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Report No. G.21.

UNIVERSITY OF DURHAM

FARM ECONOMICS BRANCH, KING'S COLLEGE,
NEWCASTLE UPON TYNE



The Economics of Yard-Fed Cattle in Northumberland

1945-46

J.B. Butler, M.Sc., M.Com.

This inquiry into the economics of winter feeding of cattle in Northumberland was commenced in 1944-45, and a report on the first year's results has already been issued.* In that year 32 farms supplied details of their feeding operations which covered 1300 cattle. For the winter 1945-6, 23 farms and 800 cattle provide material. The reduced scale of the inquiry is due in most cases either to the abandonment of winter fattening or to reduction in the numbers of cattle fed. It is a symptom of a tendency which has been in progress for some time reflecting farmers' dissatisfaction with the economic returns from yard feeding.

The expansion of the arable acreage during the war greatly increased the demands upon soil fertility and this, particularly on the lighter soils, led many farmers to feed cattle for the sake of the manure, even though net cash returns on the cattle were small or negative. There has, however, been a constant search for more remunerative alternative methods of using cattle. In some areas dairy herds have taken the place of beef cattle, but dairying, with its high capital requirements for buildings and stock, is not always a practicable alternative to feeding, particularly in the traditional feeding districts. Where the production of fat cattle has remained a main farm enterprise, there has been an increase in the practice of carrying the animals over the winter in improving store condition to finish on grass in the early summer. This practice has two advantages compared with yard feeding proper. It reduces the consumption of home-grown corn, providing more for sale, and it enables the beasts to be sold at the time of year when prices are at higher levels.

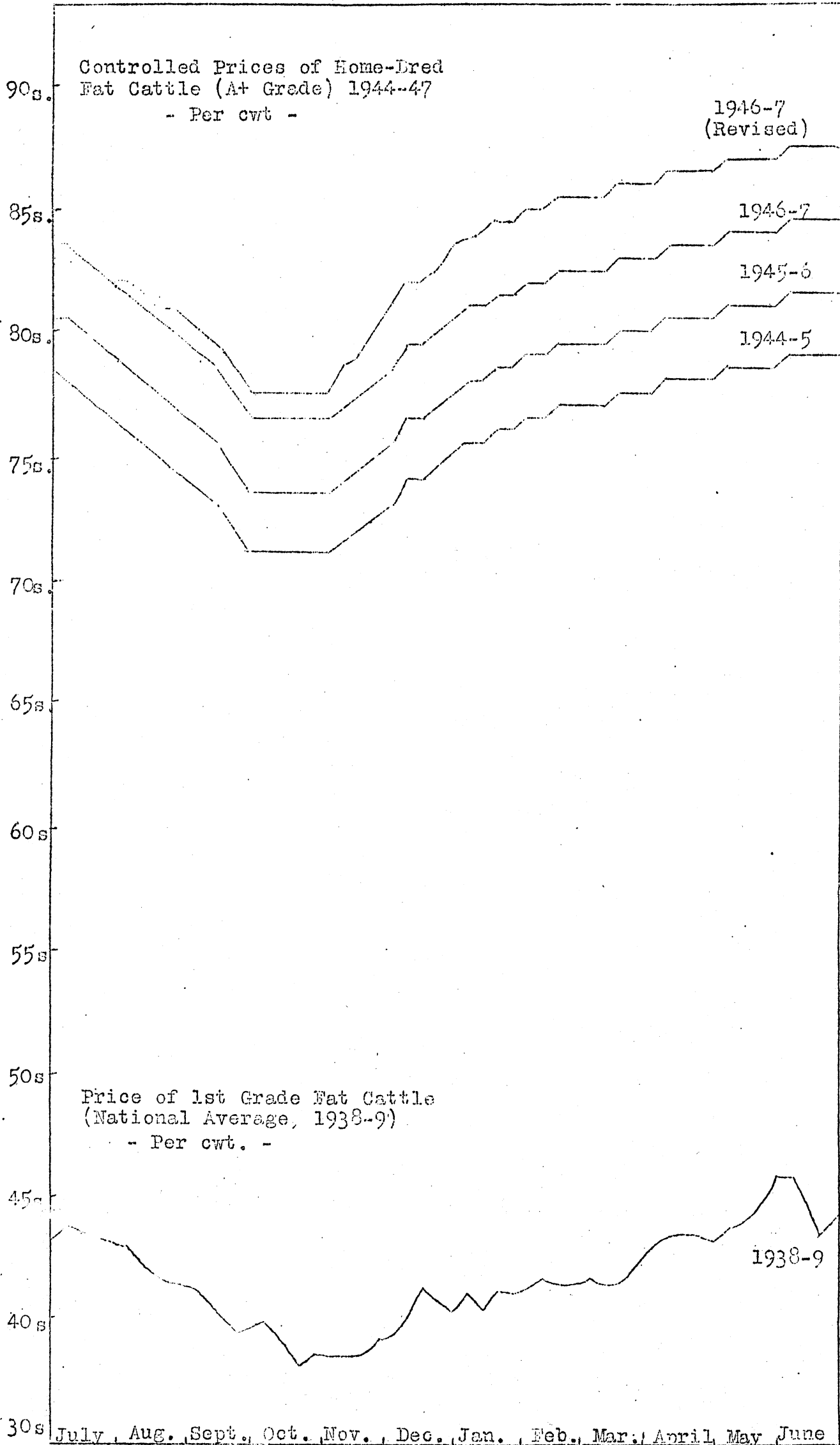
Before the war beef prices normally reached their lowest point in the autumn when there was a plentiful supply of cattle cheaply fed during the summer and pastures had to be cleared. Prices rose sharply in the early winter but from Christmas onwards the sales of yard fed cattle kept prices at a steady level. From about the middle of March to the beginning of July, prices again rose, owing to the diminishing supply of yard fed cattle. As the summer advanced grass fed cattle came on the market in increasing numbers and prices fell steadily. This trend of prices may be clearly traced in the graph of 1938-9 prices in Diagram 1. The graph records the national average for first grade cattle and the wider fluctuations experienced at individual marts are therefore smoothed out.

