Cattle - Cost of production

Agricultural Economics Department

University of Manchester

CASE STUDIES IN BEEF PRODUCTION

Bulletin No. 95/EC55

May 1960.

Acknowledgements

The Department of Agricultural Economics wishes to record its indebtedness and gratitude to the farmers who allowed their beef cattle to be weighed and who provided other necessary information. To the National Agricultural Advisory Service, for providing the weighbridge and co-operative operators, we are similarly indebted and grateful.

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Case Studies in Beef Production

Introduction

During the twelve months from Autumn 1958 to Autumn 1959 the Agricultural Economics Department of Manchester University studied aspects of beef cattle production on nine farms, as part of a national project stimulated by the Agricultural Improvement Council. Each co-operating farmer has received a copy of the statement describing his own methods and summarising the costs involved. It is felt that these farmers, and possibly others, would be glad to have a short account of each of the methods observed during the study.

This report, therefore, consists of short accounts of individual beef cattle enterprises and should not be read as anything more. A particular method may have seemed successful, or unsuccessful, on a given farm during the 1958-59 year: in another year, on some other farm, or with a different farmer the results might also have proved different. Since all the farmers reared calves, an attempt has been made to estimate costs for rearing rather than for the whole enterprise.

Nine Beef Cattle Enterprises

1. Multiple Suckling. On the first farm there is a large multiple suckling enterprise based on dairy type attested cows and using existing buildings originally designed for beef rearing and fattening. A beef bull is kept and the herd calves during early autumn. As each cow calves, similar beef cross calves are bought in the attested market so that

up to four calves may suckle one cow at the same time.

Suckling continues for ten to twelve weeks, when the calves are quickly weaned and replaced by further batches bought in the market. Cows are expected to rear a similar number of calves on this second round. When these are weaned after a further ten to twelve weeks they are replaced by a smaller, third batch. Altogether, a cow is expected to suckle ten calves during a lactation. The youngest calves in the last batch suckled once a day until August during 1959.

Calves are offered hay, grain, and cake from a fortnight old. After weaning they get mangolds, silage, and hay together with sugar beet pulp, grain and cake. Calves which are six months old go out to grass from May onwards.

The cows receive sugar beet pulp and grain to supplement autumn grazing. When housed in yards at night from November to April, mangolds, silage and hay are added to their diet whilst the sugar beet pulp is reduced.

All calves are electrically dehorned and bull calves are castrated before weaning. Calves are drenched against fluke and worms, and are injected against blackleg.

By autumn 1959 there were calves ranging from seven to thirteen months old and averaging respectively four to six hundredweights each. During the summer period the growing calves increased in liveweight by roughly $1\frac{1}{4}$ lbs. per head per day.

The replacement rate for cows was about twelve per cent. Mortality amongst calves amounted to almost twelve per cent.

Expenses per animal cannot be quoted exactly for a "continuous" system such as this; an estimate, allocating costs on a weight basis, would be as follows for a yearling weighing almost 6 cwts:

Calf purchase (net)	£10. 16. 0d.
Breeding herd depreciation	£1. 7. 0d.
Purchased Feed	£14. 7. 0d.
Home Grown Feed	£13. 6. 0d.
Grazing	£3. 14. 0d.
Labour	£3. 4. 0d.
Vet. & Medicines	£1. 18. 0d.
Total	£48. 12. 0d.

Against this should be set Government payments amounting to £8. 6. 0d., so that the approximate net cost to be covered by commercial receipts would be £40. 6. 0d. for a yearling of 12 to 13 months.

2. Multiple Suckling. Calves are reared on the second farm also by multiple suckling which is based again on attested dairy type cows. Hereford cross calves which are born in early autumn are got either by a borrowed bull or by A.I. As the calves are born similar calves are purchased in the market to give each cow four to suckle.

Suckling continues for two to three months when further young calves are purchased. For the third round of suckling fewer calves are put to each cow. The number of calves allotted to a cow depends upon a

visual assessment of its milk production and the progress of the calves. About ten calves are reared per cow. Weaning is carried out gradually, overlapping the arrival of new calves, so that the young animals are able to obtain only a limited quantity of milk when they start suckling.

