Cattle

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BEEF PRODUCTION

An Economic Report

J. S. Kurta

Edited by F. G. Sturrock

Agricultural Economics Unit
Department of Land Economy
University of Cambridge

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Foreword

There can be little doubt that of all farm enterprises, cattle are the most difficult to assess in economic terms. There are indeed pessimists who maintain that every bullock dies in debt but farmers still continue to rear cattle. They do so for a variety of reasons, not all of them economic. Traditionally cattle were fattened on arable farms to tread straw and make manure to grow crops. But this is no longer so compelling a reason because fertility can generally be maintained by purchasing fertiliser or in other ways. The keeping of cattle is sometimes justified as a means of using pasture or by products that would otherwise be unused or labour that would otherwise be idle. These are important considerations but by themselves, they are a poor excuse for an enterprise that loses money. In the long run therefore cattle should be expected to show a profit in their own right and with care it should be possible to select a system that will produce a profit on most types of farm.

There is another point. Cattle frequently change hands and calves reared on one farm are finished on a second or even a third. The total returns will thus be divided between these stages. It might be supposed that although prices fluctuate, supply and demand should in the long run ensure a reasonably fair division of profits between these stages. But this is not always true and the fattener for example may continue to lose money at the expense of the rearer because he tends to overbid for stores. Sometimes this is because the farmer has no reliable criteria by which to judge the profitability of cattle on his farm.

The aim of this report is to attempt to answer some of the problems already mentioned. To do so, Part I is devoted to describing alternative systems of beef production and assessing their advantages and disadvantages. One method of classifying systems would be according to final product i.e. baby beef, 18 month fat cattle, 2½ year old fat cattle etc. Such a comparison would be interesting to the farmer who carried cattle from birth to slaughter but would not help the majority who keep cattle for only one stage of development. The classification is therefore based on the choices open to the farmer. He can start with calves from a dairy herd or from beef cows. He can rear them intensively as barley beef or he can sell them as stores at various ages. He can buy stores for grazing on pasture or for feeding in yards. He can time his purchases and sales to catch the best prices in autumn and spring. Among the many permutations that these alternatives provide, the author has selected 32 systems that are of importance in practice. The codes used to describe them may at first seem difficult to follow but they are in fact a form of shorthand that is easy to understand. The returns to land, labour and capital are then assessed in each case.

The criteria used to judge the merits of each system are according to the return obtained for the resources used. The most important resource is usually capital and the result is given as the "discounted cash flow" over ten years from an investment of £5,000 (i.e. the surplus left after the cattle enterprise has paid all costs including 10% interest on the capital invested). Other criteria are also given—return per acre, per head, per hour of labour or per unit of housing in case these are the factors that limit the farmers' freedom of action. Still another criterion is the extra income that cattle would produce on typical farms. A recommended list of systems is then given with indications of the merits of each. There has been some increase in beef prices since this data was collected but as this has been matched by higher costs, the conclusions (particularly the orders of preference) should still be valid.

The author is indebted to the many farmers who co-operated by weighing their cattle and providing the other information necessary for this study. The original manuscript has been extensively edited by the present writer but the author is entirely responsible for the data presented and the opinions expressed.

F. G. STURROCK

Director, Agricultural Economics Unit

PART I

A COMPARISON OF BEEF PRODUCTION SYSTEMS

Chapter 1. Introduction and Resume

The aim of this publication is to assess the economics of beef production—particularly on an arable farm. Part I is devoted to a comparison of different systems and, as will be seen in Chapters 2 to 5, several different criteria have been used. It may be asked why this should be necessary. Why cannot the economist devise a simple test against which different systems could be compared? Is it not enough to calculate the costs and returns for each type of beef herd and choose the one with the largest profit?

If the farmer has a specialist beef unit with its own labour force and buildings and uses grain with a definite market price, then it is a simple matter to calculate a separate profit for this enterprise. In most cases, however, the beef herd is inextricably woven into a farming system and uses inputs that have no other use. Beef cattle may use labour in winter which would otherwise be idle. They may use byproducts such as sugar beet tops that have no cash value or pasture that cannot be ploughed and used for crops. The solution used in this investigation was to charge items such as barley that could have been sold if not fed to cattle and not to charge items such as byproducts or labour that would have been wasted if the cattle had not been on the farm.