During the war the level of fixed prices has been successively raised but there has been very little alteration in the seasonal distribution of prices. A comparison of the Ministry of Food prices for 1944-5 to 1946-7 with the 1938-9 prices (Diagram 1) shows the same seasonal pattern each year. Such increases in price as have been introduced have lifted the whole price curve upwards without altering its shape. The revised prices announced in July 1946, however, provide for a progressive increase in prices from August onwards compared with those previously declared.

Consequently the inducement to market cattle in the early summer months still remains strong and, provided the management and feeding can be suitably adjusted to effect a smooth change-over from yards to grass, better returns may be expected for cattle finished on the grass after spending the winter in yards. This price advantage, however, reflects practical difficulties on the production side. The continuing preference for grass feeding as against yard feeding is a question of the comparative advantage of the two systems and of the relationship of beef prices to prices of sale crops.

* Report F.E.B. G.19, The Economics of Winter Fed Cattle in Northumberland 1944/45.

DIAGRAM 1.



II.

The present report summarises costs in 1945/6 and is a continuation of the work commenced in 1944/45. In the tables which follow the main results for the two years are shown side by side for comparison.

There have been certain changes in the sample. Two farms were added, both in the north of the county, and eleven farms ceased to provide costs, making the number of co-operating farms 23 and the number of cattle costed 800.

About half the cattle fed were of Shorthorn type, about one-sixth Hereford and other crosses and one-third Angus or Angus crosses. The latter formed a higher proportion of the Irish stores than of the home-bred.

Table 1 shows the types of cattle fed.

TABLE 1. NUMBERS & TYPES OF CATTLE FED

	1 9 4 4 - 4 5			1 9 4 5 - 4 6		
	Bullocks	Heifers	All Cattle	Bullocks	Heifers	All Cattle
Home Bred	440	47	487	287	40	327
Irish	547	66	613	442	31	473
Total	987	113	1100	729	71	800

The reduction in numbers was marked in all classes. The bulk of the cattle fed in both years were bullocks and Irish stores formed a slightly larger proportion of the total in 1945/6.

Apart from a slight increase in average store weight there was little change in weights or in liveweight gains, as Table 2 shows.