Calves are housed in loose boxes whilst the cows graze all year but are yarded at night during the winter from November to March. The calves are offered hay, mixed corn, and cakelettes from a fortnight old; later, they also get some roots. After weaning, the calves are housed in yards and are fed hay, sugar beet pulp, and mixed corn with some silage or kale. They go out to fresh grass when six or seven months old, from April onwards.

Cows are fed hay, kale, and some concentrates during the autumn to supplement grazing. As the kale is finished, silage and swedes are introduced.

All calves are electrically dehorned and bull calves are castrated after weaning. All calves are injected against blackleg and are drenched fortnightly against worms whilst grazing.

By autumn 1959 calves on the farm varied from under seven months to over thirteen months old and averaged respectively $4\frac{1}{4}$ cwts. to just over 6 cwts. each. During the summer period the growing calves increased in liveweight by almost $1\frac{1}{4}$ lbs. per head, per day.

One quarter of the cows were replaced during the year. Mortality amongst the calves was under $4\frac{1}{2}$ per cent.

Expenses per animal are assessed, as for farm 1, on the final weight basis. Costs for a yearling, weighing just over $5\frac{3}{4}$ cwts. are estimated to be as follows:-

Calf purchase (net)	£11. 11. 0d.
Breeding herd depreciation	13. 0d.
Purchased Feed	£11. 14. 0d.
Home Grown Feed	£11. 6. 0d.
Grazing	£3. 6. 0d.
Labour	£4. 19. 0d.
Vet. and Medicines, etc.	£2. 12. 0d.
TOTAL	£46. 1. 0d.

Against this should be set Government payments amounting to £8. 4. 0d., so that the approximate net cost to be covered by commercial receipts would be £37. 17. 0d. for yearlings of about $12\frac{1}{2}$ months.

3. Bucket Feeding: Dairy Farm. On this farm calves are reared for beef as an ancillary enterprise to milk production. All calves are retained; these are Friesian calves from the heifers and Hereford x Friesian from the cows. Additional Friesian calves are purchased privately. Calving is concentrated in the early autumn.

Whole milk is bucket fed for the first fortnight; during the third week there is a gradual change to milk substitute. From this time hay kept in racks and calf pencils are available to the calves. At ten weeks, the calves are gradually weaned and, thereafter, receive hay and a concentrate mixture, based on grain, fish meal, cake and supplements, but whose constitution may vary. Grazing begins on 1st June but the

young stock continue to receive 1 lb. of concentrate mixture per head, per day.

Housing is loose in available pens or boxes in the farm buildings. Calves are dehorned using paste and bull calves are castrated at five to six months old. All calves are injected against blackleg and are drenched twice with phenothiazine.

By autumn 1959, when the calves ~~are~~ were about one year old, they weighed on average 5¼ cwts. During the summer period the liveweight increase averaged almost 1½ lbs. per head, per day.

There were no deaths amongst the calves and costs per yearling were as follows:-

Calf purchase	£8. 0. 0d.
Purchased Feed	£12. 5. 0d.
Home Grown Feed	£6.15. 0d.
Grazing	£3. 2. 0d.
Labour	£3.17. 0d.
Veterinary etc.	£1. 5. 0d.
TOTAL	£35. 4. 0d.

Against this should be set Government payments of £6. 7. 0d., so that the approximate cost to be covered by commercial receipts would be £28. 17. 0d. for a yearling of 5¼ cwts. at 12 months.

4. Limited Multiple Suckling. The fourth farm has a beef enterprise which is based on multiple suckling, outside in spring with dairy type cows. Cows are mated to a Hereford bull to calve early in the year.

As the calves are dropped, additional similar calves are purchased.

At first the cows are tied up with four calves suckling. This is gradually modified as further cows calve until each cow suckles three calves. After some ten days, cows and their three calves are moved to loose boxes. Ten days is enough to establish the necessary association and the cows (with calves) can then be transferred to a yard. During April (when the calves are one to two months old) the cows and calves go out to grass.

Creep feed is provided for the calves in the field and its daily replenishment provides an opportunity to look over the stock.

Some calves may be sold at about six months old, the rest continue to run with the cows until November when they are weaned. Cows continue to graze during winter (including kale) but the young stock are yarded.

