3.4	2.6	1.0
Total Indirect	214	227	237	152	12.1	15.9	19.6	19.6
Total Manual Labour	730	602	513	354	41.2	42.1	42.4	45.6
(2) <i>Horse Labour:</i>								
(a) Directly for Cattle	6	7	2	2	0.3	0.5	0.2	0.3
(b) Indirect: Crop Production	6	5	5	3	0.4	0.4	0.4	0.4
Total Horse Labour	12	12	7	5	0.7	0.9	0.6	0.7
(3) <i>Tractor Labour:</i>								
(a) Directly for Cattle	34	36	35	12	1.9	2.5	2.9	1.5
(b) Indirect: Crop production	76	80	78	48	4.3	5.6	6.4	6.2
Total Tractor Labour	110	116	113	60	6.2	8.1	9.3	7.7
Total Labour and Power:								
(a) Direct	556	418	313	216	31.4	29.3	25.9	27.8
(b) Indirect	296	312	320	203	16.7	21.8	26.4	26.2
TOTAL	852	730	633	419	48.1	51.1	52.3	54.0
(B) <i>Contract:</i>								
(a) Baling	19	17	22	10	1.1	1.2	1.8	1.3
(b) Threshing	7	9	15	2	0.4	0.6	1.2	0.3
(c) Other	2	—	—	—	0.1	—	—	—
Total Contract	28	26	37	12	1.6	1.8	3.0	1.6
(C) <i>Manures: Net Cost:</i>								
(a) Hay/Silage	25	25	34	21	1.4	1.8	2.8	2.7
(b) Grazing	34	30	27	31	1.9	2.1	2.2	4.0
(c) Corn and straw	10	20	18	7	0.6	1.4	1.5	0.9
(d) Roots and Green Fodder	51	33	18	5	2.9	2.3	1.5	0.6
Total Manures	120	108	97	64	6.8	7.6	8.0	8.2
(D) <i>Lime</i>	26	28	24	18	1.5	1.9	2.0	2.3
(E) <i>Seeds and Plants:</i>								
(a) Grassland	33	27	26	25	1.9	1.9	2.2	3.2
(b) Corn	20	41	38	21	1.1	2.9	3.1	2.7
(c) Roots and Green Fodder	7	8	4	1	0.4	0.5	0.3	0.1
Total Seeds and Plants	60	76	68	47	3.4	5.3	5.6	6.0
(F) <i>Rent</i>	135	94	102	65	7.6	6.6	8.4	8.4
(G) <i>Implements: repairs and depreciation</i>	75	76	87	57	4.2	5.3	7.2	7.4
(H) <i>Purchased Foods:</i>								
(1) <i>Concentrates:</i>								
(a) Dairy cake	216	57	16	2	12.2	4.0	1.3	0.2
(b) Calf nuts	15	55	24	13	0.9	3.8	2.0	1.7
(c) Calf starter and meal	14	28	1	3	0.8	2.0	0.1	0.4
(d) Other concentrates	12	9	1	1	0.7	0.6	0.1	0.1
Total Concentrates	257	149	42	19	14.6	10.4	3.5	2.4
(2) <i>Other Purchased Foods:</i>								
(a) Hay	20	11	—	2	1.1	0.8	—	0.3
(b) Straw	2	3	12	3	0.1	0.2	1.0	0.4
(c) Grass Keep	11	24	15	5	0.6	1.7	1.2	0.6
Total Other	33	38	27	10	1.8	2.7	2.2	1.3
Total Purchased Foods	290	187	69	29	16.4	13.1	5.7	3.7
(I) <i>Miscellaneous Costs:</i>								
(a) Thatching materials	5.1	5.7	7.3	3.2	0.3	0.4	0.6	0.4
(b) New gates, repairs, wire, etc.	6.6	6.2	7.1	4.5	0.4	0.5	0.6	0.6
(c) Binder and baler cord	4.3	8.3	8.2	3.3	0.2	0.6	0.7	0.4
(d) Veterinary fees and medicines	43.8	14.0	12.5	6.5	2.5	1.0	1.0	0.8
(e) Coal, coke, petrol, gas, etc.	24.0	6.4	—	—	1.4	0.5	—	—
(f) Lorry hire	7.7	4.2	5.6	2.9	0.4	0.3	0.5	0.4
(g) Market tolls and commission	5.9	19.5	11.9	18.7	0.3	1.4	1.0	2.4
(h) Bull and A.I. fees	19.3	12.0	6.9	3.0	1.1	0.8	0.6	0.4
(i) Rental of buildings	16.6	11.0	12.9	8.4	0.9	0.8	1.1	1.1
(j) Equipment: repairs and depreciation	18.9	5.7	6.4	3.0	1.1	0.4	0.5	0.4
(k) Detergents and disinfectants	9.0	1.8	1.6	0.6	0.5	0.1	0.1	0.1
(l) Milking machine parts	3.8	0.2	—	—	0.2	—	—	—
(m) Filter pads, cloths, etc.	2.7	1.8	0.1	—	0.2	0.1	—	—
(n) Salt licks, minerals, etc.	0.9	0.5	1.8	1.0	0.1	—	0.2	0.1
(o) Cattle insurance	7.9	2.8	5.2	4.4	0.4	0.2	0.4	0.6
(p) Herd Book fees	0.5	0.7	1.6	1.7	—	—	0.1	0.2
(q) National Milk Records	0.8	—	—	—	—	—	—	—
(r) Small tools	2.8	3.2	2.7	1.9	0.2	0.2	0.2	0.2
(s) Bedding straw	3.6	—	2.2	1.9	0.2	—	0.2	0.3
(t) Sundries	0.8	—	—	—	—	—	—	—
Total Miscellaneous Costs	185.0	104.0	94.0	65.0	10.4	7.3	7.8	8.4
TOTAL PRODUCTION COSTS	1771.0	1429.0	1211.0	776.0	100.0	100.0	100.0	100.0

