The Size and Weight of Cattle and Sheep in Early Modern Scotland

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Abstract

This paper argues the need for a greater understanding of the size, weight and carcass composition of cattle and sheep in early modern Scotland. These questions are then addressed through a consideration of modern 'unimproved' breeds, archaeological evidence regarding bone measurements, eighteenth-century household accounts, and contemporary agricultural commentaries. On the basis of these four sources, working estimates of the carcass-weight and composition of pre-improvement cattle and sheep are proposed and their usefulness illustrated through a calculation of the nutritional contribution, and cost relative to oatmeal, of meat in the diet of masters and students at St Leonards College, St Andrews, in 1671.

In a project aimed at charting the movement of wages, prices and living standards in Scotland between 1550 and 1780[1] a quite unexpected problem emerged with regard to the size and weight of contemporary cattle and sheep. This arose from a concern, on the one hand, with the nutritional value of known diets and, on the other, with the relative cost of different types of food.[2] Both demand an appreciation of the quantities to which diet accounts or price quotations refer, and although rarely a straightforward matter – the weights and measures used in early modern Scotland are notoriously difficult to quantify – this is a particularly difficult task where meat is involved. Early sources almost invariably refer to the consumption and cost of beef and mutton in terms of whole carcasses, whilst any investigation of the nutritional value of the meat provided in early diets, or of its value relative to other foods, demands a much more precise understanding of the quantities involved.

The St Leonards College diet accounts of 1671 illustrate the problem.[3] These reveal that over the period 5 May to 29 June the masters and students consumed (among many other items) some 145½ pieces of salt beef, 141 pieces of fresh beef, and 171 quarters of mutton. Any estimate of the nutritional value of this meat requires some knowledge of the size of the pieces of beef and quarters of mutton. Glosses in the accounts show that 223½ of these pieces of beef were cut from 3¾ carcasses and, as would be expected, that each mutton 'bowk' provided four quarters. The problem thus becomes one of establishing the amount of flesh carried by these carcasses.

Similarly, oatmeal cost in the region of

[1] A J S Gibson and T C Smout, 'Wages, Prices and Living Standards in Scotland'; an ESRC funded project, the results of which are to be published in due course by Cambridge University Press.

[2] In relating the cost of one food to another the determining criterion has been the effective cost of the calories provided. Food does, of course, provide much more than just calories, but a deficiency is felt immediately as hunger and, for those whose resources did not permit indulgence or variety, the satisfaction of energy requirements was probably the most important factor governing the choice of food.

[3] St Leonards College Diet Accounts, 1671; St Andrews University Muniments, SL 530/3. I am indebted to Miss M M Innes for allowing me to use her transcripts of these accounts.

£3.13*s* 4*d* Scots per boll at this time.[4] Taking the boll to weigh 8 stone Scottish Troy (or 2228 oz Imperial Avoirdupois), and oatmeal to provide 114 Kcal per ounce, this means that a penny spent on oatmeal obtained something of the order of 290 Kcal.[5] Knowing that beef and mutton carcasses purchased by the college cost, on average, £15.6*s* 8*d* and £2.6*s* 0*d* respectively is of little use in determining the cost of meat relative to oatmeal unless we also know approximately how much meat was provided by each carcass. Further progress clearly demands some working estimates regarding the size of pre-improvement cattle and sheep and the amount of flesh they provided.

That these animals were smaller than their modern counterparts is unquestionable, but just how much smaller never seems to have been considered in any detail. Robert Trow-Smith said of the weight of seventeenth-century beef carcasses that 'there is grossly insufficient evidence... to permit any dogmatic statement to be made upon them' and was able to do no more than draw attention to what he considered to be the two extremes; an ox slaughtered in Lincolnshire in 1692 with a live-weight of nearly 32 cwt (3584 lb), and a contemporary estimate which put the live-weight of an Irish ox at 784 lb.[6] The former was originally noted only because it was an exceptional weight, but even the latter appears quite large in the face of the Scottish evidence. Such estimates led Trow-Smith to voice 'a suspicion – but no more – ... that the later improvers redistributed the weight of beef in the mature beast rather than added to it'.[7] Certainly the major concern of livestock breeders during the eighteenth and nineteenth centuries was not to increase overall carcass-weight but to change the proportion both of edible meat and the best joints on the carcass. The meat was progressively moved from the fore-quarters to the hind-quarters, the barrel rounded, the thigh and second thigh more heavily fleshed, the hide thinned, and the bone fined down.[8] Simultaneous achievements included a mixing of fat and lean meat on the carcass so that the meat became marbled, and a shortening of the time it took to bring an animal to full maturity.[9] However, whilst the largest animals of the late seventeenth century, invariably Shorthorns, were comparable in size to the largest beasts recorded at the end of the eighteenth century, other breeds, and the common run of animals, were undoubtedly to experience a considerable increase in size during the eighteenth and nineteenth centuries. Thus in 1710 the average carcass-weight of an ox was supposed, in England, to have been around 370 lb, whilst by the end of the eighteenth century Youall considered it to be more like 550 lb.[10] The Scottish evidence, although limited and drawn from a number of disparate sources, points towards a smaller average weight than might be supposed from these English figures, and a much smaller weight than was envisaged by Trow-Smith.

