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*Dairying*

WITHDRAWN

UNIVERSITY OF NOTTINGHAM

Department of Agricultural Economics

MARCH, 1956

F.R. No. 134



*Cattle Production  
Cost*

REARING CALVES IN DAIRY HERDS



(FARMER AND STOCK-BREEDER PHOTOGRAPH)

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PRICE 2/-

F.R. No. 134.

REARING CALVES IN DAIRY HERDS.

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## 1. INTRODUCTION

In the Autumn of 1954 over 100 farmers were asked to record the feed, labour and other expenditure devoted to the rearing of Autumn born calves from birth until they were turned out to grass. There was a ready response to this request but on some farms it proved too hard a task to isolate from other cattle the calves to be costed. Nevertheless 86 farmers provided reasonably detailed records and this report is based upon this information.

Milk production was an important enterprise on nearly all these farms. Indeed most of them could be described as dairy farms. The sample was limited to farms intending to rear 12 or more calves during the last quarter of the year. A further limitation was that only farms with Friesians, Shorthorns, Lincoln Reds or crosses of these breeds were included. In other words, the investigation relates specifically to Autumn born calves, reared on dairy farms, from which beef stores could be obtained.

This is a study primarily of the cost of feeding calves. Nearly all the calves costed were home bred. Very few were for sale at the end of the period; the heifers were retained for herd replacements and the steers for sale as two year olds or as fat cattle. For these reasons, farmers were reluctant to put a value on the calves at a week old and equally reluctant to put a sale value on them at turning out time. No attempt has been made, therefore, to value any of the calves or to estimate the cash returns to be expected from the first part of the rearing process. For the same reasons, no worthwhile estimates of weight at birth and at turning out time, could be obtained.

There are many ways of rearing calves and the tables which follow refer to five groups of farms - four rearing calves on the bucket and one by multiple suckling on nurse cows. A short report dealing with the cost of rearing single suckled calves will be issued shortly.

No great accuracy is claimed for any of the figures - they are the best estimates which the farmers concerned were able to make. Only a minority were in the fortunate position of having a self-contained batch of calves whose total food consumption could be assessed with accuracy. On many farms it was necessary, for lack of suitable buildings, to put the costed calves in the same yard or building as older calves. On other farms it was impossible to determine, except very roughly, how much feed was actually fed to the calves being costed. Where accurate total figures were unobtainable the costs have been based on the rationing system followed. Farmers

were asked to describe in detail how the calves were fed each week. These rations were then added up to provide an estimate of the total food fed to the calves throughout the period of the study.

The Sample.

Dairy farms are found in all parts of the East Midlands Province<sup>1</sup> but over 80 per cent of the total number are concentrated in Derbyshire and Leicestershire. The farms in the sample were also mainly in these two counties. Two main groups were represented, namely, those rearing calves by multiple suckling and those rearing on the bucket. The latter group has been subdivided according to the reliance placed upon whole milk as a food. At one extreme stand those feeding whole milk only and at the other those feeding milk substitute only. In between these extremes are those which fed whole milk for varying periods prior to the introduction of milk substitutes into the ration. Table 1 shows the number of farms in each group and provides some general information about the "average" farm in each.

GENERAL DESCRIPTION OF THE SAMPLE

TABLE 1

	Whole milk only	Whole milk for more than 4 weeks	Whole milk for less than 4 weeks	Milk substitute only	Multiple suckling
No. of farms	8	28	33	4	13
Average No. of calves costed	12	17	19	21	18
Average age at end of costing period (weeks)	30	32	31	29	31
<b>Farm size (acres) :-</b>					
Total	227	279	278	316	370
Grass	93	149	145	56	164
Tillage	134	130	133	260	206
Average No. of cows in milk or dry.	45	47	52	16	42
No. of attested herds	8	24	27	3	6

<sup>1</sup> The East Midlands Province is comprised of Derbyshire, Nottinghamshire, Lincolnshire (Lindsey and Kesteven), Leicestershire and Rutland.

