Chapter 4

The Urban Blood and Guts Economy

Peter Atkins

I have argued that the sanitary idea and its enthusiastic adoption by many in the public health movement were responsible for two major changes in the mid and later nineteenth century. First, there was a materialization in physical infrastructure of the idea that waste products and their smells had to be removed before they could cause disease. A range of technologies, from sewers to waste destructors, were employed to achieve this purpose. Second, food producing animals and animal by-product industries became unwelcome in many cities, with the ultimate aim of establishing nuisance-free, and therefore cleansed, environments. Together, these amounted to a greater conceptual and physical separation of the urban realm from organic nature than had been experienced before.

Simultaneously, however, there were two contradictory trends. On the one hand, the second half of the century saw a further intensification of the horse domination of urban transport. There were more and more horse-drawn omnibuses, trams, cabs and private carriages, all of which had an employment multiplier in associated horse-related industries. On the other hand, this was also an era when a cheap and efficient supply of animal protein was satisfying a growing demand. Not all sections of society or regions benefited equally from this increase in meat consumption, and change was gradual, but by 1910–14 the average intake in the United Kingdom was up to an annual 126.9 lb. per person from 82.5 lb. in the decade 1841–50.[1] A declining proportion of this was from cows and pigs kept in cities or animals killed in city-centre slaughter-houses. We might say, then, that the nutritional transition initiated by this additional protein was experienced at the same time as the centre of gravity of these activities moved away to peri-urban and rural areas.

As a result, there were complex and sometimes conflicting trends in the second half of the nineteenth century. The present chapter will add some colour to this outline in touching, first, on the lives cattle driven to market and of horses used for transport, and then their deaths. It will also argue that it is possible to identify cities and districts of cities that were most active in processing the body parts of animals in the post-slaughter phase. Bermondsey in south London is particularly interesting in this regard because of a concentration of tanning and a number of closely related leather-based trades.

1 Perren 1978.

Sweat and Pain

First then, we start with urban horses. It was their ceaseless work that provided the mobility and rhythm of this period.

'Cities have been made by building around the horse'. So the editorial writer of the *New York Times* summed up the vital importance of urban horsepower in 1881.[2] McShane and Tarr argue that the rapid expansion of American cities in the nineteenth century was predicated upon the efficiency of this animal machine, and the town horse certainly multiplied in numbers in a 'co-evolution' with its context. The degree of reliance that built up is demonstrated in the story of the so-called Great Epizootic. This was an infectious disease (probably equine influenza) that in 1872 spread from Toronto to New York and Boston and brought the economies of those cities to the edge of stasis because horses were in short supply for both freight and passenger transport.

Horses registered a similar level of importance on the other side of the Atlantic. In France, Mom argues that they amounted to a 'paradigme moderne de la mobilité'.[3] In Britain, Thompson estimated that the number of town horses increased from 500,000 in 1811 to a peak of about 1.5 million in 1901.[4] These vast numbers represented respectively 40 and 50 per cent of the nation's total population of horses. In London, Turvey found about 11,000 horses in the early nineteenth century, rising to 70,000 in the mid-1860s and perhaps to 300,000 by 1900.[5] These numbers were still increasing at the century's turn despite competition from other forms of transport, such as electric trams, automobiles and, to some extent, the railways.[6]

Barker and Robbins note that the transition from animal-powered to motorized journeys in London was rapid in the years immediately before the Great War, with motor taxi cabs, for instance, exceeding the combined numbers of hansom cabs and hackney coaches for the first time in 1910.[7] This was the same year that the capital's petrol omnibuses outnumbered horse-drawn omnibuses for the first time.[8] Theo Barker argued that in 1900 the world 'depended more on horses … than ever before', for instance as a result of a general expansion in the need for commercial transport, even to the extent that railways required connexions with horse-drawn transport in order to link goods and passengers with their final destinations.[9] In

2 Quoted in McShane and Tarr 2007: ix.

3 Mom 2009: 19.

4 Thompson 1976. The numbers are even greater if one includes the horses that were being bred on farms for eventual use in towns and cities. The present author declares an interest here because his grandfather and great grandfather used horses in the family road haulage business in Liverpool.