TABLE 2. WEIGHTS & LIVELWEIGHT GAINS PER HEAD

	1 9 4 4 - 4 5			1 9 4 5 - 4 6		
	Store Weight	Final Weight	L/W Gain	Store Weight	Final Weight	L/W Gain
All Cattle	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
Bullocks	10.27	12.28	2.01	10.49	12.46	1.97
Heifers	8.23	9.80	1.57	8.40	9.69	1.29
Total	10.06	12.03	1.97	10.30	12.21	1.91
Graded Cattle only						
Bullocks	10.31	12.35	2.04	10.52	12.53	2.01
Heifers	8.31	9.87	1.56	8.39	9.69	1.30
Total	10.11	12.10	1.99	10.33	12.28	1.95

In the above table the figures are shown for all the cattle costed and also, separately, for the cattle which were actually finished in the yards and graded direct. The latter calculation, for 1945-6, excludes 7 beasts which were sold as casualties and 26 which failed to fatten and were either turned out to grass or disposed of in the store market.

Actual weights for some of the store cattle entering the yards were available and provided a valuable check on the estimated figures, but the majority of the store weights were farmers' estimates. Consequently both the average store weights and the liveweight increases shown in the above table are estimated figures and not actual weights. The final weights of graded cattle are actual "live weights" as determined at the grading centre, i.e. one quarter more than the weights upon which the feeder is paid.

The considerable range in liveweight increase in different batches of cattle is illustrated in Table 3.

TABLE 3. RANGE OF LIVELWEIGHT INCREASES

	Over $\frac{1}{2}$ cwt.	1 cwt.	$1\frac{1}{2}$ cwt.	2 cwt.	$2\frac{1}{2}$ cwt.	Total
	Not over 1cwt.	$1\frac{1}{2}$ cwt.	2 cwt.	$2\frac{1}{2}$ cwt.	3 cwt.	
No. of Farms:						
1945/6	2	2	9	8	2	23
1944/5	3	12	9	5	3	32

Although there was little difference in the average rate of liveweight gain in the two years, a larger proportion of farms had gains of more than $1\frac{1}{2}$ cwt. in 1945/6.

To judge the efficiency of the feeding process, it is necessary to relate the liveweight increase to the length of the feeding period. This varied from about 10-11 weeks to over 5 months for different batches of cattle, and averaged 18.4 weeks overall, one week less than in the previous year. The relevant data are summarised in the next table.

TABLE 4. LENGTH OF FEEDING PERIOD & LIVELWEIGHT GAINS

	1944 - 45			1945 - 46		
	All Cattle	Bullocks	Heifers	All Cattle	Bullocks	Heifers
Length of Feeding Period (weeks)	19.4	19.6	17.3	18.4	18.7	15.8
L/W Gain per head per week: lbs.						
All Cattle	11.4	11.5	10.2	11.62	11.80	9.14
Graded Cattle	11.5	11.8	10.8	11.87	12.04	9.22

Taking bullocks and heifers together, nearly the same liveweight gain was obtained in a slightly shorter feeding period in 1945/46, so that the overall average weekly rate of gain was a little higher than in the previous year. Taking bullocks and heifers separately, however, the former put on their gains at an increased rate in 1945/46 in a shorter feeding period, while the heifers, in an even shorter feeding period, put on their gains at a lower rate than in 1944/45.

Once more there was a wide variation in the length of time the cattle were in the yards. The range is shown in Table 5.

TABLE 5. RANGE IN LENGTH OF FEEDING PERIOD

Weeks	10-12	12-14	14-16	16-18	18-20	20-22	22-24	over 24	Total
No. of Farms:									
1945/6	2	1	4	5	5	4	1	1	23
1944/5	4	1	3	5	9	4	2	4	32

Although still considerable, the range in length of feeding period was less in 1945/46 and few cattle were in the yards for more than five months.

Corresponding to the narrower variation in the length of feeding period, there was a greater concentration of sales in the months of February, March and April. Over three-quarters of all sales took place in these three months. In 1944/45 only two-thirds of the cattle were sold in the same period. Table 6 compares the numbers of beasts sold fat each month.

TABLE 6. NUMBERS OF CATTLE GRADED EACH MONTH

	1944-45		1945-46	
	Number	%	Number	%
November	-	-	2	.3
December	26	2.5	13	1.7
January	133	12.8	68	8.9
February	208	20.0	228	29.7
March	276	26.5	209	27.2
April	208	20.0	157	20.5
May	183	17.5	79	10.3
June	7	.7	11	1.4
Total	1041	100.0	767	100.0

There was a distinct improvement in the final grades of cattle in 1945/46. In 1944/45, 48% were graded as Specials or Super Specials, but in 1945/46 the percentage had risen to over 58%. The figures, which are remarkably high in both years in view of present feeding difficulties, suggest that it may be more economical to feed cattle for the higher grades, since this is the policy of those feeders who still finish cattle in the yards. This inference is supported by the evidence of the individual farm results. The difficulty and expense of obtaining first class stores has, however, made it more difficult to follow this policy consistently.