Feed, consisting of grain, sharps, flaked maize and ground nut or linseed or soya bean, plus minerals, is mixed on the farm. During the winter, the calves also get silage and hay. Cows, which are brought in prior to calving early in the year, get silage, hay, and concentrates.

Calves are dehorned and bull calves are castrated in their third month. Drenching against fluke and worms is carried out monthly from March, whilst warble fly dressings are done in March, April, and May.

In the autumn these calves were eight to nine months old and weighed, on average, $5\frac{1}{4}$ cwts. There was a fairly wide variation of weight amongst the animals.

The replacement rate for cows was under 15 per cent.; mortality

amongst calves ~~are~~ was barely two per cent.

Up to the eight or nine months stage the costs per calf may be estimated approximately as follows:-

Calf Purchase	£8. 6. 0d.
Breeding Herd Depreciation	£1. 8. 0d.
Hand Fed Foods	£9. 12. 0d.
Grazing	£5. 0. 0d.
Labour	£2. 2. 0d.
Veterinary etc.	£1. 18. 0d.
TOTAL	£28. 6. 0d.

Against this should be set calf rearing subsidy of approximately £8. 0. 0d., leaving some £20. 6. 0d. per head to be met from commercial receipts.

During the five winter months the more forward calves were separated from the remainder and given a more generous concentrate ration. By the time these were 13 to 14 months old they had gained 1½ cwts., to weigh 6½ cwts., at an additional food cost of £16. 19. 0d. per head. The remainder getting less concentrates, put on 35 lbs. per head on average, to weigh 5¼ cwts., for an additional food cost of some £9. 6. 0d. per head.

5. Multiple Suckling and Bucket Feeding: Dairy Farm. On the fifth farm calf rearing for beef is subsidiary to the main enterprise of milk production. The system is flexible but is based mainly on the production of yearlings. These will be Hereford crosses from the dairy herd by A.I. or similar purchased animals. Calves will be multiple suckled if there is a nurse cow available (i.e. a cow in some way unsatisfactory in the milking

herd), otherwise they are bucket fed.

Three calves are suckled per cow and the cow is fed for three gallons of milk. Suckling continues for seven weeks, the calves being taken to the cow twice daily. Hay and calf pencils are available from an early stage so that the calves are eating well when weaned. Roots are added to the ration of autumn calves after weaning. Rearing nuts and home grown grain are introduced at about three months. Calves go out to grass in May at about seven months old; for the first fortnight only they get 1 lb. per head, per day of grazing nuts.

Bucket fed calves have one gallon of milk per day for three weeks and milk substitute for a further four weeks. Hay and cake are introduced early and after weaning at seven weeks the treatment is as for the suckled calves. Indeed, from three months old, the groups are run together. There is no significant difference in costs.

In the autumn, when these calves were eleven months to one year old, they averaged 5 cwts., having gained $1\frac{1}{8}$ lbs. liveweight per head, per day during the summer. Up to this stage it is estimated that, per head, costs were:-

Calf	£10. 0. 0d.
Purchased Feed	£9. 6. 0d.
Home Produced Feed	£12. 0. 0d.
Grazing	£1. 10. 0d.
Labour	£2. 9. 0d.
TOTAL	£35. 5. 0d.

6. Bucket Feeding: Dairy Farm. On the sixth farm, calves born in the autumn to the dairy cows are reared as replacements or, if sired by the Hereford bull, as beef stores. Each calf suckles for two days, is bucket fed for the remainder of the first fortnight, and then gets milk substitute until eight to ten weeks old. Weaning is determined by size rather than age and the calf may be getting 2½ gallons of milk substitute per day by the time it is weaned.

Hay is available to the calves from the third week and calf pencils are introduced two weeks before weaning. After weaning, rearing nuts replace the pencils; water is freely available.

The calves are housed in groups until they go out to grass in mid-May. All calves are injected against blackleg. The youngest calves may receive a small ration of cake when they first begin to graze.

By late autumn the yearlings averaged somewhat less than 4½ cwts. per head, having increased in liveweight during the summer period by almost one pound per head, per day.