[4] Fiars' prices provide a valuable guide to Scottish grain prices during the seventeenth and eighteenth centuries (R Mitchison, 'The Movements of Scottish Grain Prices in the Seventeenth and Eighteenth Centuries', *Econ Hist Rev* 2nd ser XVIII., 1975, pp 278-91). Whilst there are no prices available for Fife in 1671, the Fiars' price for oatmeal in 1672 was £3.13*s* 4*d* per boll (M Flinn *Scottish Population History*, Cambridge, 1977, Appendix on Fiars' Prices). Elsewhere in Scotland 1671 prices were somewhat higher than those recorded in 1672 so this figure should be seen as a minimum price at which oatmeal could have been purchased.

[5] The oatmeal boll was not defined as 8 stone Scottish Troy weight until 1696 (*Acts of the Parliaments of Scotland*, Vol 10, p 34, c6), but as this seems to have been an attempt to standardize the existing boll by measure in terms of weight it may be taken as the size of the boll in 1671. According to A A Paul and D A T Southgate's *McCance and Widdowson's The Composition of Foods*, 4th revised edition, MAFF, 1978 oatmeal provides 113.68 Kcal per ounce.

[6] R Trow-Smith, *A History of British Livestock Husbandry to 1700*, 1957, p 240 quoting A Young, *Farmer's Tour through the East of England*, 1771, Vol. I, p 469 and J O'Donovan, *The Economic History of Livestock in Ireland*, Cork, 1940, p 47.

[7] R Trow-Smith, op cit., p 240.

[8] R Trow-Smith, *A History of British Livestock Husbandry, 1700 – 1900*, 1959, p 170.

[9] *Ibid.*, pp 257-8.

[10] J Clutton-Brock, 'British Cattle in the Eighteenth Century', *The Ark*, Vol. IX (2), 1982, p 56.

The paucity of the evidence does mean that only the broadest guide to the average weight of pre-improvement Scottish cattle and sheep can be claimed, but even more problematic is the fact that individual animals would always have varied greatly in size, weight and composition. The age, breed and the time of year an animal was slaughtered would clearly have affected its size; as would the region and even locality in which it was raised. Cattle pose particularly severe problems, as recognized by the Town Council of Aberdeen who, whilst meeting annually for much of the sixteenth and seventeenth centuries to set the price of mutton, usually shied away from fixing the price of beef carcasses specifically because their size was so variable.[11] The difficulty lies in the fact that although it is possible to establish a reasonable estimate of the average weight of cattle and sheep carcasses, the distribution of individual weights about the average is so great that the actual animals referred to in diet accounts and price series may be very different indeed. Unless such accounts and price series provide some internal evidence on the size of the animals in question (and they very rarely do) it must be accepted that the weights determined in this paper can only provide the most general working estimates necessary for the analysis of relative food costs and the nutritional value of known diets in early modern Scotland. This variability of carcass-weights clearly poses considerable problems for the interpretation of diet accounts and price series, but the present task is to establish some realistic estimates regarding the average size and weight of pre-improvement cattle and sheep. To this end evidence has been sought from four sources;

1) a comparison with modern 'unimproved' breeds
2) archaeological evidence (extrapolation from bone measurements)
3) general agricultural commentaries
4) Slaughter books and household accounts

Used together these sources provide some indication of the average weight of pre-improvement cattle and sheep, the relationship between live-weight and carcass-weight, the amount of meat and edible fat on the carcass, and the nature (and hence nutritional value) of that meat and fat.

