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Sharp - Cost of production

UNIVERSITY OF NOTTINGHAM

Department of Agricultural Economics

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WITHDRAWN

THE ECONOMY OF SHEEP ON EAST MIDLAND FARMS

by R. OWEN WOOD, M.Sc.



Suffolk Shearling Ewe bred by E. & H. Dunn

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The cover photograph is a Suffolk Shearling Ewe bred by Messrs. E. and H. Dunn, who formerly farmed at Bearwardcote Grange, Etwall, Derby.

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THE ECONOMY OF SHEEP ON EAST MIDLAND FARMS

INTRODUCTION

The costs and returns from 50 sheep flocks in the East Midlands were collected for the years 1962-63 and from 46 flocks for the year 1963-64. The results are examined in the first part of this report and, in particular, the effect of the weather conditions experienced during these two years upon the profits is discussed.

The second part of this report considers the place of sheep within the economy of the farm as a whole and the value of certain husbandry techniques. It is largely the outcome of the exchange of views by a N.A.A.S. working party set up to consider the economy of systems of wintering ewes. The author was a member of this party and the other members were Messrs. J. D. Laurence, E. S. Carter and S. E. Turner, then county officers for Rutland, Lincolnshire (Lindsey) and Leicestershire respectively. Whilst the opinions expressed here are those of the author, they have been influenced by and therefore reflect the opinions of all members of that working party.

Full details of costs and returns are given in Appendix II.

Sheep in the East Midlands

Two broad types of farming can be distinguished in the East Midlands and in both of these sheep are a traditional feature.

On the arable farms of the Lincolnshire Wolds and Heaths stretching southward into the eastern half of Rutland, as well as on the Nottinghamshire Sands and Derbyshire Magnesian Limestones, sheep have long been considered to be a means of maintaining fertility and utilising root crops within a rotation of crops. Elsewhere in the traditional grassland counties of Derbyshire, Leicestershire and Northamptonshire, as well as in parts of Lincolnshire and Rutland, sheep frequently share the grazing with dairy and beef cattle, particularly in those areas in which milk production is less intensive. With changing costs of resources and with advances in crop husbandry, in particular those which enable cereals to be grown for more than two or three years in succession on the same land, the place of sheep in the farm economy requires reconsideration.

In 1963 there were approximately 8,000 ewe flocks in the East Midlands. It may seem strange in these days of specialisation to find 1,768 small flocks with 24 ewes or less, mainly on farms under 100 acres. Their total contribution to farm profits cannot be great—possibly up to £200 per year—but where the total net farm income is close to that of a farm worker this represents a useful addition.

45.1 per cent of the flocks were between 50 and 199 ewes and this accounts for 49.2 per cent of the ewes in the East Midlands (Table 1). Usually, sheep flocks of this size are looked after by the farmer or a paid manager. Such labour would be reasonably skilled in sheep husbandry.

SIZE DISTRIBUTION OF BREEDING FLOCKS
JUNE CENSUS 1963 — EAST MIDLANDS REGION
RAISED RESULTS FROM ONE THIRD SAMPLE

Flock Size Group (Number of Ewes)	Per cent	
	Percentage of all flocks	Percentage of all breeding sheep
1—24	21.9	3.4
25—49	23.9	9.7
50—199	45.1	49.2
200—499	7.7	25.0
500 and over	1.4	12.7
	100.0	100.0

The 1963 census does not identify the number of flocks exceeding 300 ewes but it is probable that there were about 400 flocks of this size in the East Midlands. These flocks would account for about one quarter of the ewes. Most of these flocks would require the services of a skilled shepherd spending most or the whole of his time with the flock.

46.0 per cent of the flocks and 41.8 per cent of the ewes are on holdings of between 100 and 299½ acres and a further 18.5 per cent of the flocks containing 43.4 per cent of the ewes are on holdings of 300 acres and over (Table 2). As the size of holding increases, it is much more likely that a ewe flock will be kept. Thus only one holding in eight under 100 acres has a sheep flock but two in every three holdings over 300 acres have a sheep flock.

DISTRIBUTION OF EWES BY SIZE OF FARM
JUNE CENSUS 1963 — EAST MIDLANDS REGION
RAISED RESULTS FROM ONE THIRD SAMPLE

Farm Size Group (Crops and Grass Acreage)	Per cent		
	Percentage of farms with flocks	Percentage of all flocks	Percentage of all breeding sheep
Nil to 99½	12.3	35.5	14.8
100 to 299½	53.8	46.0	41.8
300 and over	63.0	18.5	43.4
	25.6	100.0	100.0

PART I

COSTS AND RETURNS FROM SHEEP FLOCKS IN THE EAST MIDLANDS 1962-63 AND 1963-64

The costs and returns from fifty flocks in the East Midlands in 1962-63 were commented upon in a report issued in June, 1964.* Costs and returns from 46 of these flocks were collected for the following year, 1963-64. Thirty-five of these flocks were on farms with light land suitable for winter folding, seventeen on the Lincolnshire Wolds, fourteen on the Limestone cliffs and heaths of Lindsey, Kesteven and Rutland, three on the Nottinghamshire Bunter Sands and one on the Derbyshire Magnesian Limestone. The other eleven flocks were either on all-grass farms or on farms having grass associated with cereals, of these, six were in or adjacent to Rutland and the other five were on farms near to the Wolds, Limestone and Sands.

The 46 flocks have been divided into the same three groups as in 1962-63 but each group has been subdivided into flocks kept on grass only and flocks grazed on arable crops for part of the winter. The analysis into groups and sizes of flocks is shown in Table 3.

EWE FLOCKS ANALYSED BY SYSTEM OF RAISING LAMBS
AND BY SIZE OF FLOCK 1963-64

TABLE 3

POLICY	FAT LAMBS OFF GRASS More than 80 per cent lambs sold fat off grass or retained for flock replacements		FAT AND STORE LAMBS 10 to 80 per cent lambs sold fat off grass and remainder winter folded		STORE LAMBS More than 90 per cent lambs retained for winter folding		ALL FLOCKS
	Grass	Arable	Grass	Arable	Grass	Arable	
Group No.	IA	IB	IIA	IIB	IIIA	IIIB	ALL
No. of flocks							
Under 100 ewes	1	—	1	—	—	2	4
100—150 ewes	2	1	5	3	1	1	13
151—200 ewes	2	1	1	4	1	—	9
201—300 ewes	2	1	1	4	2	1	11
301—400 ewes	—	—	1	2	—	—	3
401—500 ewes	—	1	2	—	—	—	3
Over 500 ewes	—	—	1	2	—	—	3
TOTAL	7	4	12	15	4	4	46
No. of ewes							
Smallest flock	49	139	49	107	108	42	42
Largest flock	292	449	640	743	258	271	743

Note: Grass=grazed on grass only
Arable=Grazed on grass and arable crops

* R. OWEN WOOD, *Fat lamb and fat sheep production in the East Midlands 1962-63*. Department of Agricultural Economics, University of Nottingham. June, 1964 (F.R. 154).

COSTS AND RETURNS FROM EWE FLOCKS
ANALYSED BY SYSTEM OF RAISING LAMBS
EAST MIDLANDS 1962-63 AND 1963-64

TABLE 4

	1962-63			1963-64		
	Group I	Group II	Group III	Groups IA, IB and IIA	Group IIB	Group III (A and B)
	Fat lambs off grass	Fat and store lambs	Store lambs	Fat lambs off grass	Fat and store lambs	Store lambs
Number of flocks	27	13	10	23	15	8
Number of ewes	5,788	3,395	1,890	5,157	3,993	1,281
Number of lambs reared per ewe	1.29	1.34	1.31	1.36	1.43	1.25
Fat lambs						
Average estimated dressed carcase weight (lb.)	44.2	44.6	44.6	41.1	46.0	47.7
Average price (£)	6.63	6.81	6.88	6.89	7.16	7.15
Concentrates per ewe (cwts.)	1.43	1.48	1.22	1.59	0.87	0.87
Acres per ewe						
Hay, roots, grass and silage	0.04	0.02	0.03	0.02	0.02	0.02
Folded crops and beet tops	0.01	0.03	0.04	0.03	0.11	0.02
Grazing	0.36	0.35	0.35	0.32	0.29	0.32
Total	0.41	0.40	0.42	0.37	0.42	0.36
Output of livestock and wool per ewe	£	£	£	£	£	£
Lambs	8.22	8.59	7.87	8.68	9.19	7.71
Other sheep	0.07	0.53	0.17	0.24	0.28	0.10
Wool	1.44	2.05	1.75	1.51	1.94	1.67
	9.73	11.17	9.79	10.43	11.41	9.48
Less ewe and ram replacement costs	1.60	1.24	1.78	1.29	1.36	2.11
Total	8.13	9.93	8.01	9.14	10.05	7.37
Costs per ewe						
Foods:						
Concentrates	1.97	1.87	1.43	2.14	1.19	1.14
Hay, roots, silage, etc.	0.99	0.39	0.80	0.60	0.43	0.65
Folded crops	0.23	0.90	0.67	0.10	1.43	0.28
Grazing	2.30	2.10	1.75	1.99	2.26	1.48
Total foods	5.49	5.26	4.65	4.83	5.31	3.55
Man and vehicle labour	1.52	1.33	1.33	1.68	1.50	1.36
Miscellaneous costs	0.47	0.47	0.47	0.44	0.46	0.48
Total costs	7.48	7.06	6.45	6.95	7.27	5.39
Margin per ewe (Output less Costs)	0.65	2.87	1.56	2.19	2.78	1.98

For an almost identical sample, the grouping of the flocks on the basis of lamb disposals shows a considerable difference as between the two years. It is more likely that these differences are due to the particular weather conditions of the two years than to a deliberate change of policy by the farmers.