### General Notes

All calves, including those reared on milk substitute only, received colostrum (or biestings) for the first four days. Nearly all the calves were born between August 1st and January 1st and the costings were continued until the calves were turned out to grass or until June 1st if the intention was to keep them indoors throughout the Summer.

Home grown feeding stuffs have been charged, as far as possible, at their estimated market value. This is logical because the feed fed to calves is normally of the highest quality available on the farm and as such is readily saleable. This is certainly true of cereals and hay. Roots and silage are not often sold and because of the difficulty of finding a market for such crops they have been charged at their estimated cost of production. In this particular study the method of charging silage and root crops is of little importance for the simple reason that only very small quantities were fed.

Labour has been included as a direct cost but too much significance should not be attached to this cost estimate for three reasons. The first is that calf rearing is a job which is mingled with other tasks in the dairy and buildings and it is, therefore, difficult to say just how much time is actually devoted to the calves each day. Secondly, it is hard to know what charge to put on this labour. In fact it has been allowed for at 3s. 3d. per hour which implies that it could all have been employed elsewhere on the farm if the calves were not there. Thirdly, it is the quality of the labour and not its quantity which matters. Calf rearing demands great care and attention from the person doing the job.

Two other items have been omitted from direct costs namely straw for bedding and overheads. This has been done because ample straw was available on nearly all the farms visited and because overheads are not an avoidable cost - the telephone bill and the insurance premiums must be paid whether or not any calves are reared.

Of the 1,520 calves included in the study only eight died after one month and only 13 were sold; the remaining 1,499 being on hand at the end of the investigation. Friesians were the most common breed in the sample - 805 of the calves were Friesians and 261 of the remainder were Shorthorns.

The average price of the 138 calves purchased was £7. but prices varied according to breed. The Friesians averaged only £5. but the Shorthorns cost £9. 8s. Od. each and the other breeds £7. 17s. Od. More was paid for the heifer than the steer calves;

SOURCE OF CALVES

TABLE 2

	Whole milk only	Whole milk for more than 4 weeks	Whole milk for less than 4 weeks	Milk substitute only	Multiple suckling
Born on Farm :-					
Steers	3	123	160	15	59
Heifers	91	344	437	15	135
Purchased :-					
Steers	-	-	18	53	20
Heifers	-	6	19	1	21
Total :-					
Steers	3	123	178	68	79
Heifers	91	350	456	16	156
Steers and heifers	94	473	634	84	235

£9. 10s. Od. compared with £6. 10s. Od. Only 14 of the 86 farms in the sample bought any calves but of these, nine farms bought 132 of the total number purchased.

Bucket Rearing

Most of the farms studied used some form of bucket rearing. Separate cost figures have been calculated for four bucket rearing systems but this should not be allowed to conceal the variations in practice which remain within each of these systems. This is true even though most of the suppliers of milk substitutes and baby calf foods issue their own calf feeding "prescription".

Average costs per calf for the various bucket-fed groups are shown in Table 3. It should be noted that these figures do not include any allowance for the initial value of the calf itself. On average the calves were between seven and eight months old at 1st June or when turned out to grass.

The salient features of the table are; the reduction in cost when whole milk is replaced by milk substitute and the comparatively slight variations in the cost of feeds other than milk and milk substitute.

No effective substitute for milk is available on the farm and it follows that as more reliance is placed on milk substitutes, the greater