I

The evidence refers to both live-weight and carcass-weight, whilst the ultimate goal is to establish the amount of usable flesh on each carcass. Carcass-weight relative to live-weight is described by the killing-out percentage. As tabulated by Sir J B Lawes in the nineteenth century,[12] this percentage varies with the type of carcass slaughtered;

	Killing-out Percentage
Store Cattle	50 – 51
Fresh Store Cattle	52 – 53
Moderately Fat Cattle	54 – 57
Fat Cattle	58 – 62
Very Fat Cattle	62 – 65

Unimproved breeds would certainly have lain towards the lean end of this range as small scraggy animals naturally tend to have a higher proportion of skin, bone and entrails relative to body-weight than larger animals. B Noddle has assumed a killing-out percentage for Anglo-Saxon and medieval cattle of 45 per cent,[13] but if some degree of fattening for the market may be presumed then an average killing-out

[11] Minutes of the Annual Head Court, held in October or November, and recorded in the Aberdeen Town Council Register held at the Town House, Aberdeen.

[12] J B Lawes, *Tables for Estimating Dead Weight and Value of Cattle from Live Weight*, (undated, but published by the Agricultural Society of England in the late nineteenth century).

[13] B Noddle, 'The Determination of the Body Weight of Cattle from Bone Measurements', *Domestikationsforschung und Geschichte der Haustiere, Internationales Symposium in Budapest, 1971*, edited by Janos Matolcsi, Budapest, 1972, p 384.

percentage of 50 per cent seems more reasonable.

The amount of edible flesh carried by such carcasses has also been analysed[14], and it too varies according to the type of carcass:

	Type of Carcass		
	Lean	*Average*	*Fat*
Lean Meat	66%	59%	50%
Edible Fat	13%	21%	32%
Tallow Fat (Kidney Knob and Channel Fat)	3%	4%	5%
Bone	18%	16%	13%

Before the fashion for breeding fat animals took hold, the majority of beasts would have tended towards the 'lean' end of this range, and both M L Ryder and B Noddle have suggested that a total fat content of 15 per cent would be a reasonable estimate for pre-eighteenth-century animals.[15] It has also been suggested that breeding for meat has led to a shift in fat distribution within the body.[16] Unimproved breeds, and those bred for milk production, tend to have a relatively higher proportion of internal fat (i.e. as the kidney knob and channel fat) and less subcutaneous fat; a distribution which would have resulted in a smaller proportion of edible fat on the carcass. A reasonable estimate of carcass composition in early breeds would seem to be:

	Percentage of Carcass-weight	*Percentage of Live-weight*
Lean Meat	66	33
Edible Fat	12	6
Tallow Fat	4	2
Bone	18	9
Remainder [Head, hide and entrails]	–	50

Using these figures, 78 per cent of a carcass or 39 per cent of a live animal may be presumed to be edible flesh; the nutritional value of which may be calculated from modern tables of food composition on the understanding that 85 per cent of that flesh was lean meat and 15 per cent was fat. Although only a broad estimate, this would mean that after cooking the edible flesh provided about 44 Kcal per ounce.[17]

Turning to the question of how much flesh pre-improvement cattle may have carried at the end of the nineteenth century Pitt-Rivers suggested that the Kerry was comparable in size to Romano-British cattle.[18] The Kerry, however, with a live-weight of about 1000 lb, is not a particularly small animal and M L Ryder has argued that the Dexter, with a live-weight of only about 650 lb, is a more appropriate modern analogy for the Celtic ox.[19] With a carcass-weight in the region of 325 lb, and therefore providing about 253 lb of flesh, the Dexter is certainly much more in keeping with the size of pre-improvement breeds as determined by recent archaeological studies.

Through the examination of modern carcasses and skeletons B Noddle has found that certain bone measurements provide a useful guide to the fat-free carcass-weight of cattle.[20] Assuming that this relationship holds good for early breeds, Noddle calculated the probable fat-free carcass-weight of a number of animals discovered at British archaeological sites. Taking these fat-free carcass-weights to represent 42 per cent of the live-weight of cattle her results are summarized in the table below.

Great variation in the size of animals is clearly implied by these measurements of bone material, but the evidence also points to an average fat-free carcass-weight of

[14] A J Kempster, A Cuthbertson and G Harrington, *Carcass Evaluation in Livestock Breeding, Production and Marketing*, 1982.
[15] M L Ryder pers comm; B Noddle, *op cit.*, p 381.
[16] M L Ryder, pers comm.
[17] According to A A Paul and D A T Southgate, *op cit.*, lean beef provides about 27 Kcal per ounce and beef fat about 138 Kcal per ounce after cooking. If early-modern carcasses comprised 85 per cent lean meat and 15 per cent edible fat then each cooked ounce would provide about 44 Kcal.
[18] A Pitt-Rivers, *Excavations in Cranborne Chase*, Vol II, 1898, pp 218-9; quoted by Trow-Smith, *British Livestock Husbandry to 1700*, p 21.
[19] M L Ryder, 'Livestock', in S Piggot (ed) *The Agrarian History of England and Wales*, I part 1, Cambridge, 1981, p 384.
[20] B Noddle, *op cit.*, pp 377-84.