It is probable that sheep are as susceptible to differences in weather conditions as any form of livestock, for they are the only livestock normally kept out of doors all the year round. Thus in the previous report it was suggested that the severe weather in January, February and March 1963 had influenced the results and that the results should be regarded as applicable to that year only. They should not be considered as indicative of the general level of profits and of the relative profits from the different systems.

The following year, 1963-64, was favourable to sheep during the winter and the ewes lambed in good condition. April was cold and wet and this tended to check the growth of lambs. The rest of the year was dry but temperatures were below average and lambs did not fatten readily upon grass. The results for 1963-64, reported here, show the effects of these conditions upon the profitability of the sheep enterprise.

Thus, of the 27 flocks in Group 1, 1962-63, *finishing fat lambs off grass*, only eleven were in Groups 1A and 1B in 1963-64. A further eleven failed to fatten a high proportion of their lambs off grass in 1963-64 and are included in Group IIA.

A comparison of the results from Groups IA, IB and IIA, 1963-64, with Group I, 1962-63 shows a considerable increase in the margin from £0.65 per ewe in 1962-63 to £2.19 per ewe in 1963-64 (Table 4). Only six of the twenty-three flocks in 1963-64 made lower margins than in 1962-63 and many made substantially higher margins. This increase in profits was due mainly to three factors:—

1. An increase in the lamb crop from 1.29 to 1.36 lambs per ewe resulted in an increase in the output of lambs from £8.22 per ewe in 1962-63 to £8.68 in 1963-64.
2. The rise in prices for fat ewes, associated with changes in the rates of replacement and culling, resulted in a reduction in the cost of flock replacement from £1.60 per ewe in 1962-63 to £1.29 per ewe in 1963-64.
3. The milder winter of 1963-64 enabled flock owners to use less supplementary feed, particularly bulky fodders, than in the previous winter. Also grazing costs were lower in 1963-64, probably a combination of more grass and lower fertilizer use. As a result total feed costs fell from £5.49 per ewe in 1962-63 to £4.83 per ewe in 1963-64.

COSTS AND RETURNS FROM WINTER SHEEP FOLDING IN THE EAST MIDLANDS
1962-63 AND 1963-64

TABLE 5

£ per sheep fed

All flocks			Flocks on special folding crops 1963-64	Flocks on beet and sprout tops 1963-64
1962-63	1963-64			
15	19	Total number of flocks	15	4
3,859	4,565	Total number of sheep fed	3,468	1,097
£	£	OUTPUT	£	£
2.52	2.27	Output of sheep	2.54	1.41
0.06	0.12	Sales of wool	0.02	0.44
2.58	2.39	Output of sheep and wool	2.56	1.85
		FOODS		
		Concentrates:		
0.51	0.25	Purchased cakes and meals	0.22	0.30
0.43	0.35	Home grown cereals	0.37	0.30
0.07	0.04	Bulky fodders	0.05	0.01
0.13	0.08	Grazing	0.07	0.14
1.17	1.05	Folded crops	0.93	1.44
2.31	1.77	TOTAL FOODS	1.64	2.19
		LABOUR		
0.34	0.35	Manual labour	0.35	0.32
0.04	0.03	Vehicles	0.03	0.04
0.38	0.38	Total manual and vehicle labour	0.38	0.36
		MISCELLANEOUS COSTS		
0.04	0.07	Veterinary, medicines and transport	0.07	0.07
2.73	2.22	TOTAL COSTS	2.09	2.62
-0.15	+0.17	MARGIN OF OUTPUT OVER COSTS	+0.47	-0.77

AVERAGE VALUES OF SHEEP AT START OF WINTER FATTENING AND AT DISPOSAL
1962-63 AND 1963-64

TABLE 6

£ per head

All flocks			Flocks on special folding crops 1963-64	Flocks on beet and sprout tops 1963-64
1962-63	1963-64			
£	£	SHEEP AT START OF WINTER FATTENING	£	£
6.02	6.11	Lambs—home reared	6.08	6.20
6.05	6.29	purchased	6.15	7.22
3.93	3.40	Cull ewes	3.36	3.66
6.01	6.03	Total at start	5.98	6.18
		DISPOSAL OF SHEEP		
8.75	8.52	Fat hogs	8.72	7.92
6.69	8.22	Store and casualty hogs	8.53	4.75
—	—	Deaths	—	—
9.54	9.74	In stock at end of period	9.47	8.00
4.55	5.43	Ewes	5.87	5.10
8.53	8.29	Total disposals	8.52	7.59

The 15 flocks in Group IIB in 1963-64 *producing fat and store lambs* include nine of the flocks in Group II in 1962-63, two from Group I and three from Group III, with one flock not included in the 1962-63 data. The average results for the two years are similar, with a margin of £2.87 per ewe in 1962-63 and £2.78 per ewe in 1963-64. This suggests that the system is less susceptible to the effects of the weather, and moreover, it shows the highest margin per ewe of the three groups in both years.

The eight flocks in Groups IIIA and IIIB 1963-64, *producing store lambs*, include seven which were in Group III the previous year. Although the total output of livestock and wool was lower in 1963-64, mainly due to higher ewe and ram replacement costs, this group showed a reduction in feed and total costs so that the margin per ewe rose from £1.56 in 1962-63 to £1.98 per ewe in 1963-64.

Winter Sheep Fattening on Folded Crops

The store lambs produced from the flocks in Group III together with some in Group II were fattened on folded crops and the results were collected from 15 flocks in 1962-63 and from 19 flocks in 1963-64. Whereas in 1962-63 there was a loss of £0.15 per sheep folded, in 1963-64 there was a profit of £0.17 per sheep. (Table 5).

The average price realised for fat hogs was £0.23 per sheep lower in 1963-64 than in 1962-63 (Table 6), and this was the main factor causing the slight drop in the output of sheep and wool from £2.58 per sheep in 1962-63 to £2.39 per sheep in 1963-64.

The change from a loss in 1962-63 to a profit in 1963-64 was due mainly to a reduction in total costs by £0.51 per sheep in 1963-64.

In the milder winter of 1963-64, the quantity of folded crops consumed per acre showed an appreciable increase over the previous winter and this resulted in an increase in the number of sheep-weeks per acre. (Table 7). Overall, two more sheep were fattened per acre folded. It is probably significant that catch crops and rape are the only crops not showing an appreciable increase in the quantity of crop consumed. These are the only crops normally consumed during October and November before any bad weather sets in.

At the start of the winter of 1962-63, it is likely that the farmer acquired sufficient lambs to consume a normal folded crop. Therefore, when the bad weather set in, he was committed to fatten the lambs and, to do this, it was necessary to supplement the reduced supplies of folded crop by feeding more concentrates and bulky fodders. As a result the cost of purchased plus home grown concentrates was about 50 per cent more in 1962-63, £0.94 per sheep compared with £0.60 per sheep in 1963-64. Likewise bulky fodders cost £0.07 per sheep in 1962-63 and only £0.04 per sheep in 1963-64. The net effect of these extra costs in 1962-63 was that the total food cost was £0.54 per sheep higher than in 1963-64, primarily as the result of the abnormal weather conditions.

CONSUMPTION OF CROPS USED FOR WINTER FOLDING 1962-63 AND 1963-64

TABLE 7

Per acre

Average number of sheep per acre folded	Winter 1962-63		Winter 1963-64	
	9.7		11.7	
Crops	Sheep-weeks per acre	Tons per acre	Sheep-weeks per acre	Tons per acre
Kale	189	9.4	210	11.7
Cabbage	32	1.0	—	—
Swedes	175	8.7	236	12.6
Turnips	79	7.9	144	11.2
Mixed crops	177	5.6	213	13.6
Catch crops and rape	103	5.1	91	5.2
Beet tops	59	1.7	99	5.8
Sprout tops	74	1.8	175	5.8
All folded crops	130	6.9	170	9.9

In the normal winter of 1963-64 was a profit of £0.17 per sheep worthwhile? To answer this question it is necessary to consider these 19 flocks in two groups, 15 fed on crops grown specifically for folding and 4 folded on sugar beet or brussel sprout tops.

In 1963-64, the fifteen flocks fattened upon crops grown specifically for folding made an average profit of £0.47 per sheep folded or £5.12 per forage acre (including an allowance for hay and grazing). The average rate of stocking was 12.6 sheep per folded acre or 11.0 sheep per forage acre. The investment per sheep was approximately £7, made up of £6 for the cost of the lamb at the start of the feeding period and £1, representing half the cost of winter folding. On this basis the investment was approximately £80 per acre for a period of four months and the rate of interest earned, $18\frac{3}{4}$ per cent per annum. Although this investment coincides with a considerable tie up of capital in cereal stocks, these figures suggest that this is a profitable method of disposal of the lamb crop.