The grading returns are analysed below.

TABLE 7. ANALYSIS OF GRADINGS

	1944-45		1945-46	
	Number	%	Number	%
Super Special	139	12.6	128	16.0
Special	386	35.1	338	42.3
A+	330	30.0	208	26.0
A	119	10.8	72	9.0
A-	49	4.4	17	2.1
B+	14	1.3	3	.4
B	4	.4	1	.1
Casualty	5	.5	7	.9
Unfinished ..	54	4.9	26	3.2
Total ..	1100	100.0	800	100.0

III.

Feeding stuffs consisted mainly of home-grown materials. Oats formed 67% of the total concentrate ration, barley and beans approximately 10% each and purchased concentrates only 13%.

The problem of the valuation of home-grown foods was fully discussed in last year's report. The same principles have been applied to the 1945/46 season's feeding, and the prices used are similar. The actual values employed are as follows:-

TABLE 8. VALUES OF HOME-GROWN FEEDING STUFFS. 1945-6

	s.d.				
Oats	14.6.	per cwt.	Swedes	£1. 1.0.	per ton
Barley	14.6.	" "	Mangolds	£1. 6.0.	" "
Beans & Peas	20.0.	" "	Kale	£1. 2.0.	" "
Hay	£4. 8.0.	per ton	Silage	£2.10.0.	" "
Straw	£2. 0.0.	" "	Potatoes	£3.10.0.	" "
			Beet Tops	£1. 0.0.	" "

No charge is made for straw used for litter.

Home-grown corn fed is charged at average market price in the above table; hay, silage and potatoes at "feeding value" based on the price of alternative purchased foods, and roots and kale are valued with reference to costs of production.

The quantities of foods used are shown in Table 9.

TABLE 9. QUANTITIES OF FOODS CONSUMED

	1 9 4 4 - 4 5			1 9 4 5 - 4 6		
	Per Head Cwts.	Per Head per week Cwts.	Per cwt. L/W gain Cwts.	Per Head Cwts.	Per Head per Week Cwts.	Per cwt. L/W gain Cwts.
Oats	5.1	.27	2.6	5.2	.28	2.7
Barley8	.04	.4	.8	.04	.4
Beans & Peas .	.7	.03	.3	.7	.04	.4
Total H.G.Corn	6.6	.34	3.3	6.7	.36	3.5
Purchd. Concs.	1.0	.05	.5	1.0	.06	.5
All Concs.....	7.6	.39	3.8	7.7	.42	4.0
Roots	68.0	3.46	34.5	66.0	3.59	34.5
Hay	21.8	1.12	11.1	14.9	.81	7.8
Straw	7.4	.38	3.7	10.8	.59	5.7

The similarity of the figures for the two years is very striking. The only change of any magnitude is the increase in the amount of straw fed and the corresponding reduction in hay. This may reflect the better quality of the straw, after the harvest of 1945 compared with 1944 when much straw was badly weathered. There was also a considerable amount of poor quality hay made in the earlier year, which was fed generously in order to get it converted into manure.

The total costs per head are summarised in the next table.

TABLE 10. SUMMARY OF COST PER HEAD

	1944-45		1945-46	
	Per Head £. s. d.	£	Per Head £. s. d.	£
Value of Store Beast .	32.16.10.	66.5	34.13. 6.	69.2
Foods:				
Roots	3.12. 7.	7.4	3.13. 5.	7.3
Hay	4.15. 8.	9.7	3. 5. 5.	6.5
Straw	14. 8.	1.5	1. 1. 8.	2.2
Home-grown corn	4.18. 9.	10.0	5. 1. 3.	10.2
Purchased Concentrates	14. 2.	1.4	12. 4.	1.2
Total Foods	14.15.10.	30.0	13.14. 1.	27.4
Labour	1.11. 8.	3.2	1.10. 8.	3.0
Miscellaneous	3. 6.	.3	3. 9.	.4
Total Cost	49. 7.10.	100.0	50. 2. 0.	100.0

On the average, stores cost nearly £2 per head more in 1945-46, but the only other noticeable change in the level of costs was the reduction in the value of hay fed and the increase in straw, corresponding with the changes, already noted, in the quantities fed.