	Bone Measurements	*Fat-Free Carcass-weight*			*Live-weight*		
	n	*lb*			*lb*		
		Min	*av*	*max*	*min*	*av*	*max*
Anglo-Saxon	71	49	252	525	117	600	1250
Medieval	27	159	257	324	379	612	771
Late-Medieval	14	35	215	412	83	512	980

about 250 lb (implying an overall carcass-weight of about 300 lb) and thus a live-weight of about 600 lb.

General agricultural commentaries also provide some evidence, although as it was not until Sir John Sinclair's *Statistical Accounts* of the late eighteenth century that any systematic examination of Scottish agriculture was undertaken much of the evidence post-dates the beginnings of the scientific breeding which so improved the native cattle stock. In Sinclair's *General Report of the Agricultural State, and Political Circumstances of Scotland* of 1814 William Aiton noted the weights of the principal breeds of cattle found at the turn of the century.[21] The figures are almost certainly in Imperial Avoirdupois and refer to carcass-weights:

Highland Cattle; The best 3-year old – 364 to 420 lb [The smallest were scarcely half this.]

Norlands Cattle; Oxen – 440 lb
Cows – 180 lb
[These were to be found in Orkney and Shetland and were the smallest breed in Britain.]

Galloway Cattle; The best 3-year old – 574 lb
The best 4-year old – 798 lb

North-eastern Breeds; 4- or 5-year old stots – 560-672 lb [Aiton notes that these breeds had at least doubled in size over the preceeding 30 years, principally through selective breeding and winter feeding with turnips.]

Fife Breeds; The best 3-year old bullocks – 448 lb

The Wild Breed; Oxen – 490 – 630 lb
Cows – 350 – 490 lb
[These were also known as White Cattle. They were systematically culled and although possibly the direct descendents of an aboriginal breed they would have been considerably larger.]

These figures are broadly supported by those given by George Culley[22] (although he was concerned mainly with English breeds), and by James Anderson, John Smith, John Thomson and George Robertson in their *General Views* of the agriculture of Aberdeen, Argyll, Fife and Midlothian respectively.[23] The latter two authors also noted the weights achieved, in these two most favoured of Scottish counties, by their local breeds of cattle. In Midlothian they were 'short legged and thick bodied' and weighed, on average, between 418 and 627 lb, whilst in Fife they weighed, when fattened for the butcher, from 525 to 1044 lb. A carcass at the top end of this range, indicating a live-weight of about 1600 lb, was certainly large by Scottish standards, but was still only about half the size of the largest English Shorthorns. Charles Collings of Ketton near Darlington fed on one ox – the Durham Ox – to 3024 lb at five years only to sell him into a fate of six years' itinerant exhibition throughout Britain.[24] Such weights were, however, exceptional and even the largest Fife carcass of

[21] W Aiton, 'On the Livestock of Scotland', chapter 14 of Sir John Sinclair's *General Report of the Agricultural State, and Political Circumstances of Scotland*, Vol. III, Edinburgh, 1814.

[22] G Culley, *Observations on Livestock*, 1807.

[23] J Anderson, *General View of the Agriculture of the County of Aberdeen*, Edinburgh, 1794; J Smith, *General View of the Agriculture of the County of Argyll*, Edinburgh, 1798; J Thomson, *General View of the Agriculture of the County of Fife*, Edinburgh, 1800; and G Robertson, *General View of the Agriculture of the County of Midlothian*, Edinburgh, 1793.

[24] R Trow-Smith, *British Livestock Husbandry, 1700 – 1900*, p 238.

1044 lb was hardly indicative of the common run of beasts sent to market.

In addition to these observations, two rather different estimates of carcass-weights are to be found. James Cleland, writing at the beginning of the nineteenth century, estimated the average carcass-weight of no less than 10,859 cattle slaughtered in Glasgow in 1815 to be 416 lb.[25] Over a century earlier, Gregory King had estimated the average carcass-weight of 'Beeves' slaughtered in late seventeenth-century England to be 360 to 370 lb.[26] The two estimates are not, of course, strictly comparable, and the accuracy of both statements is open to question (Robert Harley, a contemporary of Gregory King, considered his estimate to be too high[27]), but it does seem likely that the difference between them reflects what must have been a slow but perceptible increase in the size and weight of cattle over the eighteenth century; an increase noted by many agricultural commentators in the late eighteenth and early nineteenth centuries.