The results from the four flocks fattened mainly on sugar beet and brussel sprout tops cannot be considered as a direct comparison with the fifteen flocks just described. Nevertheless two problems can be illustrated by their results.

Firstly, the average length of feeding in weeks per sheep was very similar in the two groups but the average realisation price of all sheep in the flocks was nearly £1 less per head for the top fed sheep. This was the main reason for a much lower output of sheep and wool, £1.85 per sheep fed on tops compared with £2.56 per sheep fed on "folded crops". The hogs sold fat from the tops were 1.62 lb. heavier on average (estimated dressed carcase weight) but they made only 2.97 shillings per lb., compared with 3.37 shillings per lb. for the "folded crops" hogs. This is a clear price difference against the hogs fed on tops and suggests that in these four cases at least, the hogs were on average below the quality required in the market.

Secondly, the calculation of profits depends upon the value put upon the tops. Based upon an estimate of the cost of production the average value of folded crops consumed by these 19 flocks was £1.07 per ton but a generally accepted feeding value of £2.50 per ton was used for beet and sprout tops. This suggests that beet tops were over-valued as an alternative to folded crops. It is more realistic to attribute no value to the tops, and, on such a basis, the total profit shown by these four flocks was £425. They consumed the produce of 92.4 acres of tops, 22.6 acres of folded crops and 29.3 acres of grass, 144.3 acres in all from which the average profit was £2.94 per acre. The stocking rate was 7.6 sheep per acre, equivalent to an investment of £53 per acre for four months so that the rate of interest earned was $16\frac{1}{2}$ per cent per annum, not quite so good as that from the folded crops.

In view of the small number of flocks involved, this difference is probably insignificant and the general conclusion is that keeping these sheep for four months on folded crops, whether specially grown or providing beet or sprout tops as a by-product, is justified by the rate of interest earned on the capital involved.

To sum up this comparison of results from the three systems of lamb production and winter fattening on folded crops for the two years 1962-63 and 1963-64 shows that profits were higher in 1963-64. The severe winter of 1962-63 reduced the amount of winter keep available per acre and this was met by an increase in supplementary feeding per sheep. At the same time, the yield of lambs was lower in most cases in 1962-63 than in 1963-64.

Costs and Returns from Breeding Flocks, 1963-64

Undoubtedly profits can be made from sheep and the profits from the six groups distinguished in 1963-64 can now be examined (Table 8). Very few of the 46 flocks included in these six groups made a loss in 1963-64 and most of them did better than in the previous year 1962-63. However, the number of flocks included in each of these groups is low and the average results must be considered with caution.

The most profitable of these groups appear to have been IA, *producing fat lambs off grass*, the profit being £3.33 per ewe equal to £9.00 per acre. This group sold light-weight lambs early in the season and they realised the highest average price of all the groups, £7.11 per lamb. For its success, it relies upon a high level of supplementary feed, both concentrates and bulk fodders.

As a result of a combination of mischance and mismanagement, two flocks in this group made a loss in 1962-63, and the higher average profit from the group in 1963-64 was due mainly to the increased profits from these two flocks rather than to an all round increase in profits. This suggests that, in general, profits from this system are not unduly affected by severe weather, but, the risks are greater should a mishap occur.

COSTS AND RETURNS FROM SHEEP BREEDING FOR ONE YEAR
EAST MIDLANDS 1963-64

TABLE 8

Per ewe

SHEEP SYSTEM	Fat Lambs		Fat and Store Lambs		Store Lambs	
	Grass only	Grass and fold crops	Grass only	Grass and fold crops	Grass only	Grass and fold crops
WINTER FEED TO EWES						
GROUP NUMBER	IA	IB	IIA	IIB	IIIA	IIIB
Number of flocks	7	4	12	15	4	4
Number of ewes	1,259	985	2,913	3,993	775	506
Number of lambs reared per ewe	1.47	1.48	1.28	1.43	1.16	1.38
Fat lambs						
Average estimated carcass weight (lb.)	40.1	41.7	41.5	46.0	50.0	46.3
Average price (£)	7.11	6.83	6.67	7.16	7.32	7.12
Concentrates per ewe (cwt.)	1.69	1.60	1.54	0.87	1.12	0.49
Acres per ewe						
Bulky fodders	0.07	0.01	0.01	0.02	0.02	0.03
Folded crops (excluding tops)	—	0.03	—	0.05	—	0.05
Grazing	0.30	0.35	0.33	0.29	0.32	0.31
Total	0.37	0.39	0.34	0.36	0.34	0.39
Output of Livestock and Wool per ewe	£	£	£	£	£	£
Lambs	10.03	9.97	7.67	9.19	6.87	8.98
Other sheep	—	—	0.43	0.27	0.14	0.04
Wool	1.37	1.57	1.54	1.94	1.81	1.46
	11.40	11.54	9.64	11.40	8.82	10.48
Less ewe and ram replacement costs	1.30	0.99	1.40	1.35	1.84	2.51
Output of livestock and wool	10.10	10.55	8.24	10.05	6.98	7.97
Costs per ewe						
Foods:						
Concentrates	2.35	2.44	1.95	1.19	1.48	0.61
Bulky Fodders	1.07	0.46	0.45	0.43	0.46	0.94
Folded crops and tops	—	0.52	—	1.43	—	0.73
Grazing	1.48	2.13	2.15	2.26	1.62	1.25
Total foods	4.90	5.55	4.55	5.31	3.56	3.53
Man Labour	1.35	1.83	1.50	1.38	1.47	1.06
Miscellaneous costs	0.52	0.84	0.54	0.58	0.56	0.50
Total costs	6.77	8.22	6.59	7.27	5.59	5.09
Margin Output over costs						
Per ewe	3.33	2.33	1.65	2.78	1.39	2.88
Per acre	9.00	5.97	4.85	7.72	4.09	7.38

Bulky fodders include hay, straw, roots and silage.

Miscellaneous includes veterinary, medicines, transport, equipment and farm vehicles

DISTRIBUTION OF FLOCKS BY PROFIT OR LOSS PER EWE 1963-64

TABLE 9

	IA	IB	IIA	IIB	IIIA	IIIB	Total
	Fat lambs off grass	Fat lambs off grass and fold crops	Fat and store lambs off grass	Fat and store lambs off grass and fold crops	Store lambs off grass	Store lambs off grass and fold crops	
Profit							
£ per ewe							
5 to 6	1	—	4	—	1	—	6
4 to 5	1	2	—	3	—	1	7
3 to 4	1	—	1	4	—	1	7
2 to 3	2	—	—	3	—	—	5
1 to 2	2	2	2	3	2	2	13
0 to 1	—	—	2	1	—	—	3
Loss	—	—	3	1	1	—	5
Total flocks	7	4	12	15	4	4	46

Four flocks in Group IB, *producing fat lambs and using some folded crops as winter keep for ewes*, were not quite so profitable as Group IA. Although the average weight of lambs sold was 1.6 lb. more, the average price realised was less at £6.83 per lamb. A charge has been included for beet tops, £0.37 per ewe. Thus some of the profit from folding beet tops has been allowed to the beet crop. All items of cost tended to be higher but the cost of flock replacement is the lowest of all groups. The two larger flocks in this group did not do so well as the two smaller flocks.

It has already been noted that Group IIA, *producing fat and store lambs from grass*, consists mainly of flocks selling over 80 per cent. fat lambs in 1962-63 but they failed to reach this percentage in 1963-64. The quantity of concentrates fed, the lower cost of bulky fodders, the lower lamb crop and the lower average price for lambs, all suggest that the husbandry is not quite so forward and intensive as for Group IA. As a result, the margin per ewe, £1.65, is just half that obtained by Group IA.

The remaining three groups, IIB, IIIA and IIIB, all produce a heavier fat lamb as well as store lambs for winter feeding.

Group IIB, *producing store and fat lambs and using some folded crops for winter ewe keep*, made a margin of £2.78 per ewe or £7.72 per forage acre, after charging for beet and sprout tops. The lamb crop was similar to that from the fat lamb groups IA and IB (1.43 lambs per ewe). Those lambs which were sold fat averaged 46.0 lb. estimated dressed carcase weight but the average price, £7.16 per lamb, was only slightly more than that for the 40.1 lb. lambs from Group IA. This system tended to use less concentrates and to rely more upon folded crops and grazing. Its feeding costs per ewe tended to be high, it had much the same output of livestock and wool as the "grass only" fat lamb group and it was not quite so profitable, unless no charge is made for beet and sprout tops.

The two groups IIIA and IIIB, *producing store lambs*, are each made up of only four flocks. The lamb crops show the same trend as the corresponding Groups IIA and IIB, with the "grass only" flocks markedly lower than the "grass and fold crops" flocks. Output and costs for these two groups are lower than for the four other groups, but the costs are geared to the final product so that, at least for these few flocks, the profit per ewe and per acre does not differ greatly on average from the other groups.