Having ascertained the return, what standard of comparison can be used to compare systems? Profit per head would not, for example, be satisfactory because some cattle are kept for a much longer period than others and should therefore show a larger profit. Inputs also vary in a way that may not show up in the profits. A single-suckled herd has a heavy capital investment in a breeding herd whereas purchased calves have none. An intensive calf-rearing unit requires far more labour per head than a herd of cattle grazing out of doors.

One method of putting all inputs and outputs on a common footing is to express the result as a *return on capital.* As can be seen from Table[1] the best returns to capital come from rearing pail-fed calves. This is hardly surprising. Capital requirements are modest because only calves are bought at the beginning and if they are sold at three months, the farmer can turn his working capital over four times a year. Further down the list appears barley beef and some of the more intensive 14 and 18 month fattening.

Although an important criterion, return to capital should not be used alone. The farmer may have ample capital or at least enough at the time of the year when it is needed for cattle. After harvest an arable farmer usually has plenty of cash to buy cattle for wintering even if he is short of capital in spring.

Another important criterion is the return *per acre.* It will be seen (Table 1) that in some systems the gross margin per acre can be as much as £40 to £80 or even more, as high a return as could be obtained from cash crops. Sometimes, however, these returns per acre are somewhat artificial because the chosen system requires hardly any land. Intensive calf-rearing for example requires hardly any land except to grow the small amount of hay consumed. Most of the food comes from barley and other grains, the acreage of which is not included[2]. Further down the list, some multiple-suckling and rearing and fattening systems use an acre or more per head and return gross margins of £20 to £30 per acre. This is a very fair return for unploughable pasture but not enough to compete with cash crops—except as a

[1] For an explanation of the system codes, see Table 5, page 15.

[2] Cereal crops are counted as cash crops. If the grain is fed, it is 'sold' at market price to the livestock.

ley intended as a break crop. Further down the list (see Table 8) single-suckling and a number of the small stores show returns of only £10 to £20 an acre and the summering of forward stores is below £20—a poor return unless no better use can be found.

Table 1 Systems giving the Highest Return to Single Inputs

To Capital (per £5,000 over 10 years D.C.F. discounted 10%)			*To Land (per acre of pasture and forage)*			*To Labour (per hour overall)*		*Per Head*		
System	*Capital per head*	*Return*	*System*	*Acres per head*	*Return*	*System*	*Return*	*System*	*Months Duration*	*Gross Margin*
	£	£			£		£			£
PF–S3	20	13479	PF–S3	None		S24(S)–F30	1·8	SS–F24	24	48
PF(A)–S14	45	11402	PF(A)–S8	0·1	123	S8(S)–S14	1·5	PF(A)–F24	24	43
PF(A)–S8	36	9129	PF(S)–S8	0·1	113	S14(S)–S20	1·2	MS–F24	24	40
PF(S)–S8	36	8324	PF–F12*	0·2	85	PF(A)–S14	0·9	SS–F14	14	39
PF(A)–F24	94	8269	PF(S)–F12*	0·2	85	PF–F12*	0·8	SS–S14	14	37
PF(S)–S14	48	7603	PF(S)–S14	0·4	40	PF(A)–S8	0·8	SS–S20	20	37
MS–S14	53	6736	PF(A)–S14	0·5	38	PF(A)–F24	0·8	PF–F24	24	33
MS–F24	107	6620	PF(A)–F18	1·0	31	PF(S)–F12	0·8	PF(A)–F18	18	31
SS–F14	110	6190	MS–S8	0·5	28	SS–S8	0·8	SS–S8	8	31
S8(S)–S14	46	5986	WSS–F14	0·3	25	PF(S)–S8	0·7	MS–S20	20	23
PF(S)–F12*	65	5948	PF(A)–F24	1·8	24	PF(A)–F18	0·6	MS–S14	14	21
PF(A)–F18	90	5927	MS–S14	0·9	24	SS–S14	0·6	PF(S)–S20	20	21
PF–F12*	48	5795	PF(A)–S20	0·8	23	PF–S3	0·5	PF(A)–S14	14	19
MS–S8	98	5785	PF(S)–F24	1·6	21	SS–F14	0·5	PF(A)–S20	20	18
SS–S14	110	5764	MS–F24	2·2	18	PF–S20	0·5	PF–F12*	12	17

*Barley Beef

System Code—First half (before hyphen) describe animal as bred or purchased; second half describes it as it leaves as fat or store:

First half:	PF	Pail-fed calf	Second half:	S20	Sold as 20 month store
	SS	Single-suckled calf		F30	Sold as 30 month fat
	MS	Multiple-suckled calf			
	S8	8-month store			
	(A)	Born or purchased in autumn			If (A) or (S) not specified,
	(S)	Born or purchased in spring			born or purchased all year round.