COST OF BUCKET-FED CALVES 1954-55

TABLE 3

	Per calf			
	Whole milk only	Whole milk for more than 4 weeks	Whole milk for less than 4 weeks	Milk substitute only
	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Milk	15. 2. 8.	9. 1. 4.	3.19. 6.	2.11.
Milk substitutes and gruels	-	2.18. 3.	2.16. 2.	4. 3. 7.
Cereals	4. 7. 1.	3. 6. 8.	3. 1.11.	3. 7.10.
Rearing nuts and cakes	3.11. 4.	4. 0. 9.	4. 2. 8.	3.16. 1.
Hay	2. 9. 2.	2.16. 2.	2.14.10.	2.10. 4.
Other	19.11.	17. 4.	1. 0.11.	1. 6. 3.
<hr/>				
Total feeding stuffs	26.10. 2.	23. 0. 6.	17.16. 0.	15. 7. 0.
Labour	2.14. 2.	3. 4. 6.	2.14. 8.	2. 3.10.
Veterinary and medicine	7.	2. 1.	2. 1.	9.
Other <sup>1</sup>	-	-	4.	2. 2.
<hr/>				
Total direct costs	29. 4.11.	26. 7. 1.	20.13. 1.	17.13. 9.
Overheads	13. 7.	16. 2.	13. 8.	10.11.
Straw for bedding	1. 1. 3.	1. 0. 8.	17. 3.	19.11.
<hr/>				
Total costs	30.19. 9.	28. 3.11.	22. 4. 0.	19. 4. 7.
<hr/>				
No. of farms	8	28	33	4

<sup>1</sup> Transport, market expenses, feed grinding or heating and other sundry costs.

is the proportion of purchased feed. The whole milk group bought 18 per cent. of the feed fed (in terms of £.s.d.) but 66 per cent. of the total feed used by the milk substitute group was purchased.

Table 4 gives the cost of rearing calves in terms of gallons of milk and quantities of feed.

One pound of milk substitute, reconstituted with a gallon of water is often regarded as equivalent to a gallon of whole milk. It seems reasonable to deduce from Table 4 that to rear a calf to seven to eight months of age needs roughly :-

- 100 gallons whole milk or 100 lbs. milk substitute.
- $2\frac{1}{2}$  cwts. cereals.
- 2 cwts. calf nuts and cake.
- 6 cwts. hay.
- $\frac{3}{4}$  cwt. silage or beet pulp or other miscellaneous items.

QUANTITIES OF FEED AND LABOUR USED

TABLE 4

	Per calf			
	Whole milk only	Whole milk for more than 4 weeks	Whole milk for less than 4 weeks	Milk substitute only
Milk (gallons)	92.0	55.0	24.0	1.0
Milk substitute and gruel (lbs.)	-	89.0	72.0	98.0
Cereals (cwts.)	3.2	2.4	2.3	2.6
Nuts and cakes "	1.9	2.3	2.1	1.8
Hay "	5.8	6.6	6.4	5.9
Other <sup>1</sup> "	0.5	0.6	1.0	0.7
Labour (hours)	17	20	17	13
Total No. of calves	94	473	634	84
Average age (weeks)	30	32	31	29
Weeks on whole milk	12	8	3	-

<sup>1</sup> Mainly silage and beet pulp.

It is cheaper to use milk substitute than milk and there is no evidence that calves reared on milk substitute require more cereals or cake than those fed on whole milk.

It can be seen from a close study of Table 4 that the average level of feeding in the second group (whole milk for more than four weeks) was very high. If a pound of substitute or gruel replaces a gallon of milk, then it can be said that average consumption in this group was about 50 lbs. higher than in the other three groups. It can be reckoned that the cost of this "extra" feed is at least £2. per calf.

The explanation is to be found in the fact that on six out of the 28 farms in the group, the calves costed were pedigree animals which their owners hoped to sell. In every instance the high level of feeding was considered to be justifiable in terms of the expected sale value of the calves concerned. If these six farms are omitted, the average for the remaining farms is 50 gallons of whole milk and 77 lbs. of substitute or gruel per calf. This is still substantially higher than that for the

other groups. Incidentally, it is the length of time for which substitutes are fed which varies and not the daily allowance.

Multiple Suckling

Thirteen farms reared 235 calves by multiple suckling them on nurse cows. Because the investigation covered only a part of the year, it was not possible to obtain the costs of maintaining the nurse cows. The following costs, therefore, relate only to the supplementary foods supplied to the calves in addition to the milk derived from the cows.