Considering the results from these various types of sheep enterprises, one concludes that the differences in profits are due as much or more to the ability and attitude of the management as to the specific nature of the enterprise. Thus the lower average profits shown by the flocks devoted to store lamb production and winter fattening are due to the fact that high profits were not sought. Cereals, sugar beet and potatoes may be the main source of profit and the farmer is concerned that that portion of his land which he cannot devote to these crops shall yield a profit to give an adequate reward for the resources used. Since most of these resources, e.g. working capital and managerial time, will be scarce relative to land, he will use them extensively, being satisfied with a low profit per unit since he is not able to intensify and increase his profits.

On the other hand, much better management is given to the flocks producing fat lambs off grass. The enterprise is expected to make a greater contribution to the total farm profits to give balance to the farming system. The farmer's knowledge of sheep husbandry enables him to make above average profits from the sheep enterprise and therefore it may be a more profitable alternative to other enterprises.

A number of the flocks in the two groups producing store and fat lambs in 1963-64 were included because they failed to fatten the majority of their lambs as they did in 1962-63. This suggests that the management was not so good as that found in the flocks fattening lambs off grass in both years. In some cases this may have been only that the sheep were of lesser importance in the overall farm economy.

It is unwise to conclude that a particular system is inefficient merely because it results in a lower profit per unit. Consideration must be given to the individual circumstances of the farm, its climate, soil, policy and manager. Therefore it is necessary to consider the application of these results to the management decisions of farmers contemplating changes in farm policy involving a sheep enterprise.

PART II

THE ECONOMY OF SHEEP KEPT UNDER TRADITIONAL AND NEW SYSTEMS

and a consideration of the value of gross margins in
assessing the profitability of sheep

Economic pressure and technical ability to keep more sheep per acre of grass has created problems of keeping more sheep relative to existing winter resources. This has aroused interest in such practices as winter housing and foggage grazing.

Before considering the problems arising from an increase in the density of sheep stocking, the present general position must be examined. As a basis, standards for the main systems of sheep husbandry at present practised in the East Midlands have been set out in Tables 10 to 13. These standards are based upon the results of the investigation carried out in the East Midlands in 1963-64. They assume that an appropriate breed is used for each system. The annual stocking rates for the various systems are all about three ewes per forage acre, with a general range from two to four ewes per forage acre on the individual farms.

Five systems are distinguished for flocks kept entirely on grassland for the production of fat lambs. Thus if the grass is lightly stocked and concentrate feed is also light, the gross margin per acre is estimated to be only £10.6 (Table 10) compared with £18.3 per acre from a normal stocking rate of three ewes per acre and fairly heavy concentrate feeding. The introduction of arable folded crops (Table 11) does not greatly change the density of stocking but results in lower variable costs per ewe, mainly a saving in concentrates, so that the gross margin per acre is higher at £21.3 per acre. A further saving in acreage occurs if beet or sprout tops are used and the gross margin tends to be higher at £23.7 per acre. Production of store lambs (Table 12) is not so profitable and the gross margin tends to be about £13 per acre. If these store lambs are fattened on folded crops, the additional land used yields a gross margin of £15 to £17 per acre (Table 13).

All these gross margins per acre are appreciably below those which can be expected from arable crops e.g. cereals at £26 to £35 per acre and potatoes at £60 to £80 per acre. Therefore it might be supposed that farm profits could be improved either by replacing sheep with arable crops or by increasing the gross margin per acre from the sheep enterprise.

However, the management decision is not quite so simple and it will depend upon the individual physical features of the farm, the risk factor, the pattern of capital investment, the costs and returns from continuous barley growing and the farmer's special abilities.

ESTIMATED STANDARD OUTPUTS AND COSTS
FAT LAMB PRODUCTION—FLOCKS ENTIRELY ON GRASSLAND

TABLE 10

Systems	Low Stocking Low Concentrates		Medium Stocking High Concentrates	
	Details	£ per ewe	Details	£ per ewe
Output				
Lambs	1.45 lambs per ewe @ £7 per lamb	10.15	1.45 lambs per ewe @ £7 per lamb	10.15
Cull ewes and rams	0.18 sheep per ewe @ £2 per head	0.35	0.18 sheep per ewe @ £2 per head	0.35
Wool		1.35		1.35
		11.85		11.85
Less ewes and lambs replacements	0.18 ewes and rams @ £10 per head	1.80	0.18 ewes and rams @ £10 per head	1.80
Output, Livestock and wool		10.05		10.05
Variable Costs				
Concentrates	1.1 cwts.	1.50	1.8 cwts.	2.50
Grassland	0.67 acres	1.00	0.33 acres	1.00
Total feed costs		2.50		3.50
Veterinary, medicines, trans- port, etc.		0.45		0.45
Total variable costs		2.95		3.95
Gross Margin per ewe		7.10		6.10
Gross Margin per acre		10.6		18.3

ESTIMATED STANDARD OUTPUTS AND COSTS
FAT LAMB PRODUCTION USING ARABLE CROPS FOR WINTER KEEP

TABLE 11

Systems	Flocks on crops grown specially for folding		Flocks folded on beet tops	
	Details	£ per ewe	Details	£ per ewe
Output				
Fat lambs	1.40 lambs at £7 per head	10.00	1.45 @ £6.5 per head	9.40
Cull ewes and rams	0.22culls @ £4.0 per head	0.90	0.18 @ £4.0 per head	0.75
Wool		1.90		1.80
		12.80		11.95
Less ewes and lamb replacements	0.22 gimmers @ £10 per head	2.20	0.18 @ £11 per head	1.95
Output, Livestock and wool		10.60		10.00
Variable Costs				
Concentrates	0.6 cwts.	0.80	1.2 cwts	1.30
Mangolds, etc.	0.01 acres	0.05	0.01 acres	0.05
Folded crops	0.07	0.35	—	—
Grassland	0.30	0.90	0.30	0.90
Total foods	0.38	2.10	0.31	2.25
Veterinary, medicines, transport, etc.		0.40		0.40
Total variable costs		2.50		2.65
Gross Margin per ewe		8.10		7.35
Gross Margin per acre		21.3		23.7

ESTIMATED STANDARD OUTPUTS AND COSTS
STORE LAMB PRODUCTION

TABLE 12

Grazing System	Ewes on grassland only		Ewes on grassland and winter fold crops	
	Details	£ per ewe	Details	£ per ewe
Output				
Store lambs	1.20 stores @ £6 per head	7.20	1.33 stores @ £6.25 per head	8.30
Cull ewes and rams	0.25 culls @ £2 per head	0.50	0.28 culls @ £3.5 per head	1.00
Wool		1.80		1.60
		9.50		10.90
Less ewes and rams replacements	0.25 gimmers @ £9 per head	2.25	0.28 gimmers @ £11 per head	3.10
Output livestock and wool		7.25		7.80
Variable Costs				
Concentrates	1.0 cwts.	1.30	0.5 cwts.	0.65
Mangolds, etc.	0.01 acres	0.05	0.08 acres	0.10
Folded crops		—	0.06	0.30
Grassland	0.33	1.00	0.33	1.00
	0.34	2.35	0.47	2.05
Veterinary, medicines, transport, etc.		0.45		0.50
Total variable costs		2.80		2.55
Gross Margin per ewe		4.45		5.25
Gross Margin per acre		13.1		12.8

ESTIMATED STANDARD OUTPUTS AND COSTS
WINTER FATTENING OF HOGGS ON FOLDED CROPS

TABLE 13

Estimated dressed carcase weight	Over 55 lb.	Under 55 lb.	
System	Heavy hogg on fold crops for long period	Medium weight hogg on fold crops	Medium weight hogg on beet tops
Average fattening period	22 weeks	19 weeks	16 weeks
	Per hogg	Per hogg	Per hogg
	£	£	£
Value of fat hogg sold	9.00	8.50	8.00
Value of store hogg at start	6.00	6.00	6.00
Output Livestock	3.00	2.50	2.00
Variable Costs			
Concentrates, fodders, folded crops and grassland	1.30	1.00	0.60
Gross Margin	1.70	1.50	1.40
Hoggs per forage acre	10	10	12
Gross Margin per forage acre	£17	£15	£17

Continuous Corn Growing or Sheep and Corn in Rotation

The probable alternative to sheep is barley, particularly now that continuous barley growing has been demonstrated to be a practical possibility in some circumstances.

As a basis for a consideration of this proposition it is proposed to take a unit of 300 acres, approximately the maximum corn acreage which can be harvested by one combine with adequate drying and storage facilities. Thus the data can be applied to any multiple of 300 acres.