5 Turvey 2000: 57, Barker [1983]: 103, Gordon 1893: 113.

6 The peak year in Paris was 1899 with 17,323. Bouchet 1993: 89.

7 Barker and Robbins 1974, vol. 2: 329.

8 Ibid., vol. 2: 170.

9 Barker 1983: 101.

the twentieth century, horse numbers in Britain as a whole declined steadily, but there were still 923,000 in towns in 1924 – 48.9 per cent of the total – and, as late as 1939, the total animal 'horse power' on British farms still exceeded that of tractors.[10] In France and other European countries total horse numbers continued to grow into the 1920s and 1930s.[11]

Cattle Markets: 'the Cauldron of Steaming Animalism'[12]

In his wonderful book, *Nature's Metropolis*, Bill Cronon describes the relationship between nineteenth-century Chicago's ever-growing stomach and the transformation of American agriculture.[13] His point is that the ceaseless demand of the city's stockyards was responsible for bringing about a profound environmental change in the broader hinterland of the city. He shows that the animals brought from far afield were every bit as human-made as the streets of Chicago.

Contemplation of Chicago's stockyards or of the livestock market at La Villette in Paris brings to mind the industries of disarticulation that depended upon fat, bone, blood and sinew. The experiences of exploitation, slaughter and disassembly were common means for contemporaries to understand their animals, either through gothic descriptions that were somehow emblematic of society's broader problems with urbanization, or through the morality of regret. After all, this was the century of campaigning against animal cruelty and against experimentation on animals.

Animals walked through the streets of London and other large cities on their way to market and thence to the slaughter-house. Smithfield was the largest congregation of cattle, sheep and pigs in the capital and was notorious, on the one hand, for its overcrowding – it was only three acres in extent – and, on the other, for the casual cruelty shown to the animals. A large proportion of them were driven down the Great North Road, with a pre-market stopover in Islington at the lairages of Laycock and Rhodes. Others came from the east along the Whitechapel Road, or walked through the streets from the railway stations. It is clear that this activity caused great frustration and a sense of powerlessness among the general population. The Highway Acts of 1835 and 1864,[14] and the Metropolitan Police Act of 1839, gave means to prohibit cattle from being driven or tethered on footpaths but it was the main roads that were the real issue.[15] More effective were restrictions on the time of droving. The Islington Parish Amendment Act (1857) closed the streets of that particular district for 24 hours each Saturday midnight,

10 Thompson 1976: 63.
11 Mom 2009: 20.
12 The quotation is from Dodd 1856: 244, cited in Maclachlan 2007.
13 Cronon 1991.
14 5&6 Will. IV, c. 50, 27&28 Vict., c.101.
15 2&3 Vict., c .47.

and the Metropolitan Streets Act (1867) created a London-wide curfew on droving between 7 p.m. and 10 a.m.[16] Meanwhile the Metropolitan Market Act (1857) had given the police powers to make rules for the driving of cattle in the streets of London but their negotiations with various interested parties were drawn-out and the rules did not come into effect until the mid 1860s.[17] One prescribed route, for instance, was to be from the Metropolitan Cattle Market in Islington, along King's Cross Road and Farringdon Road to Blackfriars Bridge, and so to the south.[18]

The increasing incongruity of the street chaos around Smithfield was demonstrated in 1849 by the experience of Mrs Elizabeth Brown of 291 Great Warner Street, Clerkenwell. She was surprised by a runaway bullock that charged into her house and fell down the stairs. There it became stuck and it had to be butchered in order to get it out.[19] It seems that animals occasionally broke away from the herds taken through the streets and, panic-stricken, some knocked over or even gored passers-by. In Mrs Brown's case the bullock was being driven to market, and certain routeways were notorious for their disturbance to local life. Indeed, it was probably Smithfield that best symbolized at this time the clash of ideas about how live animals should become meat. It was described in a *Times* editorial as a 'monster nuisance':

> Every week on the two market days the traffic of the city is disturbed, and the passengers along the streets kept in a state of apprehension and terror, by the rush of the infuriated cattle along the public thoroughfares.[20]

Apart from the congestion of the surrounding streets, another objection frequently heard was the cruelty of the drovers. They were under pressure to deliver their animals and present them for sale in a space that was too small to accommodate them all comfortably. Most notorious were the 'ring-droves' of 20 to 30 animals in a circle with their heads facing inwards. Violence was routinely used to keep them in this formation, for instance by goading them with spikes or beating their hocks.[21]

One reason for such chaotic scenes was that there were different drovers for each successive leg of the animals' journey. The country drovers walked with them into London, as far as the overnight holding pens or lairs. The salemen's drovers then brought them to market and handed over to the butchers' drovers, who took

16 20&21 Vict., c. 118, 30&31 Vict., c.134.

17 20&21 Vict., c. 135.