William Aiton ascribed this increase (as well as the general variability of cattle weights) principally to the conditions under which cattle were kept.[28] Winter feeding, particularly with turnips, was seen as paramount to the production of large beasts; a practice which became widespread only towards the end of the eighteenth century. It is almost certain[29] that there was a general increase in cattle weights in the centuries leading up to 1815, but if we must make some overall estimate of pre-improvement cattle-weights from the evidence of these agricultural commentators then a carcass-weight of about 300 lb (providing 234 lb of flesh) seems quite reasonable.

Slaughter books and household accounts provide the final source of evidence on cattle weights. Usually these do little more than record a few miscellaneous weights. The Ochtertyre House Book of Accompts for 1738 provides a case in point[30], for in it are a series of references to cattle killed and consumed on the estate for example:

Quarter of a large ox	8 stone
Hind-quarter of beef	5½ stone
Leg of beef	6½ stone
Quarter of beef	4 stone 5 lb.
Hind-leg of a stott	3½ stone

Somewhat later, in 1774, a note of a 'Beeve' killed for the use of the Grant family at Monymusk[31] gave the total weight of the four quarters as 372 lb. This is very similar to the four-year old black bullock killed by Macintosh of Borlum in 1730 which, as he reported to the Society of Improvers in the Knowledge of Agriculture in Scotland,[32] had a carcass-weight of 392 lb. Occasionally, however, the accounts concerned themselves with larger numbers and a more reliable guide to the average weight of contemporary cattle is provided. At Gordon Castle in 1779 some 16 oxen and 5 'Isle of Skye' cows were slaughtered. Carcasses of the former weighed, on average, 624 lb whilst those of the latter only 321 lb.[33]

By far the best evidence, however, comes from the Buchanan estate of the Earl of Montrose where cattle and sheep were being raised for the Glasgow market.[34] Carcass-weights were only recorded

[25] James Cleland, *Annals of Glasgow*, Glasgow, 1816, Vol. I, pp 324-7.

[26] 'Gregory King on the State of England in 1695' and 'Gregory King Elaborates on his Calculations in Reply to Criticisms by Robert Harley, 1697', in J Thirsk and J P Cooper (eds) *Seventeenth-Century Economic Documents*, Oxford, 1972, pp 770--98.

[27] *Ibid.*, p 797.

[28] W Aiton, *op cit.*, pp 90-100.

[29] J Clutton-Brock *(op cit.*, p 56) has suggested that Shetland and Highland cattle of the late eighteenth century were no larger than their medieval ancestors.

[30] James Colville (ed) *Ochtertyre House Book of Accompts, 1737 – 1739*, Scottish History Society, Vol 55, Edinburgh, 1907.

[31] Scottish Record Office (SRO), GD 345/990; Grant of Monymusk Muniments, 'A Note of a Beeve killed for the use of the family, 1 October 1774'.

[32] R Maxwell, *Select Transactions of the Honourable The Society of Improvers in the Knowledge of Agriculture in Scotland*, Edinburgh, 1743, pp 294-5.

[33] SRO, GD 44/52/96(1); Gordon Castle Muniments, Account of Cattle and Sheep Slaughtered at Gordon Castle, 17 Nov 1779 to 24 Oct 1780.

[34] SRO, GD 220/6/1413-1579; Montrose Papers for Stirlingshire, Farms Accounts, 1752 – 1786.

when animals were slaughtered for family consumption, but as this amounted to 139 stotts and 57 cows over the period 1752 to 1780, the numbers involved were quite substantial. The variability of cattle-weights is striking, but no apparent trend emerges over twenty-eight years covered by the accounts. The average carcass-weight of the stotts was 424 lb whilst that of the cows was 338 lb. An overall average carcass-weight of 380 lb seems reasonable, and this figure may be added to those already established from the other sources considered:

1. through a comparison with modern breeds – 325 lb
2. on the basis of the archaeological evidence – 300 lb
3. from general agricultural commentaries – 300 lb
4. from slaughter books and household accounts – 380 lb

Although a general increase in average carcass-weights over the sixteenth, seventeenth and eighteenth centuries must have occurred, and though there must always have been a wide distribution of individual weights about the average, a carcass-weight of about 310 lb would seem to be a reasonable working estimate. Such would contain about 242 lb of flesh, 206 lb being lean meat and 36 lb being edible fat. Returning to the illustrative problem with which we began, using these figures the masters and students at St Leonards College in May and June of 1671 would together have been provided with a daily average of 21 lb of beef contributing approximately 13 per cent of the total energy provided by their diet.[35] Similarly, if the cattle bought by the college provided, on average, 242 lb of flesh – or 170,368 Kcal – for an average price of £15 6*s* 8*d* then a penny spent on beef would have purchased only 46 Kcal. As a source of energy beef was thus about six-and-a-half times more expensive than the oatmeal which provided in the region of 290 Kcal per penny.