The gross margins, fixed costs and profit from a 300 acre unit producing wheat, barley and sheep could be estimated as follows:—

		£
Gross margins	60 acres wheat @ £40 per acre	2,400
	180 acres barley @ £30 per acre	5,400
	60 acres sheep @ £20 per acre	1,200
		<hr/>
	Total	9,000
Fixed costs	300 acres @ £16 per acre	4,800
		<hr/>
Profit		£4,200
		<hr/>

The first matter to examine is the probable gross margin from continuous corn growing. Considering the 60 acres under wheat in the corn and sheep system, it might be that it would be impossible to attain a gross margin of £40 per acre under a continuous corn growing system. Thus in certain years it might be difficult to sow the full 60 acres to wheat at the most suitable time in the autumn or to avoid the multiplication of disease organisms. The result would be lower yields of wheat or a switch of wheat to barley, and both of these courses would give a lower gross margin from that land formerly growing wheat in rotation. Also it is unlikely that the gross margin per acre of barley grown in rotation would be maintained under continuous corn cropping. If yields per acre are to be maintained, variable costs would be increased by the need for extra fertilisers to maintain an adequate supply of plant nutrients and for extra sprays to control diseases and weeds. If these extra fertilisers and sprays were not given then yields would fall. In any case, the result would be a decrease in the gross margin per acre. Lastly the gross margin from the extra 60 acres under barley in place of leys for sheep could fall appreciably below that from the former 180 acres, although it could show an increase on the gross margin from sheep. In addition to the extra costs and/or lower yields attributed to plant nutrients, diseases and weeds, this acreage of barley would be subject to the risk of untimely cultivations and harvesting, both of which can reduce yields and therefore gross margins.

It is not suggested that the effect of any of these possibilities on the gross margin per acre is likely to be great. Thus a change by £1 per acre is equivalent to each of the following:—

- 20 units nitrogenous fertiliser
- 0.9 cwt. complete fertiliser
- 1.0 cwt. barley
- 0.8 cwt. wheat

By making comparatively minor adjustments to meet the suggestions as to the nature of changes in costs and yields following a change from corn and sheep to continuous corn growing, there would be no change in fixed costs and the gross margin from 300 acres under continuous corn growing could be as follows:—

	Gross margin £
60 acres part wheat and part barley @ £38 per acre	2,280
180 acres barley @ £28 per acre	5,040
60 acres barley in place of sheep @ £27 per acre	1,620
Total gross margin	<u>£8,940</u>

This does not differ greatly from £9,000 the gross margin from corn and sheep. Minor alterations in the gross margins per acre for individual items would swing the advantage slightly either way as between the two systems. Indeed it might be maintained that the gross margin from continuous corn growing could decline the longer the system was continued.

This example shows the probable effect on total farm profits offered by the two systems and the conclusion to be drawn is that a change is unlikely to have a great influence on total farm profits. Indeed probably a greater increase could be achieved by an improvement in the efficiency of the existing enterprises.

Risk is another factor which the prudent manager considers. The farmer is aware that any form of continuous cropping or monoculture is subject to special risks from outbreaks of disease. A reminder of this appeared in the farming press* on 30th August, 1966, when it was reported that Dr. Hayes and Dr. Cotton of the Welsh Plant Breeding Station considered that root eelworm could cause a 20 per cent reduction in badly infested barley and that this disease is present in nearly half the corn fields of this country. Expecting such occurrences many farmers will tend to favour a rotational system in which the absence of the host plant during some years keeps in check or even reduces the extent of infestations.

By itself, a gross margin excludes consideration of the capital investment. Thus in addition to the changes in variable costs and returns which have been considered, a change in policy from a corn and sheep rotation to continuous corn growing releases capital invested in the sheep flock for investment in other ways. At a stocking rate of three ewes per acre, the 60 acres devoted to sheep in the example would carry 180 ewes. On the disposal of the sheep flock, the cash released would be about £10 per ewe or £1,800 in all. This would include the sale of a small quantity of specialised equipment.

* Farmer and Stockbreeder 30th August, 1966, p. 8

It is possible that some or all of this would be required to increase the storage facilities on account of the extra 60 acres of barley. In such circumstances little or no capital would be available to put to other uses. On the other hand it is quite likely that surplus capacity for storage would be available at no capital cost and an attraction of the change to continuous corn growing would be the availability of capital which could be used in several ways.

As an investment in shares, this capital could appreciate in capital value and yield an annual income from £72 to £90 at least. A similar increase in income would also be obtained if the cash realised were used to reduce a bank overdraft and thereby reduce the annual cost of financing bank advances. Neither of these uses would increase the farm business and the effect on the farmer's income after taxation would be slight.

Bearing in mind that the availability of £1,800 would be a factor in obtaining a bank advance, considerably more capital could become available to the farmer. This could be used to expand the farm business, using the extra profits to pay off the bank advance rather than for personal living expenses.

The figures used so far have assumed that the farm acreage is fixed and therefore an increase in profits would be obtained by the changes in policy and efficiency. The extra capital available would provide two options which would increase the size of the business.

One option would be to introduce an enterprise such as pigs or poultry, neither of which would need much land. The introduction of such an enterprise would depend very much upon the profits which the farmer could expect to achieve, bearing in mind the farmer's probable level of technical efficiency, the costs of resources and the prices of the products.

Alternatively, the farmer might consider the purchase of land using the £1,800 as a deposit and raising additional capital by a loan on the security of the land. Under normal circumstances the total capital available for land purchase on this basis could be expected to be about £18,000 purchasing say 60 to 80 acres. If the farmer had surplus equipment capacity, an addition such as this would be achieved without a proportional increase in fixed costs and this would make the transaction more attractive.

The repayment of loan capital and the expected rise in land values would add to the farmer's capital worth in £ sterling. At the same time he could use some of the extra profit to increase living standards.

To sum up, a farmer faced with the choice between continuous corn growing or corn and sheep in rotation would conclude that he could expect much the same profit from either policy. If he is skilled in sheep husbandry, he can expect greater efficiency from his sheep enterprise so that the gross margin may more nearly approach that which he could expect from putting the land to barley in a continuous corn growing system.

However, should the farmer wish to expand the size of his business, the example shows that he may have, within his existing resources, capital which can be made available for expansion although it involves a change in the cropping and livestock policy.

The Use by Sheep of Resources Peculiar to the Farm

The management decisions as to the contributions of the sheep enterprise to farm profits has been considered so far on the assumption that 300 acres is a unit of corn acreage. The decision is not so simple when the total acreage of the farm does not fit this unit and there is an area from, say, 50 to 250 acres upon which the farmer has the option between growing corn at high capital cost and stocking the land with sheep.

For example, a farmer with 450 acres would need two combines and, for the capital outlay of £3,000 on the second he would effectively harvest only 150 acres. In addition he would need storage facilities for this corn and this would cost another £2,000 to £3,000. If the farmer is short of capital he may prefer to stock 100 acres of this land with 300 ewes for a capital outlay of £3,600 to £4,000 and to take a chance on handling 350 acres of corn. Not only would this reduce his capital outlay but it would also reduce his working capital since some or all of the income from sheep is received between June and early October during which period he has reached his maximum outlay on corn and, particularly from early September onwards, will prefer to be in a position to store the corn in order to market it at the most propitious time. Also it would provide employment for the farm staff, and for one man in particular at a time when the demands of the corn enterprise are not very great.

The assessment of the contribution of sheep to farm profits is also affected when the alternative use of some of the land used for sheep is restricted by physical factors such as soil and topography. For example, the gross margin from sheep in a particular case might be found to be only £10 per acre, but a proportion of this land might be unsuitable for regular cropping or even be poor grassland. In such circumstances, if the gross margin from the whole farm is increased by keeping sheep on the poorer grassland and diverting some of the better land from cash cropping to the sheep enterprise, then the sheep enterprise will be worthwhile.

Intensification of the Sheep Enterprise

So far there has been no suggestion that the gross margin per acre from the sheep enterprise should be raised by a change in the system of sheep husbandry. Thus, in certain circumstances it may be considered that an increase in the density of stocking is desirable.

For example, the probable objective on corn and sheep farms is to grow the maximum area of corn and cash crops within the limitations of good husbandry and of equipment. This leaves a specific acreage, mainly of grass, to be devoted to sheep. The most profitable size of flock which can be kept on this acreage will depend upon the supply of labour and husbandry techniques, subject to the over-riding consideration that adequate managerial attention can be given to it.

Economy in management and labour will be achieved if the flock is the largest which can be handled by any particular labour force. Under a particular farm policy, the enterprises other than sheep might not fully occupy the labour force required and some of the spare time could be used for the sheep enterprise. Alternatively, it might be considered worthwhile to employ a full-time shepherd. In both cases, there will be an optimal size of flock to fit the particular farm circumstances. It is most likely that this size of flock will need to be kept at a higher stocking rate per acre than that which can be kept using methods of grassland and sheep husbandry in general use in the East Midlands.

It is probable that adequate summer grazing can be obtained by efficient grazing methods with a correct use of fertilisers but this may create the problems of wintering the flock on a limited area.

Provided due attention is given to husbandry, both feeding and hygiene, there are a number of systems which enable more sheep to be kept during the winter period when the amount of land available is limited. The main methods discussed here are:—

- (1) Increased supplementary feeding.
- (2) Use of traditional folding crops, e.g. kale, turnips and beet tops.
- (3) Use of foggage, e.g. bulky autumn growth of pure cocksfoot leys is allowed to stand for grazing during the winter months.
- (4) Provision of winter housing.

Increased Supplementary Feeding

The winter feeding of sheep is based upon their ability to graze and to make use of low quality grazing. The level of supplementary feeding, both of concentrates and of hay or silage, depends very much upon the available winter grazing. In some cases, sheep are used to eat off autumn growth and leave a clean sward for next year's crop. In other cases, particularly with limited acres of grass, there is a tendency to sacrifice one field, stocking it heavily, losing summer growth and relying upon the fertiliser response on other fields to provide ample hay or silage for winter sheep feed.