COST OF MULTIPLE SUCKLING  
(EXCLUDING COST OF NURSE COWS)

TABLE 5

Per calf

	Cost per calf		
	Quantity	£.	s. d.
Cereals	2.4 cwts.	3.	10. 7.
Rearing nuts and cake	1.5 "	3.	2. 5.
Hay	6.5 "	2.	15. 8.
Silage and roots	0.7 "		4. 7.
Sugar beet pulp	0.2 "		2. 11.
Others	-		19. 2.
<hr/>			
Labour	18 hours	10.	15. 4.
Veterinary and medicine		2.	17. 11.
Sundries			3. 10. 2.
<hr/>			
Total direct costs		13.	17. 3.
Overheads			14. 6.
Straw for bedding		1.	0. 9.
<hr/>			
Total costs		15.	12. 6.
<hr/>			
Average age of calves (weeks)			31

Few, if any, of these farms could be regarded as orthodox practitioners of multiple suckling because many of the nurse cows were rejects from the dairy herd. Many of these cows had lost one quarter and the intention was to sell most of them at the end of their lactation.

On many of these farms most of the calving was in the Autumn and the general policy was to transfer calves from good cows for suckling by the poorest cows in the herd. As a rule calves were bought only when calvings within the herd were not enough to absorb all the milk that the nurse cows were capable of providing.

#### Cost of Nurse Cows

On a dairy farm where milk is normally sold, the real cost of feeding calves on nurse cows is the amount for which the milk consumed could have been sold.

Milk fed to bucket-fed calves has been charged in this study at 3s. 3½d. per gallon. There is perhaps a slight saving of labour when a cow is sucked and not milked but this is unlikely to be worth more than 3d. or 4d. per gallon. The "cost" of the calves is, therefore, the gallonage consumed times 3s. Od. If each calf received 90 gallons of milk, the cost of feeding these calves was 90 x 3s. Od. or £13. 10s. Od. To this must be added £10. 15s. 4d. the cost of the supplementary feed supplied to the calf, making a total of £24. 5s. 4d. It will be seen from Table 3 that only calves bucket-fed on whole milk cost more than this to feed.

On farms where milk is not produced for sale, the cost of calf rearing by multiple suckling can be based on the cost of feeding the nurse cow. If it is assumed that the nurse cow is a 700 galloner<sup>1</sup>, the cost of feeding such a cow for a year with feed charged at market price would be about £60. If eight calves are reared by such a cow, the cost per calf would be £7. 10s. Od. and the total cost of feeding the calf £18. 5s. 4d. Table 3 shows that this is more than the cost of feeding for the calves fed for less than four weeks on whole milk but less than the cost incurred for calves which received whole milk for more than four weeks.

There can be no cut and dried answer to this problem. The dairy farmer must ask himself - "How much milk are these calves getting?" and "How much could that milk be sold for?" He must also bear in mind that the saving in labour where calves suck cows is more apparent than real.

The farmer who is not selling the milk can only solve the problem by recording what the cow is actually fed and valuing this feed at its selling price on the farm. The total cost so derived can then be shared among the calves reared. Cow depreciation may be an important item of cost but if the nurse cow already has some

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<sup>1</sup> This is of course more than the national average yield.

defect, such as a damaged quarter, the depreciation may already have been incurred and reflected in the purchase price of the cow.

Variations in Costs according to Season of Calving

The figures given above are in respect of Autumn born calves and the question naturally arises as to what the costs of Spring born calves would have been. Some of the farmers visited intended to keep all their Autumn born calves indoors throughout their first Summer. This means that the only difference to be expected in the cost of Spring compared with Autumn born calves will be the value of the milk fed to them.

The Autumn born calves which were costed were fed milk which could have been sold at 3s. 3½d. per gallon (valued at August, 1954 to March, 1955 pool prices). Spring born calves would have been fed milk which could have been sold for only 2s. 9d. per gallon (February - September, 1954 prices). The differences in cost would have been as shown in Table 6.