18 Select Committee of House of Lords on Traffic Regulation (Metropolis) Bill. Report, P.P.1867 (186) xi.Q.291.

19 Select Committee on Smithfield Market: Report, P.P.1849 (420) xix.Q.576.

20 *The Times* 17 January 1849: 4d.

21 Select Committee on Smithfield Market: Report, P.P.1849 (420) xix.Q.1146, J.R. Norris; Royal Commission to Make Inquiries Relating to Smithfield Market, and Markets in City of London for Sale of Meat. Report, P.P. 1850 (1217) xxxi.Q.1362, J. Harper.

them for slaughter. This division of responsibility meant that the degradation of meat quality from beating, goading, and the sheer terror that the beasts must have felt, was difficult to pin on any one individual.[22] Rather than auditing the actions of individuals, it seemed increasingly obvious in the 1840s and early 1850s that the whole market had to go.

Dickens brought his argus eye cleverly to bear upon Smithfield. In *Oliver Twist* he made it into a sculpture of sounds and smells:

> The whistling of drovers, the barking of dogs, the bellowing and plunging of beasts, the bleating of sheep, and the grunting and squealing of pigs; the cries of hawkers, the shouts, oaths, and quarrelling on all sides, the ringing of bells, and the roar of voices that issued from every public house; the crowding, pushing, driving, beating, whooping and yelling; the hideous and discordant din that resounded from every corner of the market; and the unwashed, unshaven, squalid, and dirty figures constantly running to and fro, and bursting in and out of the throng, rendered it a stunning and bewildering scene which quite confused the senses.[23]

It is no surprise, then, that Smithfield was described as a nuisance 'picturesque in its enormity'.[24] It was emblematic of what we might call the old and new animal geographies of London, and even to the conservative eye it seemed overcrowded and in the wrong place, so close to the heart of a world city. The noise, smell and pain all were contradictions to the 'new urban identities associated with standards of civility, public decency, and norms of compassion'.[25] Yet the vested interests of the City Corporation, which benefited monetarily from the market tolls, coupled with the inertia of the other participants – cattle salesmen, slaughterers, and butchers – led to a concerted campaign that resisted change for three decades. The delay in establishing a new Metropolitan Cattle Market in Islington, in 1855, after several false starts and much parliamentary investment in enquiries, was lengthy and is proof that 'modern' modes of organization were slow in developing and taking hold in the collective mind of the trade.[26] The new market covered an area of 30 acres, with enough accommodation for 10,000 horned cattle, 40,000 sheep, 3,000 calves, and 2,000 pigs,[27] making a 'heaving, restless, noisy sea' of animals arranged in 'long lines of writhing horns'.[28] Provision was made for abattoirs in close proximity, separated from the street by a high wall. These public buildings had floors of waterproof cement, sloping to allow waste to drain away easily.

22 Dodd 1856: 235.
23 Dickens 1838.
24 *The Times* 10 April, 1851: 5b.
25 Wilbert 2009: 124.
26 White 2007: 188–9.
27 Palmberg 1895: 119.
28 Gordon 1890: 22.

A Foreign Cattle Market at Deptford followed in 1871 for beasts landed under controlled conditions that were meant to prevent the importation of disease.[29] Over 1,000 steamers a year arrived at the Deptford wharf, mostly coming up the Thames on Sundays and Wednesdays, the days before the twice-weekly markets. Animals equivalent to 1,000 tons of meat per week were sold and slaughtered there.[30]

The irony of both new cattle markets was that their heyday was relatively short-lived. The ease of railway transport had already led to an increase in country-killed meat being brought into London and this trend continued, supplemented by refrigerated meat from overseas. The new dead meat market that opened for business in Smithfield in 1861 became increasingly important, along with Leadenhall.[31] The measure of this is illustrated by data for 1890.[32] At that date Smithfield received 170,000 tons of country meat by rail, and about 140,000 tons from Australia, New Zealand and America. The town-killed meat it gathered from London's abattoirs and slaughter-houses had shrunk to only 70,000 tons. Meanwhile, the 350,000 cattle and 1,800,000 sheep that Islington had marketed in the early 1860s, were down in the years immediately before the First World War to only 50,000 and 290,000 respectively.[33] London had become the world's largest market for meat and therefore also the main outsourcer of the pain and suffering of the slaughter process.

Blood on the Streets

Most of the livestock sold at Smithfield were taken to the many small slaughter-houses in the immediate neighbourhood. As a result, the local population were subjected to yet further nuisances associated with blood and smells.