Hence considerable variation in the level of supplementary feed will be found amongst ewe flocks relying entirely upon grass and this variation will also be affected by the practice of substitution between concentrates and bulk fodders.

Many flock owners are already achieving reasonable rates of stocking in the summer, e.g. 6 or 7 ewes per acre and upwards, but the annual stocking rate probably falls to 3 to 4 ewes per acre when allowance is made for winter grazing and bulk fodders.

When planning the policy for a sheep flock due allowance should be made for the feeding system which can be adopted. Some indication of the range of variation is given in Table 10 giving standards for medium stocking rates and low stocking rates.

Use of Traditional Folding Crops

The folding of kale, turnips and other succulents has long been a method of reducing the acreage required for sheep. With modern techniques of drilling and disease control, these crops are more reliable, less labour consuming and higher yielding. Hence some flock owners find that they can be fitted into the labour and cropping of arable farms. Moreover on arable farms there is not so much work to do on crops during the winter and regular labour may be available for winter folding.

Similarly, beet tops and the residues of brassica crops grown for sale can make a valuable contribution to winter feed supplies for ewes at virtually no variable cost.

Use of Foggage

Another method of providing winter keep for sheep is the growth of foggage. This is aftermath which is allowed to stand for grazing during the winter, mainly from January to April.

The weather kills some of the more exposed grass and this provides its own protection to part of the crop. To some extent this can be done with any permanent or temporary pasture but attention has been turned to this method by the Rutland version in which stands of pure grasses have been used.

Typically a three year stand of cocksfoot is grown. The summer growth is used for silage, hay or dried grass. After the last cut, fertiliser is applied and the crop is allowed to grow during the autumn producing about 4,000 lb. dry matter per acre.

From the information available such a stand will keep 20 to 25 ewes per acre for up to 16 weeks and as pregnancy advances will be supplemented by about 4 lb. silage per head per day and by increasing the concentrate allowance.

In the summer, the same crop produces sufficient silage for the ewes during the winter and a considerable amount in excess for cattle feeding. Since the use of foggage enables a high stocking rate to be achieved, the gross margin from the sheep enterprise as a whole is likely to be £24 per acre, and the excess silage should give a return from feeding the cattle equal to a gross margin of £2 per ton. On this basis the gross margin from an acre of cocksfoot managed in this way can be estimated as follows:—

	Gross margin
	£
0.5 acres—sheep grazing and 3 tons silage @ £24 per acre	12
0.5 acres—9 tons silage @ £2 per ton 	18
Total gross margin	<u>£30</u>

Another way of looking at this would be to include half of the acreage of cocksfoot in the sheep acreage and the other half in the cattle acreage in order to arrive at the gross margins per acre from sheep and cattle respectively.

Provision of Winter Housing

The introduction or expansion of a sheep enterprise may be restricted by the inability to find sufficient land upon which to winter the sheep. This restriction may be due to the soil conditions, or to the loss of crop which may follow from winter stocking. In some cases winter housing of the flock will enable the farmer to make efficient use of the summer grass. Thus it might be possible to keep 100 ewes on 14 acres of ley during the summer but these would require an additional 6 acres of ley to provide hay for winter feed. On this basis the annual stocking rate would be 5 ewes per acre, but the gross margin over feed, veterinary, transport, etc., at £6 per ewe would be £30 per acre, out of which the cost of winter housing has to be met.

In some cases existing buildings can be adapted. In others, surrounding buildings can provide sufficient protection to reduce the cost of providing walls. For example, the provision of a roof, low walls, pens, floor and fittings might cost up to £3 per ewe or, at 5 ewes per acre, £15 per acre. On this basis the increase in the gross margin from £20 to £30 per acre would quickly recoup the investment in buildings.

To sum up, the adoption of a particular system of wintering ewes is a means of dealing with a particular problem, keeping in mind the available resources. There is no evidence that any particular system—heavier supplementary feeding, folding, foggage or winter housing—has a pronounced advantage over any of the others.

These systems enable the farmer to increase the stocking rate, and, thereby, the gross margin per acre. Thus they introduce greater flexibility into the substitution between sheep and corn, and may well justify the expansion of sheep at the expense of corn to a point at which the full benefit of scale can be obtained by the sheep enterprise.

CONCLUSIONS

An investigation into the costs and returns from 46 sheep flocks in the East Midlands, covering the two years 1962-63 and 1963-64, shows that, in reasonable weather conditions, profits can be expected from sheep flocks. On the other hand, in a year such as 1962-63, abnormally severe weather during the winter will reduce profits. In individual cases severe losses can be experienced. Fortunately such winters are not too frequent—the previous one occurring in 1946-47.

According to the system of sheep production, a general trend in profits was noted. Thus the most profitable system was early fat lamb production. Such a system requires good husbandry and a high level of feeding to ensure success. It was noted that the lower profits from fat and store lamb production were associated with a failure to fatten the lambs following a set-back in the conditions of the lambs in the early summer and it was suggested that this could have been due to a lower level of sheep management. The least profitable system was store lamb production, often associated with winter folding.

It is not suggested that these systems are interchangeable. The system of sheep production adopted on any particular farm is governed by a number of considerations such as other farm enterprises, soil, climate, topography. The profit from the sheep enterprise will be that which leads to maximisation of the total farm profits in the particular circumstances. Although such investigations, as the one in the East Midlands for 1962-63 and 1963-64, may show a higher profit from another system of sheep production, it does not follow that the adoption of that system will increase the total farm profits.

In view of these comments a review has been made of the use of gross margins in assessing the contributions of sheep to an existing or projected farm policy. Published standard gross margins are often little more than guides. If these standard gross margins are lower relatively than those given for cereals and other enterprises they lead to a conception that sheep are not profitable and that action should be taken to improve total farm profits by a change in the sheep enterprise or by its replacement with enterprises with higher standard gross margins.

As a basis, a series of calculations have been put forward showing expected gross margins from a number of systems of sheep production. It would be impossible to give a complete range but they provide information upon a number of situations which can be found in the East Midlands.

A gross margin calculation does not include a reference to the use of capital resources. Therefore in the consideration of the various situations involving a sheep enterprise, the alternative use of capital has been considered. A considerable sum is invested in a sheep enterprise and it may pay the farmer to use this capital as a means of increasing the size of his business by acquiring more land or setting up enterprises such as pigs and poultry, neither of which entail the use of much land.

With the total profit and capital use in mind, three situations have been examined,

- (i) sheep and corn in rotation or continuous corn growing,
- (ii) sheep using resources peculiar to the farm and
- (iii) increasing the density of sheep stocking.

The decision of many farmers to retain the sheep enterprise as part of a sheep and corn policy is influenced mainly by the risk that the alternative, continuous corn growing, will result in a build up of disease leading to a considerable and sudden drop in yields. In any case, the probable total profits from the alternative policies will not differ greatly. In assessing these profits it is considered that the gross margin from continuous corn growing will be lower on average than from corn in rotation, whilst it will be possible by better management to raise the gross margin from sheep to approach more nearly that from the alternative use of the land under a continuous corn policy. In these circumstances, the pressure on capital resources will be the vital factor. Given an adequate existing income from sheep and corn in rotation, the farmer would be loathe to change to continuous corn growing. On the other hand, a desire to increase the business might encourage the farmer to sell the sheep flock to provide the capital for expansion.

The decision to keep sheep may be influenced by the availability of land. Two situations give rise to this. Firstly, there may be an area in excess of that which can be harvested by a combine and therefore the purchase of an additional combine plus the provision of additional storage may be considered to be uneconomic. Secondly, there may be on the farm land which by its topography and quality is unsuitable for corn growing. In both cases, although the gross margin per acre from sheep may be lower than that from corn the total farm profit will be greater by using the land unsuited for corn to produce sheep.

Under another set of circumstances, it may be necessary to increase the density of sheep stocking in order to maximise the size of flock in relation to the management and labour supply. It is easier to increase the production of grass keep during the summer period than during the winter. When the area of land is restricted there are several ways of keeping more sheep during the winter, e.g., increased hand feeding using purchased foods or higher yielding crops from the arable land, special crops such as foggage, and in wintering. The final choice will be influenced both by the extent to which the particular method will fit the circumstances of the farm and by the estimated gross margin.

To conclude, the place of sheep on the farm is determined by tradition and by the farmer's personal knowledge. Tradition is determined in part by the climate, soil and topography of the area and farmers in such areas will have been trained in sheep husbandry. Tradition does not exclude the profit motive and the purpose of this report and discussion has been to appraise the profits from sheep in relation to the alternative use of the resources, in particular land and capital. The profit or margin per unit, whether of land or livestock, is only a measure relating to a particular set of circumstances. That this unit measure is higher or lower than in another set of circumstances does not mean that the higher can be substituted for the lower, e.g. barley for sheep. The ultimate measure is the total profit from the resources used in the business and the examples in the second part of this report indicate that sheep, in appropriate circumstances, are the most profitable use of the resources available.