DIFFERENCE IN VALUE OF MILK FED TO SPRING AND AUTUMN BORN CALVES

Type of Bucket-Feeding	Per calf		
	Reduction in value of milk fed to Spring Born Calves		
	£.	s.	d.
Whole milk only	2.	10.	10.
Whole milk for more than four weeks	1.	9.	9.
Whole milk for less than four weeks		13.	0.
Milk substitute only			9.

(NOTE : It is assumed that the consumption of other foods would not be different.)

Variations in Costs according to Age of Calf

This study continued until the calves were turned out to grass or until June 1st, if the intention was to keep the calves indoors throughout the greater part of the Summer. The average age at the end of this period was 7½ months. In many respects this is an inconvenient age, but it would have been unreasonable to ask farmers to exclude from the costings all calves as they attained the age of six months.

For comparative purposes there is much to be said for estimating what in fact it did cost to feed calves for the first 26 weeks.

These estimates are given in money terms in Table 7 and in physical terms in Table 8. In calculating these figures it was assumed that after the 26th week the calves consumed 4 lbs. of concentrates and 5 lbs. of hay per day. The concentrates were valued at 3 $\frac{3}{4}$ d. per lb., that is, at the average market value or purchase price of the home grown or purchased cereals and concentrates used. For the purposes of Table 8 this concentrate feed was deducted from the cereals and concentrate quantities shown in Table 3 on a pro rata basis.

ESTIMATED COST OF FEEDING AUTUMN BORN CALVES  
Up to six months, (26 weeks), in 1954-55

System of rearing	Per calf		
	£.	s.	d <sup>1</sup>
Whole milk only	24.	3.	6.
Whole milk for more than four weeks	19.	18.	6.
Whole milk for less than four weeks	14.	19.	7.
Milk substitute only	13.	6.	3.
Multiple suckling :-			
Supplementary feed and value of milk fed	21.	7.	0.
Supplementary feed and share of cost of feeding nurse cow	15.	7.	0.

<sup>1</sup> All food at market value.

It is interesting to note that the quantities shown in Table 8 are rather higher than those given in the Ministry of Agriculture Bulletin No. 10 "Calf Rearing", where the approximate requirements for the first six months are stated to be (p.13) :-

Milk	25 gallons
Gruel meal	50 lbs.
Dry concentrates	3-3 $\frac{1}{2}$ cwts.
Hay	4 cwts.

The difference in cost between various systems of calf rearing occurs in the first 12 weeks or so. When calves have been fully weaned from milk and milk substitutes and are eating solid food - a fairly wide range of feed is available and the choice of feed is in no way governed by the system followed during the first 12 weeks. The actual cost of the ration will depend very largely on the quantity of purchased feed included in it. The following table shows specimen calculations of the weekly cost of feed for different systems of rearing.

ESTIMATED FEED CONSUMED BY AUTUMN BORN CALVES  
Up to 26 weeks

TABLE 8

	BUCKET-FED CALVES				Per calf Multiple sucklers (exclud- ing keep of nurse cow).
	Whole milk only	Whole milk for more than 4 weeks	Whole milk for less than 4 weeks	Milk subs- titute only	
Milk (gallons)	92.0	55.0	24.0	-	?
Substitute or gruel (lbs.)	-	<del>89.0</del> 98.0	72.0	98.0	-
Cereals (cwts.)	2.5	1.6	1.6	2.2	1.7
Rearing nuts and cake (cwts.)	1.6	1.6	1.6	1.5	1.0
Hay (cwts.)	4.6	4.8	4.9	4.9	5.0
Other (cwts.)	0.5	0.6	1.0	0.7	0.9