The feeding costs, excluding the price of the store beast, are also analysed in the next table to show the cost per head per week and per cwt. of liveweight gain.

TABLE 11. COST PER HEAD PER WEEK AND PER CWT. LIVELWEIGHT GAIN

	1944-45		1945-46	
	Per Head per week £. s. d.	Per cwt. L/W Gain £. s. d.	Per Head per week £. s. d.	Per cwt. L/W Gain £. s. d.
Roots	3. 9.	1.16.10.	4. 0.	1.18. 5.
Hay	4.11.	2. 8. 7.	3. 6.	1.14. 3.
Straw	9.	7. 5.	1. 2.	11. 4.
Home-grown corn	5. 1.	2.10. 1.	5. 6.	2.13. 0.
Purch. Concs...	9.	7. 2.	8.	6. 6.
All Foods	15. 3.	7.10. 1.	14.10.	7. 3. 6.
Labour	1. 8.	16. 1.	1. 8.	16. 0.
Miscellaneous .	2.	1.10.	2.	1.11.
Total	17. 1.	8. 8. 0.	16. 8.	8. 1. 5.

In spite of slightly higher expenditure on home-grown corn the total food cost incurred to produce each cwt. of liveweight increase was lower in 1945/46 than the previous year. This was due entirely to the saving on hay, and the real saving to the farmer might turn upon the cost of making the hay and the alternative uses to which he might have put it. Some discussion of these points will be found in a later section.

IV.

The returns obtained for cattle sold are shown in Table 12, in which the average price of graded cattle is given separately as well as the overall average received for all cattle fed.

TABLE 12. SUMMARY OF RETURNS

	1944-45			1945-46		
	No.	%	Value per Head (in Group) £. s. d.	No.	%	Value per Head (in Group) £. s. d.
Cattle Sold Fat (Graded)	1041	94.6	44.17.4.	767	95.9	47. 4.9.
Unfinished Cattle	54	4.9	38. 5.6.	26	3.2	40. 0.2.
Casualties	5	.5	28.15.4.	7	.9	33. 4.5.
All Cattle	1100	100.0	44. 9.5.	800	100.0	46.17.7.

Unfinished cattle are entered in the records either at the price they realised when sold as stores or at an estimated value if retained on the farm.

A summary of the financial results of feeding based on the foregoing tables can now be given.

TABLE 13. FINANCIAL MARGINS PER HEAD

	1944-45			1945-46		
	All Cattle £. s. d.	Graded Cattle £. s. d.	All Cattle £. s. d.	Graded Cattle £. s. d.		
Average Return per head	44. 9. 5.	44.17.4.	46.17.7.	47. 4. 9.		
" Store value "	32.16.10.	32.17.9.	34.13.6.	34.15. 6.		
Gross Feeding Margin	11.12. 7.	11.19.7.	12. 4.1.	12. 9.3.		
Cost of Food, Labour &c	16.11. 0.	16.11.0.	15. 8.6.	15. 8.6.		
Net Margin per head (Loss)	4.18. 5.	4.11.5.	3. 4.5.	2.19.3.		

In spite of the increased price of stores, the financial results of feeding were better in 1945/46 than in the previous year. An increase of 3/- per cwt. in the price of all beef cattle, together with better gradings and a higher price per head for ungraded cattle sold kept the gross margin above the level of the earlier year, whilst the reduction in the cost of feeding helped to reduce the loss still further. Much of the improved result must be attributed to the better season, which led to an all-round improvement in the quality and nutritive value of home-grown fodder.

The margins varied widely from farm to farm. The following tables indicate the range.

TABLE 14. RANGE IN GROSS FEEDING MARGINS PER HEAD

Margin	£3-5	£5-7	£7-9	£9-11	£11-13	£13-15	£15-17	£17-19	Total
No. of Farms									
1945/6	1	-	2	5	6	7	2	-	23
1944/5	-	2	8	5	6	4	4	3	32

TABLE 15. RANGE IN NET FEEDING MARGINS PER HEAD

Margin	Profit					Loss					Total
	£4-6	£2-4	£0-2	£0-2	£2-4	£4-6	£6-8	£8-10	£10-12	£12-14	
No. of Farms:											
1945-6	1	1	2	4	10	3	-	-	2	-	23
1944-5	-	2	5	3	3	10	2	5	-	2	32

Since the making of Farmyard Manure was one of the main objects for which the cattle were fed, it is reasonable to transfer the cash loss on the cattle to the manure and regard it as the cost of making farmyard manure.