There were no losses amongst these calves and the costs per head of producing yearlings of 12 to 13 months may be estimated as follows:-

Calf	£8. 5. 0d.
Purchased Feed	£7. 13. 0d.
Home Produced Feed	£3. 11. 0d.
Grazing	£2. 14. 0d.
Labour	£5. 0. 0d.
Veterinary, etc.	6. 0d.
TOTAL	£27. 9. 0d.

Against this can be set subsidy income of £5. 15. 0d., leaving £21. 14. 0d. to be met from commercial receipts for a yearling weighing under $4\frac{1}{2}$ cwts.

Stores are carried through the winter. They may be sold in the spring or retained according to progress and the market. Winter rations for yearlings consist of hay, roots, sugar beet pulp or brewers' grains and cake. Where the yearlings were fed 6 lbs. of nuts per head, per day they gained $\frac{3}{4}$ lb. liveweight per day: where they received only 3 lbs. of nuts the daily liveweight increase was only $\frac{1}{3}$ lb. per head.

7. Bucket Feeding. On the seventh farm the beef enterprise is based on Hereford cross heifer calves from attested herds, purchased at auction markets during the autumn and early winter.

General policy is to give calves glucose and water on the first day after purchase, milk and water for two days, and then gradually to change to milk substitute, which is fed at 6 pints per calf per day. Calf pencils are offered almost from the beginning and when 2 lbs. are eaten in the day a calf is weaned: this is normally at about nine weeks.

Only two house cows are kept, hence the limited milk available.

After weaning, the calves get hay and starter pencils with water freely available. Silage and meal are introduced at three to four months and these foods continue in varying amounts through the winter.

Calves are housed in draughty boxes or straw bale pens and scouring was severe with some casualties (attributed to eating barley straw).

All calves are electrically dehorned, and are drenched with P.T.Z. before and during grazing as an effective control of husk. Grazing is controlled by use of an electric fence.

By the autumn the calves were eleven months to a year old and weighed almost 4 cwts. having gained 1⅓ lbs. liveweight per head, per day during the summer. Mortality amongst calves was approximately 14 per cent. Costs per yearling are estimated as:-

Calf	£12. 16. 0d.
Purchased Feed	£5. 10. 0d.
Home Produced Feed	£8. 16. 0d.
Grazing	£2. 12. 0d.
Labour	£2. 15. 0d.
Veterinary etc.	£1. 1. 0d.
TOTAL	£33. 10. 0d.

Against this government payments averaging £9. 6. 0d. should be set, leaving £24. 4. 0d. per 4 cwt. yearling to be covered by commercial receipts.

In general, the yearlings are wintered for sale in the spring, although some are carried on to the two year old stage.

8. Multiple and Single Suckling. Store stock rearing is the object of production on the eighth farm where two breeding herds are kept. With the dairy x beef cows calves are multiple suckled in the autumn, whilst with the pure beef cows single suckling of spring calves is practised.

For multiple suckling, additional calves are bought in the market from attested herds so that newly calved cows will have up to four calves to

suckle according to their capacity. Calves suckle for approximately four months, being gradually weaned during the last fortnight. Fresh calves are then purchased for suckling.

Calves are encouraged to eat hay and a concentrate mixture, which includes weaning nuts, from about a month old. After weaning, the concentrates are increased; soon the nuts are replaced by fish meal and silage takes the place of some of the hay. Grazing begins in April, when calves are six to seven months old, but silage feeding continues for another month whilst $\frac{1}{2}$ lb. of corn per head is fed daily throughout the summer.

The multiple suckling cows graze, including kale, until December when they are housed for the winter and get silage, hay and concentrates.

All calves are dehorned with caustic at six weeks. They are drenched with Terramycin against scour, and vaccinated against husk and blackleg in the grazing season.

By the autumn there were calves of 7 to 8 months and of 12 to 13 months which had been reared by multiple suckling. The yearlings weighed almost 6 cwts. having gained rather more than $1\frac{1}{4}$ lbs. liveweight per head, per day during the summer.

Mortality amongst cows was $12\frac{1}{2}$ per cent. and amongst calves $3\frac{1}{2}$ per cent.