APPENDIX I

Summaries, Total Costs and Returns

RETURNS FROM BREEDING FLOCKS IN THE EAST MIDLANDS PRODUCING FAT LAMBS
YEAR 1963-64

TABLE 1

Totals

System	IA. Fat lambs off grass only			IB. Fat lambs off grass and fold crops		
Number of flocks	7			4		
Item	Totals		Value per head £	Totals		Value per head £
	Numbers	Value £		Numbers	Value £	
LAMBS						
Fat lambs sold	1,683	11,959	7.11	1,347	9,194	6.83
Store lambs sold	34	195	5.74	42	318	7.57
Casualties and deaths	53	24	0.46	21	6	0.29
In stock at end of year	77	448	5.82	47	301	6.40
Total output of lambs	1,847	12,626	6.83	1,457	9,819	6.70
OTHER SHEEP						
Output	—	—	—	—	—	—
EWES						
B/f from previous year	995	7,342	7.38	857	6,649	7.76
Ewes purchased	116	1,417	12.22	82	645	7.87
Gimmers purchased	127	1,162	9.15	—	—	—
Homebred gimmers	—	—	—	—	—	—
Homebred lambs	21	126	6.00	46	276	6.00
Total ewes into flock	1,259	10,047	7.98	985	7,570	7.68
Fat and store ewes sold	127	628	4.94	97	512	5.28
Casualties and deaths	98	22	0.22	48	2	0.04
Cull ewes c/f	5	15	3.00	73	255	3.50
Breeding ewes c/f	1,029	7,943	7.72	767	5,948	7.76
Total disposal of ewes	1,259	8,608	6.84	985	6,717	6.82
Deficit on ewes	—	1,439	1.14	—	853	0.86
RAMS						
Deficit	34	191	5.62	23	117	5.09
OUTPUT OF LIVESTOCK		10,996			8,849	
SALES OF WOOL		1,718			1,541	
OUTPUT OF LIVESTOCK AND WOOL		12,714			10,390	
MARGIN OF OUTPUT OVER COSTS		4,197			2,293	

GROUP I
COSTS FROM BREEDING FLOCKS IN THE EAST MIDLANDS PRODUCING FAT LAMBS
YEAR 1963-64

TABLE 2

Totals

System	Group IA Fat lambs off grass only		Group IB Fat lambs off grass and fold crops	
Number of flocks	7		4	
Item	Totals		Totals	
	Quantities	Value	Quantities	Value
	Cwt.	£	Cwt.	£
FOODS				
CONCENTRATES				
Purchased cakes and meals	1,268	2,124	1,427	2,262
Home grown cereals	852	840	145	143
Total concentrates	2,120	2,964	1,572	2,405
BULKY FODDERS				
Hay	1,110	347	5	2
Mangolds	2,600	325	2,700	337
Silage	5,080	635	—	—
Other	—	30	—	120
Total bulky fodders	—	1,337	—	459
FOLDED CROPS	Acres		Acres	
Kale, swedes, turnips, etc.	—	—	29.8	151
Tops	—	—	106.0	364
Total folded crops	—	—	135.8	515
GRAZING				
Leys	140.0	906	336.9	2,068
Permanent grass	231.7	956	6.0	26
Total grazing	371.7	1,862	342.9	2,094
TOTAL FOODS	—	6,163	—	5,473
LABOUR	Hours		Hours	
Employees	5,135	1,415	4,835	1,445
Farmer	1,059	291	1,297	357
Total manual labour	6,194	1,706	6,132	1,802
Vehicles	—	114	—	213
Total manual and vehicle labour	—	1,820	—	2,015
MISCELLANEOUS COSTS				
Veterinary and medicine	—	333	—	240
Other	—	201	—	369
Total miscellaneous costs	—	534	—	609
TOTAL COSTS	—	8,517	—	8,097

GROUP II
RETURNS FROM BREEDING FLOCKS IN THE EAST MIDLANDS PRODUCING FAT AND
STORE LAMBS
YEAR 1963-64

TABLE 3

Totals

System	IIA. Fat and store lambs off grass only			IIB. Fat and store lambs off grass and fold crops		
Number of flocks	12			15		
Item	Totals		Value per head	Totals		Value per head
	Numbers	Value		Numbers	Value	
LAMBS		£	£		£	£
Fat lambs sold	1,605	10,695	6.67	2,314	16,566	7.17
Store lambs sold	933	5,008	5.38	246	1,552	6.32
Casualties and deaths	91	3	0.04	133	42	0.32
In stock at end of year	1,094	6,632	6.07	3,026	18,514	6.13
Total output of lambs	3,723	22,338	6.00	5,719	36,674	6.41
OTHER SHEEP						
Output	537	1,255	2.34	617	1,105	1.79
EWES						
B/f from previous year	2,288	16,769	7.33	3,055	23,799	7.78
Ewes purchased	82	712	8.68	—	—	—
Gimmers purchased	356	3,702	10.39	316	2,998	9.47
Homebred gimmers	90	772	8.58	515	5,635	10.94
Homebred lambs	97	657	6.77	107	856	8.00
Total ewes into flock	2,913	22,612	7.77	3,993	33,288	8.34
Fat and store ewes sold	424	2,372	5.59	404	2,631	6.51
Casualties and deaths	232	106	0.46	232	27	0.12
Cull ewes c/f	215	742	3.45	199	678	3.41
Breeding ewes c/f	2,042	15,565	7.62	3,158	24,965	7.91
Total disposal of ewes	2,913	18,785	6.45	3,993	28,301	7.08
Deficit on ewes	—	3,827	1.32	—	4,987	1.25
RAMS						
Deficit	73	257	3.52	97	414	4.27
OUTPUT OF LIVESTOCK		19,509			32,378	
SALES OF WOOL		4,501			7,755	
OUTPUT OF LIVESTOCK AND WOOL		24,010			40,133	
MARGIN OF OUTPUT OVER COSTS		4,804			11,121	

GROUP II
COSTS FROM BREEDING FLOCKS IN THE EAST MIDLANDS PRODUCING FAT AND STORE LAMBS
YEAR 1963-64

TABLE 4

Totals

System	IIA. Fat and store lambs off grass only		IIB. Fat and store lambs off grass and fold crops	
Number of flocks	12		15	
Item	Totals		Totals	
	Quantities	Value	Quantities	Value
	Cwt.	£	Cwt.	£
FOODS				
CONCENTRATES				
Purchased cakes and meals	2,231	3,430	1,631	2,803
Home grown cereals	2,271	2,238	1,853	1,948
Total concentrates	4,502	5,668	3,484	4,751
BULKY FODDERS				
Hay	669	208	1,300	406
Mangolds	3,933	492	9,360	1,160
Silage	6,780	581	500	63
Other bulky fodders	—	28	—	80
Total bulky fodders	—	1,309	—	1,709
FOLDED CROPS	Acres		Acres	
Kale, swedes, turnips, etc.	—	—	202.6	2,476
Tops	—	—	239.1	3,254
Total folded crops	—	—	441.7	5,730
GRAZING				
Leys	727.4	5,340	957.7	7,731
Permanent grass	219.3	927	219.3	1,288
Total grazing	946.7	6,267	11,770	9,019
TOTAL FOODS	—	13,244	—	21,209
LABOUR	Hours		Hours	
Employees	13,618	3,672	14,363	3,991
Farmer	2,559	704	5,574	1,533
Total manual labour	16,177	4,376	19,937	5,524
Vehicles		475		446
Total manual and vehicle labour		4,851		5,970
MISCELLANEOUS COSTS				
Veterinary and medicines		834		1,406
Other		277		427
Total miscellaneous costs		1,111		1,833
TOTAL COSTS		19,206		29,012

GROUP III
 RETURNS FROM BREEDING FLOCKS IN THE EAST MIDLANDS PRODUCING STORE LAMBS
 YEAR 1963-64

TABLE 5

Totals

System	IIIA. Store lambs off grass only			IIIB. Store lambs off grass and fold crops		
Number of flocks	4			4		
Item	Totals		Value per head	Totals		Value per head
	Numbers	Value		Numbers	Value	
LAMBS		£	£		£	£
Fat lambs sold	15	110	7.32	57	406	7.12
Store lambs sold	200	1,464	7.32	—	—	—
Casualties and deaths	27	9	0.33	—	—	—
In stock at end of year	655	3,739	5.71	644	4,140	6.43
Total output of lambs	897	5,322	5.93	701	4,546	6.48
OTHER SHEEP						
Output	54	107	1.97	21	21	1.00
EWES						
B/f from previous year	652	4,874	7.47	294	2,391	8.07
Ewes purchased	—	—	—	70	802	4.46
Gimmers purchased	—	—	—	140	1,465	10.47
Homebred gimmers	62	732	11.81	2	22	11.00
Homebred lambs	61	549	9.00	—	—	—
Total ewes into flock	775	6,155	7.94	506	4,680	9.25
Fat and store ewes sold	50	217	4.34	55	341	6.29
Casualties and deaths	78	8	0.10	47	10	0.23
Cull ewes c/f	59	154	2.60	41	138	3.37
Breeding ewes c/f	588	4,416	7.50	363	2,967	8.17
Total disposal of ewes	775	4,795	6.19	506	3,456	6.83
Deficit on ewes	—	1,360	1.75	—	1,224	2.42
RAMS						
Deficit	23	67	2.91	12	48	4.00
OUTPUT OF LIVESTOCK		4,002			3,295	
SALES OF WOOL		1,404			736	
OUTPUT OF LIVESTOCK AND WOOL		5,406			4,031	
MARGIN OF OUTPUT OVER COSTS		1,077			1,456	