> In Bear Alley, that is a lane running from Farringdon Street to the old wall of London called Breakneck Steps … there is a slaughter-house … The stench is intolerable, arising from the slaughtering of the cattle, and from the removal too, after they are slaughtered, of what I may call the evacuations of the faecal matter, the guts and the blood and the hides of the animals; and when they clean the guts out, the matter is turned out; some of the heavier parts of the manure are preserved to be carted away, but a great deal of it is carried away by the water into the sewers.[34]

29 This market only lasted until 1913. Perren 2006.

30 Gordon 1890.

31 It replaced Newgate market, which closed in 1861. Ironically, Smithfield became more and more important with the increase in imported meat from the 1870s and its business quadrupled up to 1932. Passingham [1935]: 14.

32 Gordon 1890.

33 Perren 1978: 153.

34 Select Committee on Smithfield Market. Report, P.P. 1847 (640) viii.Q.2181, Dr J.R. Lynch.

Figure 4.1 The Slaughterman

Source: Pyne, W.H. (1804) *The Costume of Great Britain*. London: Howlett and Brimmer, courtesy Wellcome Library, London

It was by no means unusual to see blood running in the gutters and water courses of early nineteenth-century British cities.[35] This and other evidence of the effluvia of killing were commonplace because of the slaughtering facilities in back street yards or in residential and commercial buildings made over into slaughter-houses without any particular adaptation. Animals were also killed close to city centres in retail butchers' shambles, where animals were led into a back room. Their death, so close to the point of consumption, did at least guarantee fresh meat, but associated nuisances became increasingly intolerable. In Hull, for instance,

35 Select Committee on Smithfield Market: Report, P.P.1849 (420) xix.Q.476.

> most of the slaughtering-houses … are in the midst of the town, in a long narrow alley passing from the main street to a parallel street at a considerable distance. Those slaughtering-places are very confined, and generally have a muck-yard attached, which is filled with the offal, dung, and blood, taken from the animals, and most offensive effluvia are constantly flowing from the purifying masses; the bloody matter, moreover, flows in streams along the open channels towards the covered sewers in the streets.[36]

30 years later the system had not greatly changed. In the early 1870s there remained about 1,500 private slaughter-houses in London, for instance 75 in the parish of Marylebone and 43 in Fulham.[37] Between November 1875 and March 1877 Edward Ballard, a Medical Officer of the Local Government Board, visited over 70 slaughter-houses around the country. His are the best-informed and among the most detailed eye witness accounts that we have of the industry for the period. He was surprised to find that small-scale killing was still carried out in 'an open yard, in some stable or inappropriate outhouse or even within a dwelling-house, in a room, cellar, or shop'. In South Shields he found that 24 shops were used for slaughter and 14 dwelling houses, including some where cupboards, cellars or wash houses were employed, sometimes even adjoining inhabited rooms.[38]

Publicly-owned slaughter-houses had begun to spread by this date. Some were deliberately located on the edge of town, as with the Foreign Cattle Market at Deptford in south east London, and those at Croydon, Manchester, Reading, Hereford, and Glasgow. Others were much closer to the centre, as in Newcastle, although the abattoirs there were in private ownership. Ballard's is the best contemporary description of the killing process at that time.

> The ox is led by a rope round its neck or driven into the slaughter-house, and the rope being run through a ring in the wall near the floor … the head is drawn down to a level convenient for the reception of the blow. Sometimes the rope is held by an assistant, and sometimes the animal is blindfolded. Taking a good aim, such as only long practice will ensure, the slaughterman with one swing of the pole-axe drives it into the centre of the crown a couple of inches in front of the horns, and the ox instantly falls heavily upon the floor. By the opening thus made, a long cane is run into the vertebral canal. As the animal lies on its side, the slaughterman then drives a knife deeply into the carcase above the sternum so as to cut thoroughly into the large vessels behind that part, and the blood gushes out freely. When it begins to run feebly, the slaughterman presses upon and kneads the abdomen and sternum so as to promote the flow and press the blood out. The blood, as it flows, is received in shallow iron vessels and

36 Royal Commission for inquiring into State of Large Towns and Populous Districts: Second Report, P.P. 1845 (610) xviii.670.