II

Similar calculations may be made with regard to sheep. Modern lamb carcasses comprise about 65 per cent lean meat, 12 – 18 per cent fat and 15 – 18 per cent bone. In older animals the proportion of bone is higher, as much as 22 per cent. Unimproved breeds, however, tend to have lighter skeletons – bringing the proportion of bone down to about 18 per cent of carcass-weight.[36] Carcasses of Scottish sheep at the end of a winter on the mountains have been found to contain only 10 per cent fat; described as 'pregnant skeletons covered with wool'[37] these probably represent an extreme – a more likely working estimate would be 15 per cent fat. Establishing the killing-out percentage of early breeds is a little more problematic. Modern lambs kill-out at about 50 per cent, older animals at 60 per cent.[38] But as has been suggested with respect to cattle, unimproved animals naturally tend to have a lower carcass-weight relative to live-weight. A killing-out percentage of about 50 per cent seems reasonable, although this may be a little optimistic as sheep about to die of prolonged malnutrition have been found to contain as little as 30 per cent carcass-weight relative to live-weight.[39]

[35] There were, on average, just under 60 'pieces' of beef cut from each carcass. If each carcass provided 242 lb of flesh, then each 'piece' would have weighed 65 ounces. Some 286½ pieces of beef were consumed over the 56 days covered by the accounts, a daily average of just under 21 lb to be shared between the masters and students. It is difficult to be sure of the number of individuals living at St Leonards at this time, but the average total daily provision of energy was about 115,000 Kcal of which about 13% (14,800 Kcal) was provided by the beef.

[36] M L Ryder, pers comm.

[37] A J F Russel, R G Gunn & J M Doney, 'Components of Weight Loss in Hill Ewes during Winter', *Animal Production*, 10, 1968, pp 43-51.

[38] M L Ryder, pers comm.

[39] H H Mitchell, W G Kammlade & T S Hamilton, 'Alfalfa, Clover and Timothy Hay for Sheep', *University of Illinois Agricultural Experimental Station Bulletin*, 317, 1928; quoted by B Noddle, *op cit.*, p 384.

The 'prehistoric' Soay sheep has fat deposited internally rather than subcutaneously,[40] just as appears to be the case with unimproved breeds of cattle. It is likely, therefore, that pre-improvement sheep contained relatively less edible fat than their modern counterparts and that an acceptable estimate of carcass composition would be:

	Percentage of Carcass-weight	*Percentage of Live-weight*
Lean Meat	66	33
Edible Fat	12	6
Tallow Fat	4	2
Bone	18	9
Remainder [Head, hide and entrails]	–	50

Although their skeletons have not attracted the sort of detailed analyses undertaken for cattle, sheep from the neolithic to the middle ages are reckoned from bone measurements to show about the same range of height as modern Soay sheep.[41] This breed has a live-weight of about 80 lb for rams and 55 lb for ewes, although both vary considerably from season to season.[42] This suggests carcass-weights of about 40 and 27 lb respectively. M L Ryder has also drawn attention to the modern Orkney and Shetland breeds as being similarly comparable to earlier unimproved Scottish breeds.[43] The carcass of a mature Orkney wether weighs only about 30 lb, the mature Shetland about 32 lb.

William Aiton identified and recorded the average weights of four breeds of sheep present in late eighteenth-century Scotland;[44] the Aboriginal or Hebridean; the Blackface; the Cheviot; and the Leicester or Dishley. Other early agricultural writers noted the weights of the native Shetland, the ancient Fife and the contemporary Midlothian breeds of sheep.[45]

		Carcass-weight
Hebridean		20 lb [often much less]
Blackface	(fat wether)	52 lb
	(ewe)	40 lb
Cheviot	(wether)	60 – 72 lb [when fed on turnips]
	(draft wether)	48 – 60 lb
Leicester	(young wether)	80 – 120 lb
	(ewe)	64 – 104 lb
Old Fife		33 – 36 lb [even when fat]
Midlothian		52 lb [maximum]
Shetland		32 lb