With increasing scarcity of labour, return *per man hour* is becoming more important. Some cattle enterprises show returns of £0·80 to £1·80 per hour, a very fair return. Mature cattle for example require very little attention and thus show a good return for such time as is spent on them. In examining returns to labour, the farmer should bear in mind the fact that although the worker expects the same wage all the year round, his value to the farmer depends on the season. In winter, when bad weather stops cultivation, time may be of little account but when grain or roots are being harvested, a man hour can be worth many times the wage paid. The balancing of marginal values of labour that can be used for alternative uses is one that can be calculated with linear programming. In this case, the computer selects the system that best utilises the scarcest resource available. This may not necessarily be the system that by itself appears the most profitable. This aspect is dealt with in Chapter 5.

To bring together these various tests, a list is given (Table 2) of the 15 systems out of the 32 systems considered in this report[1] which appear to have merit. The criteria are given in the order: returns to capital, returns per acre, appearance in computer plans, returns per man hour, and finally returns per square yard of housing. According to whichever resource is most valued, a system can be chosen to suit the circumstances. As the farmer is often short of several of these resources, the choice may rightly fall on the one that satisfies the largest number of these criteria.

[1] These 32 systems are illustrated in Figure 1 page 9.

Table 2 Recommended Systems of Beef Production

System Code	Start with	Finish with	Months on Farm	Return on:—								In Computer[4] Plans
				Capital	Acres	Housing Space	Labour					
							Early Spring	Late Spring	Early Autumn	Late Autumn	Overall	
No. 1. PF–S3	Pail-fed Calf[3]	3m Calf	3	XX	XX[1]	X						X
2. PF–F12[5]	,, [3]	12m Fat	12	X	XX		X			X	X	
3. PF(A)–S8	,, (autumn)	8m Store	8	XX	XX			X			X	X
4. PF(A)–S14	,, (autumn)	14m Store	14	XX	X	X	X	X		X	X	X
6. PF(A)–F18	,, (autumn)	18m Fat	18	X	X			X				
7. PF(A)–F24	,, (autumn)	24m Fat	24	XX		X	X	X				
8. PF(S)–S8	,, (spring)	8m Store	8	XX	XX					X		X
11. PF(S)–F12[5]	,, (spring)	12m Fat	12	X	XX					X	X	X
14. SS–S14	Single-suckled Calf[3]	14m Store	14	X		X[2]			X			
16. SS–F14	,, (spring)	14m Fat	14	X		X[2]			X			
19. MS–S14	Multiple-suckled Calf[3]	14m Store	14	X								
21. MS–F24	,, ,, [3]	24m Fat	24	X								
25. S8(S)–S14	8-month Store (spring)	14m Store	6	X		X[1]	X				X	X
28. S14(S)–S20	14-month ,, ,,	20m Store	6			X[1]		X		X	X	
32. S24(S)–F30	24-month ,, ,,	30m Fat	6			X[1]	X			X	X	X

[1] None used [2] If the cows are outwintered [3] All the year round [4] Small numbers ignored [5] Barley Beef

X Good Return XX Very good return (indicated for land and capital only)

It will be appreciated that the figures given are those that applied when this investigation was carried out and are liable to vary. By and large, however, small changes in cost since then have been matched by adjustments in price. In the absence of any drastic change, therefore, the orders of preference suggested should not have changed appreciably. The relative profitability of different groups depends of course partly on costs but mainly on the market prices for different age groups. If, for example, farmers realised that the younger stages were more profitable than the older, they could bid up the price of calves and let the price of forward stores fall. Farmers, however, have reasons other than profitability for choosing mature animals—they are less of a responsibility or they give manure for the potatoes. For this reason, price differentials change slowly. Meantime, the farmer looking for a genuine profit from beef cattle can find it in spite of the popular belief that cattle never pay. It is asking too much to expect a list of 'best buys' in choosing a system of beef production. Within the limitations stated, however, this report is perhaps as near as one can go to providing such a guide.