It has been estimated that the usual output of manure from cattle fed in yards is approximately 6 cwt. per head per week. Combining this with the cash loss on the cattle, it may be estimated that the average cost of the farmyard manure produced by all the cattle costed was 11s. 8d. per ton. The cost on individual farms varied as shown in Table 16. Where the cost is shown as "Nil" in the table, a cash profit was made on the feeding of the cattle. The 1944/45 figures are shown for comparison.

TABLE 16. COST OF FARMYARD MANURE PER TON

Cost per ton	Under									Total
	Nil	5/-	5-10s	10-15s	15-20s	20-25s	25-30s	30-35s	35-40s	
No. of Farms:										
1945/6	4	3	4	5	5	-	-	1	1	23
1944/5	7	2	4	1	7	5	-	4	2	32

V.

In last year's report it was argued that the cost of production of any farm product taken by itself is not a fixed quantity precisely measurable, but the result of calculations based, of necessity, upon certain arbitrary assumptions

The figures presented above illustrate one aspect of this problem. They show that, even when the costing method employed remains the same and similar values are used for all home-grown foods, the cost of production varies from year to year on account of seasonal factors. The importance of continuing such inquiries over a period of years is thus emphasised.

Apart from seasonal fluctuations, however, considerable variation in the results obtained will occur according to the purposes for which the figures are intended and the accounting methods employed. For example it is sometimes argued that all home-grown materials should be charged at market price, since the farmer, if he did not feed them, could sell them in the open market. On the other hand it may be contended that the appropriate figure for all products is the actual sum which they cost to produce.

To illustrate the effect of these methods of charging home-grown foodstuffs, the cost of feeding per head, already given in Table 10, has been recalculated, first on the basis of assumed market prices and secondly at cost of production as indicated by such data as are available.

TABLE 17. FEEDING COST PER HEAD ON DIFFERENT PRICE BASES

	Quantity Cwts.	As in	Market	Cost of
		Table 10	Price	Production
		£. s. d.	£. s. d.	£. s. d.
Roots	66.0	3.13. 5.	6.12. 0.	3.13. 5.
Hay	14.9	3. 5. 5.	6. 6. 8.	2.10.11.
Straw	10.8	1. 1. 8.	1.12. 5.)	
Home-grown Corn ...	6.7	5. 1. 3.	5. 1. 3.)	2.14. 8.
Total Home-Produced	-	13. 1. 9.	19.12. 4.	8.19. 0.
Purchased concs....	1.0	12. 4.	12. 4.	12. 4.
Total Food ...	-	13.14. 1.	20. 4. 8.	9.11. 4.

Market price, although it appears a more definite measure than "cost" or "feeding value", is in some cases equally elusive. There is, for example, no regular market price for fodder roots. An arbitrary figure of £2 per ton has been adopted in the above table, in the light of available information. Again, the price of straw is very uncertain. Official maximum prices are, indeed, laid down, but the actual price obtainable on the market may fall considerably short of this standard. A price of £3 per ton has been adopted in the table. For hay the average controlled price for the period under review has been taken as £8.10.0. per ton, most of the hay fed being seeds hay. No alteration has been made in the values of concentrates, which were already entered at market prices.

In estimating the costs of production of the various items, use has been made of data obtained by the Department in separate investigations. These are applicable only in a very rough way to the problem under consideration, since they were obtained from a different sample of farms and refer in many cases to different parts of the county (although all are from Northumberland). The figures on which the costs of root crops are based refer to an earlier year, but the data for oats and for hay both deal with the 1945 crop. In the absence of cost data for barley and beans, these crops are taken at the same value as oats. The value of the oats and oat straw are not separately stated, the cost figure for the crop being inclusive of straw and grain. It has been assumed that the cost of the 6.7 cwts. of oats would cover a like amount of straw and an allowance has been made for the remainder at the rate of one-fifth of the total cost of the crop.