The Hebridean, Shetland and Old Fife breeds stand quite distinct from the rest. These were local remnants of the native white-faced breed, whereas the Blackface, Cheviot, Leicester, and probably the Midlothian, were all eighteenth-century innovations.[46] By the nineteenth century few of the ancient white-faced breed remained; as mutton animals they were negligible and, although unsurpassed for quality, their wool clip was equally small. Ousted by the Cheviot and the Blackface, a few flocks were still to be found on the Scottish islands and one was maintained in the ancient style by the Earl of Cawdor at Nairn.[47] Here even the best feeding succeeded only in bringing wethers from the 32 lb carcass-weight recorded by Robson in 1794 to about 13 lb the quarter.[48] For unimproved Scottish breeds an average carcass-weight of the order of 30 lb does not seem unduly pessimistic in the light of this evidence.

The great leap forward in sheep weights took place, not with the improvement of the native stock, but with its replacement by the larger breeds of northern England and the borders: the Linton from the hills of Yorkshire and Westmorland from which the Scottish Blackface descended;

[40] M L Ryder, pers comm.
[41] M L Ryder, 'Livestock', *AHEW*, I part I, p 364.
[42] P A Jewell, C Milner & J M Boyd, *Island Survivors: The Ecology of the Soay Sheep of St Kilda*, 1974, pp 101-4.
[43] M L Ryder, *Sheep and Man*, 1983, pp 531-39.
[44] W Aiton, *op cit.*, pp 108-48.
[45] G Culley, *op cit.*, p 102; J Thomson, *General View . . . of Fife*, p 262; George Robertson, *General View . . . of Midlothian*, p 53.
[46] M L Ryder, *Sheep and Man*, p 514.
[47] R Trow-Smith, *British Livestock Husbandry, 1700 – 1900*, p 276.
[48] J Robson, *Agriculture of Argyll and West Inverness*, 1794, p 8,24.

and the Cheviot from the hills on either side of the Anglo-Scottish border. Unfortunately, surviving slaughter books and household accounts seem to refer to these imported breeds and may not be directly relevant to the weight of Scottish sheep in earlier centuries. An exception may be the fifty-six wedders which were killed at Gordon Castle between November 1779 and October 1780.[49] These had an average carcass-weight of 35 lb. Four ewes were also killed, but with an average carcass-weight of 48½ lb the suspicion must be that these were representatives of one of the new imported breeds.

Once again, however, the farm account books of the Earl of Montrose's estate of Buchanan provide the most detailed evidence.[50] Between 1752 and 1780 some 299 wedders were killed for the family's consumption and their carcasses weighed, on average, 51½ lb each. These accounts hint at a general upward trend over the twenty-eight years they cover. It is not pronounced, but in only one year prior to 1760 did the average weight of a wedder carcass rise above 50 lb, whilst in only one year after 1760 did it fall below that weight. Before 1760 the average carcass-weight was only 45 lb. It is most unlikely that these animals were of the old Scottish white-faced breed, but the accounts do show that more gradual stock improvements were taking place during the eighteenth century. This improvement may, of course, have been restricted only to those estates engaged in the commercial productin of mutton, as Buchanan was for the Glasgow market.

Matters were clearly changing rapidly with the introduction of new breeds and new methods of farming. Drawing together all the available evidence it seems most unlikely that before the eighteenth century, and for much of the country during the greater part of that century, that sheep carcasses weighed more than about 30 lb. Such a carcass would have contained about 23½ lb of flesh, of which 20 lb would have been lean meat and 3½ lb edible fat. After cooking, this flesh would have provided about 49 Kcal per ounce, a total of 18,300 Kcal for the entire carcass.[51] Returning once more to the example of St Leonards College, this would mean that sheep carcasses which cost, on average, £2 6*s* 0*d* provided energy at a rate of about 59 Kcal per penny. A slightly cheaper source of energy than beef, mutton was still five times more expensive than oatmeal.

III

Regarding the nutritional contribution that mutton made to the diet of the masters and students at the college; the 171 quarters of mutton they were allowed would have provided in the region of 1000 lb of flesh for the eight-week period covered by the accounts. With this providing approximately the same amount of energy as the beef, meat of one sort or another (including smaller quantities of veal and lamb) contributed about 38 per cent of the total provision of energy in the college diet.[52] This was a generous diet with a substantial meat component.

It has been this quantification of the nutritional value of meat in known diets and its cost relative to other foods which

[49] SRO, GD 44/52/96(1); Gordon Castle Muniments, Account of Cattle and Sheep Slaughtered at Gordon Castle, 17 Nov. 1779 to 24 Oct. 1780.