While Part I of this report deals with the choice of system, Part II deals with the factors affecting the profit margin for any given system. The data for Part I was collected over a number of years from nearly 300 farms in East Anglia, covering over 10,000 cattle.

Much of the information used in Part II was collected in co-operation with the Eastern Counties Beef Recording Society and the National Agricultural Advisory Service and use has been made of their recording schemes. The results gave a usable sample of 280 pairs of weighings on 184 individual groups of cattle from 99 farms, covering nearly 4,000 head. Although the results obtained from this investigation could be applied in areas other than East Anglia, the input-output coefficients may differ in detail. This applies especially to grazing because the output per acre is higher in some regions than others. In part, this is due to the more suitable climate, and partly due to the amount of attention given to grass cultivation. In the Eastern Counties, for example, grass does not always receive the attention that is given to arable crops.

Chapter 2 Systems of Beef Production

In comparison with other farm enterprises, beef production has certain characteristics of its own.

1 **The production cycle.** Unlike cash crops that have an annual cycle, the beef cattle cycle can vary from a few months to several years. Once a system is established, however, there is an annual batch, or in some cases a continuous flow of stock to the market.

2 **Flexibility.** Compared with other livestock enterprises, beef production is very flexible. To produce milk, specialised buildings and equipment are required and the herd may be built up over a long period. This means that a decision to start or stop milk production is a major event not to be lightly undertaken. By contrast, cattle rearing and fattening can be given up at any time simply by not buying calves or stores, and can be re-started again just as easily. A breeding herd of beef cows is a more stable unit but this is usually the only exception.

Again, there is a wide choice of system depending on the size of cattle kept, the season when they are bought, the season when they are sold and the intensity of feeding. Not only is this so, but the system can be changed from stores to fat cattle or from grazing to grain feeding without much difficulty. By contrast, dairying is much more rigid and once a system has been chosen, changes are difficult and expensive.

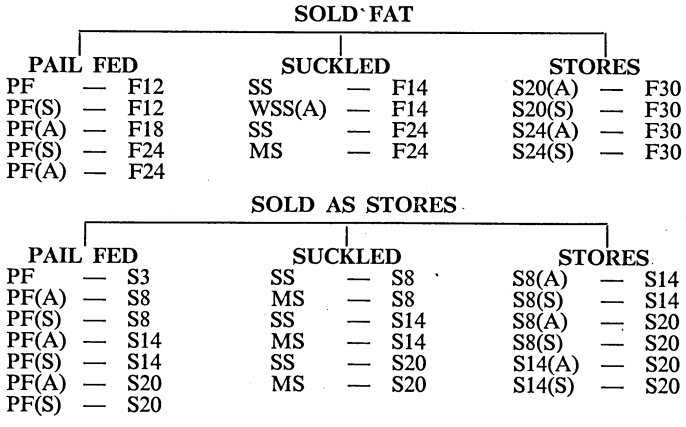
Because of this flexibility, a number of management decisions have to be made when starting beef production. Indeed, because each system uses a different combination of inputs, it is unwise to regard beef production as a single enterprise. It is a series of enterprises with different requirements of buildings, crops and labour. If this point is realised, the reader will not expect a single recommendation of one best universally profitable method of beef production suitable for all farms. As each farm has different amounts of land, labour and capital, a beef system profitable on one farm may not be profitable on another.

In deciding on a system for any given farm, the problem is twofold. First, one must decide on a system, and having done so, it then remains to maximise profit within that system.

Due to the flexibility of beef production, there is almost an infinite variety of systems, particularly if we include store production as well as fattening. Although East Anglia is traditionally an area where animals are finished, a surprising number of farms produce stores, especially younger beasts. Store production was therefore included in addition to fattening. Indeed, more cattle storing than fattening systems are described, not because stores are more important but because there is a much wider range of ages at which the cattle can be sold.

Thirteen systems of producing fat cattle are included and nineteen of store production, giving a total of thirty-two, as shown diagrammatically in Figure 1.

Figure 1 Systems of Beef Production



System Code—See Table 1, page 6.