SPECIMEN FEED COSTS FOR BUCKET FED CALVES

TABLE 9

Week No.	Per calf per week			
	Whole milk only	Whole milk for more than 4 weeks	Whole milk for less than 4 weeks	Milk subs- titute only
	£. s. d.	£. s. d.	£. s. d.	£. s. d.
1	1. 3. 4.	1. 3. 4.	1. 3. 4.	5. 10.
2	1. 3. 4.	1. 3. 4.	1. 3. 4.	5. 10.
3	1. 3. 4.	1. 3. 11.	14. 7.	7. 4.
4	1. 4. 4.	1. 3. 11.	12. 11.	8. 10.
5	1. 5. 2.	1. 5. 5.	12. 11.	8. 10.
6	1. 5. 8.	1. 5. 5.	8. 6.	10. 3.
7	1. 5. 8.	1. 6. 10.	10. 6.	10. 3.
8	1. 8. 7.	1. 8. 4.	10. 6.	10. 3.
9	1. 10. 0.	19. 4.	14. 0.	11. 8.
10	1. 11. 0.	1. 1. 8.	15. 9.	14. 7.
11	1. 11. 0.	12. 7.	12. 10.	8. 9.
12	1. 6. 1.	12. 7.	12. 10.	8. 9.
Total	15. 17. 6.	13. 6. 8.	8. 12. 0.	5. 11. 2.

Beyond the 12 weeks point feeding costs per week vary comparatively little because the calf's increasing appetite can be partly met by giving it more bulky and cheap feeding stuffs. From three to six months of age a suitable ration need not at present prices cost more than 10s. Od. to 12s. Od. per calf per week.

#### SUMMARY AND CONCLUSIONS

- (1) This report deals primarily with the cost of feeding Autumn born calves from birth until they are turned out to grass. Five groups of farms have been described, four of these reared calves on the bucket and one by multiple suckling on nurse cows.
- (2) All the feed supplied to the calves has been charged at its market price. This is a realistic procedure because nearly all the feed used could have been readily sold.
- (3) Some of the bucket-fed calves received whole milk only and some milk substitute only, but the majority were given some whole milk before being put on milk substitute.
- (4) The estimated cost of feeding the calves in the sample up to 26 weeks of age, under the various feeding systems, was :-

	£.
Whole milk only	24.
Whole milk for more than four weeks	20.
Whole milk for less than four weeks	15.
Milk substitute only	13.
Multiple suckling :-	
Supplementary feed and value of milk fed	21.
Supplementary feed and share of cost of feeding nurse cow	15.

- (5) These figures are feed costs only. No attempt has been made to value the calves at birth or at six months of age.
- (6) It is important to remember that these costs relate to calves on dairy farms. The majority of the calves were heifers intended for herd replacement. On the other hand, Channel Island breeds and Ayrshires were not included in the costs.
- (7) All the steers and all the heifers other than Friesian heifers were eligible to receive the calf subsidy of £7. 10s. Od. per head if they were well reared and likely to make a good beef animal.



- (8) Although the cost position is clear, it must still remain a matter of opinion as to which system yields the best product or the best return above cost.
- (9) This is largely because of the length of time which elapses before the calves are ready for market or in production. This may be two years or more for beef steers and even longer for heifer replacements for the dairy herd.

A P P E N D I X

Standard Charges and Procedures.

Labour

All labour, including that of the farmer himself was charged at 3s. 3d. per hour.

Share of General  
Farm Overheads

These have been charged for at 5s. Od. for each £l. of direct manual labour.

Feeding Stuffs

- (1) Purchased feed has been charged at cost delivered on the farm.
- (2) Home grown feeding stuffs have been charged at the average market price for the period 1st October, 1954 to 31st March, 1955. For those items for which no market price could be ascertained an estimated cost of production was used, but these were fed in insignificant quantities.

	<u>Market Price.</u>		
	(per cwt.)		
	£.	s.	d.
Wheat	1.	2.	7.
Barley	1.	7.	11.
Oats	1.	5.	5.
Mixed corn	1.	8.	0.
Beans	1.	10.	6.
Hay		8.	6.
Straw		1.	6.
Milk (pool price)		3.	3½ per gallon

- (3) No allowance has been made for the manurial residues of the feed fed.

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