GROUP III
COSTS FROM BREEDING FLOCKS IN THE EAST MIDLANDS PRODUCING STORE LAMBS
YEAR 1963-64

TABLE 6

Totals

System	IIIA. Store lambs off grass only		IIIB. Store lambs off grass and fold crops	
Number of flocks	4		4	
Item	Totals		Totals	
	Quantities	Value	Quantities	Value
FOODS	Cwt.	£	Cwt.	£
CONCENTRATES				
Purchased cakes and meals	480	765	46	87
Home grown cereals	390	387	204	220
Total concentrates	870	1,152	250	307
BULKY FODDERS				
Hay	412	129	147	46
Mangolds	1,600	200	3,610	431
Silage	—	—	—	—
Other	—	25	—	—
Total bulky fodders		354		477
FOLDED CROPS	Acres		Acres	
Kale, swedes, turnips, etc.	—	—	25.5	366
Tops	—	—	—	—
Total folded crops	—	—	25.5	366
GRAZING				
Leys	186.8	977	66.9	353
Permanent grass	61.5	278	92.8	283
Total grazing	248.3	1,255	159.7	636
TOTAL FOODS	—	2,761	—	1,786
LABOUR				
Employees	3,711	952	1,186	336
Farmer	676	185	715	201
Total manual labour	4,387	1,137	1,901	537
Vehicles	—	73	—	—
Total manual and vehicle labour	—	1,210	—	537
MISCELLANEOUS COSTS				
Veterinary and medicine	—	334	—	201
Other	—	24	—	51
Total miscellaneous costs	—	358	—	252
TOTAL COSTS	—	4,329	—	2,575

GROUPS IIA, IIB, IIIA AND IIIB
DETAILS OF OTHER SHEEP

TABLE 7

Totals

	Item	Totals		Value per head £
		Numbers	Value £	
GROUP IIA FAT AND STORE LAMBS OFF GRASS	Fat sheep sold	199	1,413	7.10
	Store sheep sold	62	633	10.21
	Casualties and deaths	10	7	0.72
	In stock at end of year	266	2,552	9.60
	Total disposals	537	4,605	8.58
	In stock at start of year	507	3,097	6.11
	Purchases and transfers in	30	253	8.44
	Total in	537	3,350	6.24
	Output other sheep	—	1,255	2.34
GROUP IIB FAT AND STORE LAMBS OFF GRASS AND FOLD CROPS	Fat sheep sold	78	485	6.22
	Store sheep sold	158	1,754	11.11
	Casualties and deaths	1	—	—
	In stock at end of year	380	3,966	10.42
	Total disposals	617	6,205	10.06
	In stock at start of year	99	577	5.83
	Purchases and transfers in	518	4,523	8.73
	Total in	617	5,100	8.27
	Output other sheep	—	1,105	1.79
GROUP IIIA STORE LAMBS OFF GRASS	Fat sheep sold	24	233	9.71
	Store sheep sold	30	360	12.00
	Casualties and deaths	—	—	—
	In stock at end of year	54	593	10.97
	Total disposals	54	593	10.97
	In stock at start of year	—	—	—
	Purchases and transfers in	54	486	9.00
GROUP IIIB STORE LAMBS OFF GRASS AND FOLD CROPS	Total in	54	486	9.00
	Output other sheep	—	107	1.97
	In stock at end of year	21	231	11.00
	Transfers in	21	210	10.00
	Output other sheep	—	21	1.00

ALL GROUPS
DETAILS OF RAMS 1963-64

TABLE 8

Totals

	Totals		Value per head £	Totals		Value per head £
	Numbers	Value £		Numbers	Value £	
Group	IA. Fat lambs off grass only			IB. Fat lambs off grass and fold crops		
B/f from previous year	25	317	12.68	17	220	12.93
Purchased	9	247	27.52	6	229	38.22
Total in	34	564	16.59	23	449	19.52
Sold and died	4	5	1.35	4	28	6.98
In stock at end of year	30	368	12.27	19	304	16.00
Total disposals	34	373	10.97	23	332	14.43
Deficit on rams	—	191	5.62	—	117	5.09
Group	IIA. Fat and store lambs off grass only			IIB. Fat and store lambs off grass and fold crops		
B/f from previous year	49	782	15.96	78	1,217	15.61
Purchased	24	532	22.16	19	675	35.52
Total in	73	1,314	18.00	97	1,892	19.51
Sold and died	19	143	7.53	22	105	4.78
In stock at end of year	54	914	16.92	75	1,373	18.31
Total disposals	73	1,057	14.48	97	1,478	15.24
Deficit on rams	—	257	3.52	—	414	4.27
Group	IIIA. Store lambs off grass only			IIIB. Store lambs off grass and fold crops		
B/f from previous year	18	226	12.62	10	130	13.00
Purchased	5	101	20.20	2	78	39.37
Total in	23	327	14.21	12	208	17.33
Sold and died	8	54	6.75	—	—	—
In stock at end of year	15	206	13.73	12	160	13.33
Total disposals	23	260	11.31	12	160	13.33
Deficit on rams	—	67	2.91	—	48	4.00

Group	Number of ewes per ram	Group	Number of ewes per ram
IA	37.0	IB	42.8
IIA	39.9	IIB	41.2
IIIA	33.7	IIIB	41.7

WINTER SHEEP FOLDING
COSTS AND RETURNS FROM FLOCKS IN THE EAST MIDLANDS 1962-63 AND 1963-64

TABLE 9

Totals

Year	1962-63			1963-64		
Number of flocks	15			19		
Item	Totals		Value per head £	Totals		Value per head £
	Numbers	Value £		Numbers	Value £	
SHEEP AT START OF WINTER FATTENING						
Lambs—home reared	3,156	18,998	6.02	3,935	24,037	6.11
purchased	672	4,066	6.05	456	2,867	6.29
Other sheep	31	122	3.93	174	594	3.40
Total at start	3,859	23,186	6.01	4,565	27,498	6.03
DISPOSAL OF SHEEP						
Fat hogs	3,395	29,707	8.75	3,924	33,414	8.52
Store and casualty hogs	103	688	6.69	124	1,082	8.22
Deaths	82	1	—	89	1	—
In stock at end of period	248	2,366	9.54	254	2,377	9.74
Other sheep	31	137	4.55	174	975	5.43
Total disposals	3,859	32,899	8.53	4,565	37,849	8.29
OUTPUT						
Output of sheep	—	9,713	2.52	—	10,351	2.27
Sales of wool	—	265	0.06	—	541	0.12
Output of sheep and wool	—	9,978	2.58	—	10,892	2.39
FOODS						
CONCENTRATES:						
Purchased cakes and meals	Cwt. 1,220	1,937	0.51	Cwt. 607	1,136	0.25
Home grown cereals	1,708	1,673	0.43	1,641	1,608	0.35
Bulky fodders	—	281	0.07	—	187	0.04
Grazing	Acres N.a.	488	0.13	Acres 62.4	363	0.08
Folded crops	408.5	4,504	1.17	389.3	4,801	1.05
TOTAL FOODS	—	8,883	2.31	—	8,095	1.77
LABOUR						
Manual labour	Hours 5,128	1,332	0.34	Hours 5,738	1,576	0.35
Vehicles	—	175	0.04	—	138	0.03
Total manual and vehicle labour	—	1,507	0.38	—	1,714	0.38
MISCELLANEOUS COSTS						
Veterinary, medicines and transport	—	166	0.04	—	306	0.07
TOTAL COSTS	—	10,556	2.73	—	10,115	2.22
NEGATIVE MARGIN OF OUTPUT UNDER COSTS	—	-578	-0.15	—	+777	+0.17

APPENDIX II

METHODS USED IN SHEEP ENTERPRISE COSTS

Averages

The total data for the group divided by the appropriate total number of sheep in the group.

Period

Ewes Groups I, II and III. The year for each flock is taken from the date the ewe flock is made up and put to the rams.

Winter folding. The period for each flock is from the date the flock is made up to the date of the last sale of fat or store hogs. The average period is the total of the periods for each flock divided by the total number of flocks.

Value of Home Grown Foods

Hand fed per cwt.				s.	d.
Barley	...	...	...	19	0
Oats	...	...	...	20	0
Hay	...	...	...	6	3
Swedes	...	...	...	2	6
Silage	...	...	...	2	6

FOLDED CROPS. These have been charged at cost calculated as a basic cost of £5 per acre drilled plus cost of fertilisers, summer cultivations and rent. The weight of crop consumed has been calculated from the difference between total foods required per sheep and the quantity fed by hand (e.g. purchased and home grown concentrates, hay, swedes, carted to the sheep).

GRAZING. Valued at cost.

Labour

Man labour at actual cost or 5s. 2d. per hour.

Jeep, van, car at 5s. 0d. per hour.

Tractor at 3s. 6d. per hour.

Sundries

This is actual expenditure on veterinary and medicine, repairs or replacements of equipment, and transport during the period.

Share of equipment, depreciation and general farm overheads

These have not been included in the costs.