Expenses for multiple suckled calves cannot be quoted exactly but for the 6 cwt. yearlings may be estimated as follows:-

Calf Purchase	£11.	3.	0d.
Breeding Herd Depreciation	£5.	5.	0d.
Purchased Feed	£5.	1.	0d.
Home Produced Feed	£10.	13.	0d.
Grazing	£3.	9.	0d.
Labour	£5.	14.	0d.
Veterinary, etc.	£3.	19.	0d.
TOTAL	£45.	4.	0d.

Against this should be set Government payments amounting to £12. 6. 0d., so that the approximate net cost to be covered by commercial receipts would be £32. 18. 0d. for a yearling of some 13 months.

Policy with the single suckled herd is to calve down early in March and to leave the calves with the cows until they are sold as weanlings in September or October. Conditions may lead to deferment of sale in some years.

The cows are outwintered being given liberal supplies of oat straw together with some silage and hay. In spring they get a small ration of sugar beet pulp with which is mixed calcined magnesite. Calves are allowed a small quantity of concentrate creep feed for the last three months before weaning.

More than one-quarter of the breeding cows were replaced during the year; mortality was almost five per cent. Mortality amongst the calves was approximately nine per cent.

These calves were six to seven months old in the autumn at weaning and weighed some $3\frac{1}{2}$ cwts. each, which represented a daily liveweight gain from

birth of about $1\frac{3}{4}$ lbs.

Expenses for these calves are incurred mainly through the cows and are estimated per weanling as follows:-

Breeding Herd Depreciation	£12.	15.	0d.
Purchased Feed		15.	0d.
Home Produced Feed	£12.	13.	0d.
Grazing	£5.	2.	0d.
Labour	£6.	0.	0d.
Veterinary, etc.	£4.	0.	0d.
TOTAL	£41.	5.	0d.

Against this can be set £10. 10. 0d. for Government payments leaving £30. 15. 0d. to be covered by commercial receipts (and calf subsidy if the weanlings are carried over the winter).

9. Bucket Feeding: Dairy Herd. On the ninth farm beef stores are raised from a dairy herd of dual purpose cows served with beef semen by A.I. Calving is concentrated in winter and spring and the rearing is based largely on milk substitute.

Calves get their dams' milk for four days; for the next six days milk and milk substitute are fed in equal proportions. Milk substitute is then fed until the calves are one month old. Calf pencils, a little straw, and water are available to the calves from the end of the first week.

Weaning is carried out gradually during the fifth week and calves are then transferred from individual pens to small loose boxes. Trinamide

tablets are used, where necessary, to prevent serious scouring developing as calves come to depend more on the calf pencils.

After weaning, hay, calf pencils, and water are available to appetite until the calves are between three and four months old. At this stage calf pencils are replaced by a farm mixed concentrate and the calves are expected to rely increasingly upon hay for their nourishment.

Before grazing, and at intervals during the summer, the stock are dosed with P.T.Z. Apart from the initial period, all beef stock run together, whilst the dairy cows have the best available grazing. The young stock, approaching yearling stage, were brought in during October.

By the autumn these calves were from seven to twelve months old and weighed from $2\frac{1}{2}$ cwts. to almost 5 cwts. having averaged more than $\frac{3}{4}$ lbs. daily liveweight gain per head during the summer. Where groups of calves of mixed ages are handled together, the specific expenses per head to a given age can only be estimated. For an early winter calf raised here with bucket feeding and early weaning the costs are assessed as follows:-

Calf	£10. 0. 0d.
Purchased Feed	£6. 10. 0d.
Home produced Feed	£5. 0. 0d.
Grazing	£1. 15. 0d.
Labour	£2. 6. 0d.
Veterinary, etc.	14. 0d.
TOTAL	£26. 5. 0d.

Against this may be set government payments averaging £6. 5. 0d. leaving £20. 0. 0d. per yearling calf of $4\frac{1}{2}$ cwts. to be met from commercial receipts.

General Comment

Readers should resist any temptation to make straightforward comparisons between the estimated costs on the different farms since this might be misleading. No only are there variations in the time of year, the weight, the type of animal, and to some extent the age of beasts to which the costs refer, but on several farms other methods are also employed - if to a smaller degree. All these factors affect the interpretation of "cost" figures which are given only as a brief and approximate summary.