[50] SRO, GD 220/6/1413-1579; Montrose Papers for Stirlingshire, Farm Accounts, 1752 – 1786.

[51] According to A A Paul and D A T Southgate, *op cit.*, lean lamb provides about 33 Kcal per ounce and lamb fat about 137 Kcal per ounce after cooking. If early-modern carcasses comprised 85 per cent lean meat and 15 per cent fat then each cooked ounce would provide about 49 Kcal. Thus a carcass of 23½ lb (376 oz) would provide just under 18,300 Kcal.

[52] There was a total daily provision of about 115,000 Kcal shared, probably unequally, between the masters and students (and possibly servants) at St Leonards College. Beef provided about 14,800 Kcal, mutton about 14,000 Kcal, veal about 11,000, and lamb about 3,800 Kcal. Totalling something of the order of 44,000 Kcal, meat thus contributed about 38% of the total energy provided by the diet.

has necessitated the assessment of early-modern cattle and sheep weights. Although the conclusions must remain tentative, further studies may be able to throw more light on regional variations and the changes which were undoubtedly occuring during the eighteenth century. Such studies would certainly be worthy of attention as the history and development of early breeds clearly has an important place in addressing key issues relating to diet and living standards in early modern Scotland.

Notes and Comments

ANNUAL CONFERENCE AND AGM, 1988

The Spring Conference was held at Plaxtole House, King's Lynn from 6-8 April 1988. A report on the conference appears elsewhere in the *Review*. Hitherto the Secretary has been rather constrained since he was responsible both for inviting speakers to the conference and for reporting on their performance afterwards. The 36th AGM was held on 7 April 1988. Professor Mingay was re-elected President of the Society, Dr Collins re-elected Treasurer, and Dr Overton re-elected Secretary. Dr Chartres was re-appointed Editor of the *Review*. The meeting expressed thanks to Dr Bettey who retired from the Executive Committee. Dr Hey, Dr Holderness, Professor Roebuck, and Professor Thompson were elected unopposed to the Executive Committee.

The Chairman of the Executive Committee, Dr Hey, presented the Committee's report. Membership of the Society stood at 897, a net decrease of four over the year. The Treasurer presented the audited accounts of the Society and outlined the case for a subscription increase as reported below. The Editor, Dr Chartres, reported that he had received 27 articles for consideration over the period from April 1987 to April 1988. A supplement to the *Review* by A Hall on *Fenland worker peasants* was to be published soon and an *Index* to the *Review* was to be issued free with the first issue of 1989. The meeting expressed its thanks to Dr Holderness the conference organizer, to the staff of Plaxtole House, and to the Officers of the Society.

WINTER CONFERENCE, 1988

The next Winter Conference is to be held at the Institute of Historical Research, Senate House, Malet Street, London, on 1 December 1988. Once again it is to be held jointly with the Historical Geography Research Group and the theme is 'Agriculture and the Village'. Booking forms should be included in this issue of the *Review*.

SPRING CONFERENCE, 1989

Next year's Spring Conference is to be held at Burwalls, the University of Bristol's conference centre. An advance booking form should be inserted in this issue of the *Review* although another form will be in the first *Review* of 1989.

EUROPEAN ASSOCIATION FOR ENVIRONMENTAL HISTORY

This Association has been founded following a workshop held in Bad Homburg in March this year during which papers were given on a wide variety of topics in environmental history including; the history of energy flows and their bearing on past societies; pollution of air, water and soil; and environmental perception. The Association will publish a newsletter. For further information contact Professor Christian Pfister, Historisches Institut, Engehaldenstr. 4. CH-3012 Bern.

A LAXTON VIDEOTAPE

Laxton, England's last open field village, is well known to members of the British Agricultural History Society. Laxton has thousands of visitors every year, many of them school parties, but unlike a country house or a cathedral it is not easy to understand on the ground. The Visitors' Centre, opened in the summer of 1986, provides a starting point but now a short video has been produced by the University of Nottingham in conjunction with the Trustees of the Visitors' Centre, which attempts to explain how open field farming works. The video is designed as a teaching aid for schools, colleges and universities, which can be shown either prior to, or possibly after, a visit to the village. It describes how the open field system works in modern Laxton, and how the system has changed since the seventeenth century. It comes complete with a set of notes designed both to develop some of the points made in the video, and also to offer guidelines on when to visit the village, and what to look for. The video lasts for 23 minutes, and is supplied in VHS format. In the UK it costs £14.50 (incl VAT, p&p). Enquiries to Dr John Beckett, Department of History, University Park, Nottingham, NG7 2RD.