The effects of these methods of food valuation upon the net margin, or cash profit or loss from the feeding process is as follows:

- (a) The method adopted in this report shows a cash loss of £3. 4. 5. per head as indicated in Table 13.
- (b) Valuation of all foods at market price increases the cash loss to £9.15.0. per head. (The additional loss on cattle is, of course, a credit to the crops fed).
- (c) Valuation of all foods at cost of production converts the cash loss into a profit of 18s. 4d. per beast. (Here, of course, the benefit to the cattle is at the expense of the crops).

What is the significance of these results? The main point at issue is whether the producer should calculate profit or loss on intermediate products or only on his final product. An ordinary factory differs from a farm in that it produces, as a rule, only a single commodity for sale. The profit made on the sale of that product covers all costs incurred in manufacturing the component parts. A farm, however, produces a variety of products jointly. Thus a feeding farm grows oats which may either be sold direct or be fed to cattle and sold as beef. In the latter case the profit on the cattle must be at least sufficient to cover the profit that would have been obtained on the direct sale of the oats or, in the long run, the farmer will give up feeding oats to his cattle and will prefer to sell them as corn. If all farmers did this, the effect on corn prices is not difficult to forecast. The profit on the cattle, however, need not necessarily be all cash profit: there are benefits such as farmyard manure to take into account, but when all such benefits are allowed for, the returns from feeding oats (or other foods) to cattle should be at least equal to those obtainable from other methods of utilising the feeding stuffs. If they are not, that branch of farming will gradually decline and more economic alternatives will be sought.

Somewhat different considerations apply in the case of hay, straw and roots. These are grown as stock foods and have no alternative use. No regular market exists in which they can be sold for other purposes and the sole criterion which can be applied to the efficiency of their utilisation is whether the stock consuming them leaves a margin of profit sufficient to cover the costs of production of these foodstuffs. Here again, in assessing profit, account must be taken of the indirect benefits to the whole rotation from the growth of the roots and seeds crops as well as from their conversion to farmyard manure.

The figures given in Table 17 show that a very much higher price per cwt. must be paid for beef to show a "profit" if costs are calculated on "market prices" than if they are calculated on "cost of production". Yet the amount of work - the number of man-hours and horse and tractor hours - involved in each case is identical. The market prices are higher than the cost prices merely because an element of profit is provided for in the prescribed prices for crops.

These points have been referred to at some length to emphasise once again the falsity of the assumption that there is one definite figure which can be described as the cost of any farm product where that product, as in the case of beef, is the result of a process of joint production involving many intermediate stages.

The figures given in Table 17 indicate broadly the upper and lower limits within which, on any method of calculation, the cost of winter feeding of beef cattle will lie. Within this range the actual figure adopted to represent the average cost will depend upon the assumptions made regarding the allocation of profits, which, in turn, is a question to be decided in each case in the light of all the relevant circumstances and according to where the emphasis is laid between crops, cattle and fertility maintenance in the policy of the farming.

In assessing the "cost of beef production" in this report a choice has been made amongst various possible systems of accounting. A different choice could have been made and would have led to a different result.

The problem of calculating the cost of beef production has been shown to be complex. An assessment of the benefit obtained from farmyard manure is equally complex. It depends upon the extent and value of the increased crop yields in the whole rotation following the application of the dung. Scientific measurement of these factors is difficult, but their possible magnitude is indicated by some recent work in this field. The increased yields of crops obtained from applications of dung were estimated by Crowther and Yates in a report published in 1941 and also at the Saxmundham Experimental Station in Suffolk by Black and Oldershaw, who studied the effects of farmyard manure over a period of 30 years from 1909 to 1939. Valuing these increased yields at current prices, MacGregor* has calculated that dung applied to potatoes may increase the value of the crop by 22/11d. for every ton of dung applied. Over a complete rotation the increased crop value following an application of 10 tons of dung was estimated at £22. 16. 6. During the winter feeding period a bullock will produce about 5 tons of dung, so that for every beast fed the increase in crop values on this basis would be over £11, or allowing for the cost of carting and spreading, say about £10.

Much more experimental work is needed before figures such as these can be given general application. They are, however, sufficient to indicate that even when costs are calculated on the highest scale they may not be wholly disproportionate to the benefits obtained. Alternative systems of feeding may leave higher profits, but even the finishing of cattle in yards may still pay for itself in the long run when account is taken of all the circumstances. Not the least important of the circumstances is the need at the present time for high total output.

* Economic Aspects of Beef Production and Consumption, by J.J. MacGregor, Harper Adams Agricultural College, 1945.