It should be remembered, also, that differences in method affect the distribution of costs. For example, where single suckling is the method followed, the "cost" of obtaining the calf is covered by the upkeep of the cow and this appears mainly against feed items. Where calves are purchased for multiple suckling there is a direct "cost" of buying which can be entered as such. Again, the depreciation of the breeding or nurse cows (herd maintenance) is spread over several calves per cow where there is multiple suckling but is carried by one calf per cow in single suckling. Further, the single suckling cow requires relatively little supplementary feed, maintaining herself and providing for the calf largely from grazing. With multiple suckling the cow is expected to produce on the scale of a dairy cow and has to be fed accordingly; moreover, after the first two months the calf is also dependent on supplementary feeding. The advantage of intensive methods is that they make possible a larger turnover, where this is desirable.

In the course of the studies several hundred potential beef animals were put over the weighbridge - some only once, some three times. It is possible to draw a few impressions from the series of weighings, but by the nature of things they can be no more than impressions, for more precise comparisons can only be made where all conditions are standardised except for the one variable being examined.

Amongst the cattle on these farms Hereford (or Hereford crosses on dairy stock) and Friesian were most common: age for age the Hereford cattle were generally a little heavier. In general, steers were heavier and grew a little faster than the heifers. Possibly, the relative advantage to steers was a little greater where castration was carried out later rather than earlier. Greater liveweight increase on grass seems to have been made by steers which were heavier, age for age, when grazing began. Differences in the weight of heifers at the commencement of grazing do not seem to have influenced the rate of their growth. Readers will appreciate that these influences may be too closely inter-connected for them to be separated and given anything approaching exact measurement.

Store rearing on these farms is largely based on autumn calving cows; only one farm concentrates on spring born calves, although four others rear some in addition to the autumn drop. In working this way they run counter to tradition and perhaps raise fresh problems - for themselves or store cattle buyers - concerning the treatment of yearling stores during their second winter. For it is fairly clear from these weighings that store cattle

of eight or nine months old and upwards in the autumn do not grow appreciably on normal winter rations and that to keep them growing is costly. The position on these farms appears to be that up to eight or nine months old a calf is adequately fed at any time of the year to enable it to gain one to 1½ lbs. daily. This rate will be maintained by the yearling on grass during the summer whereas in winter the rate of growth falls to around half a pound a day, or even less.

Whether the rates of growth in winter and summer are closely inter-dependent, and how they interact, remains a matter for argument but it is clear that, as stores approach the two year old stage, they will readily gain 2 lbs. per day whilst grazing. Associated with seasonal rates of growth and feeding, the beef cattle producer must take account of price movements in the market. Here, the spring price (March-April) for calves and yearlings has recently been some £2 per head above the autumn price (September-October) but the price for fat cattle has been fifteen shillings or more per cwt. higher. Although this represents £6 on an 8 cwt. animal, it is by no means clear that it covers the higher cost of winter feeding.

It might be anticipated that the long-run effect of these factors, with otherwise reasonable stability, would give rise to more pressure to sell young stores in the autumn and to buy in the spring. This would widen the differentials between spring and autumn prices for stores and for fat cattle, so tending to make the margins on each season's production more nearly

equal. From this point it would be easy to argue that, with animals fat at two years old, there would come to be greater emphasis on autumn calving.

However, it is clear that beef production is not yet stable. Greater specialisation, and pressure for still younger fat cattle are likely to be significant influences. For example, some of the better reared calves are going out fat at 18 months old. These will need to average 8 cwts. at slaughter, which represents a rate of growth from birth of just over $1\frac{1}{2}$ lbs. per day. If they are autumn born calves sold fat in the spring, this requires good and ample feeding during the second winter. The results from the fourth farm show that a rate of increase of $1\frac{1}{2}$ lbs. per day during the winter is not obtained easily or cheaply. On the other hand, if spring born calves are to be sold fat in the autumn off grass, it will be maintaining the rate of growth during the middle winter period which may present difficulty. These husbandry considerations have to be set against the recent market returns for 8 cwt. animals of about £60 in the autumn and about £68 in the spring.

If there is greater emphasis on autumn calving, the seasonal pattern of prices will almost certainly be affected. Equally, if there are changes in the methods of production costs are bound to be modified. As yet one cannot say which development will be the more important; nevertheless, a general appreciation of future prospects suggests that cost reducing developments are the ones to seek.