37 Select Committee on Noxious Businesses, Report, P.P. 1873 (284) x.434.

38 Ballard 1878: 149.

> set aside, or it is allowed to flow out upon the floor of the slaughter-house and into what is termed a blood-hole, that is to say, a sunken paved or cemented receptacle the size of which varies in different slaughter-houses. In this process a certain quantity of blood rarely fails to flow upon the pavement and into the drain. The carcase, when sufficiently bled is then turned over upon the back, in which position it is supported by what are termed 'prytches'. A prytch is a stout stick of wood about two feet long, provided at each end with a stout iron point. The point at one end is forced against the carcase, while the other point is slipped into little shallow holes in the floor which are termed 'prytch-holes'. An incision through the skin is then made along the whole length of the carcase, the skin is turned back sufficiently, and the abdomen opened and partially disembowelled. The head and neck are flayed, the horns are chopped off so as to be left upon the hide, and the head and feet are cut off. The sternum is sawed in the middle line along its whole length and the symphysis of the pubes also. The ends of a stout wooden bar are then introduced between the hinder leg bones and the tendons, and by this bar the carcase is hoisted head downwards into a perpendicular position by means of pulleys. The disembowelment and the flaying and dressing are then proceeded with. The omentum containing fat is cut off and hung on a hook to cool, and other portions of the folds of peritoneum containing fat are similarly removed. The portions of intestines to which fat is attached are removed to a table where the fat is cleaned off and set aside for the fat melter. The paunch and second stomach are separated; the former is opened and the contents removed, being either thrown upon the floor of the slaughter-house or put into an appropriate receptacle, and the paunch is then hung up on a hook. The second stomach is set aside for preparation as dogs' meat. The intestines, when freed from fat, if not otherwise required for pigs' or dogs' food, go away with the manure. Of the thoracic viscera the heart is used for human food, while the trachea and lungs are hung up for use as dogs' or cats' food. In this process more or less blood and other animal fluids and manure are spilt upon the floor, varying with the degree of carelessness of the slaughterman – the spilling of more or less is inevitable.[39]

Slaughter-houses, along with other noxious and noisome industries, had long been considered nuisances under the common law and were therefore subject to action by affronted citizens. In 1845 they were identified as

> an almost constant source of complaint and almost without exception, centre of the diffusion of noisome influences, affecting, with more or less intensity, the immediate vicinity, deteriorating the sanatory condition of the surrounding population, commonly poor and dense, as recorded in the local reports of the

39 Ibid., 149–50.

> Commissioners, and in a more remote degree vitiating the general atmosphere of the town, and thus becoming a nuisance to the inhabitants at large.[40]

In the light of such contemporary descriptions, it is no surprise that pressure was building by the middle of the nineteenth century to alleviate the suffering of animals in the marketing process and their painful deaths in the pre-modern conditions of urban slaughter-houses. Indeed the condition of animals in the food chain became a campaigning issue for early animal rights activists. Henry Salt was advocating humane slaughter in the 1890s and the Admiralty – a large purchaser of meat for its ships worldwide – investigated killing techniques in 1904 and made recommendations for improvements. But it was not until the Slaughter of Animals Act (1933) that these were implemented to any extent.[41]

The Modernization of Death

The original Napoleonic abattoirs that were opened in Paris in 1818, and later in other cities, were of strategic advantage in supplying the French army with protein. But it is the emergence of modern, rationally-planned abattoirs in Europe and North America in the second half of the nineteenth century that has attracted most academic interest. Their significance was at two spatial scales. First, within their often palatial architecture they were heterotopias: withdrawn from the mundane, and responsible for a renewable and limitless cornucopia of bloody flesh.[42] The designed-in inspectability was an important factor in their popularity with urban authorities, although for obvious reasons the butchers liked them less and resisted them strongly in many cities.[43]

Second, within the city as a whole, the abattoir was generally pushed towards the edge, to a neutral space that was neither urban nor rural.[44] Here society's growing queasiness and guilt about the killing of animals could be mitigated because it was out of sight and out of mind. Certainly, in Victorian visionary utopia, slaughter-houses were marginalized. For instance, Buckingham in his model city had them 'removed some distance from the town', along with the cattle market, reservoirs for sewerage, and tan-pits.[45] Something similar was dreamed of by William Morris in *News from Nowhere* and Benjamin Ward Richardson in his *Hygeia*.[46]

---

40 Royal Commission for Inquiring into State of Large Towns and Populous Districts: First Report, Part I, P.P. 1845 (602) xviii.46.

41 Burt 2006b, McLachlan 2008.

42 Lee 2008: 6.

43 Otter 2008b.

44 But these locations often became absorbed into the city fabric due to rapid urbanization.

45 Buckingham 1849: 185 and 207.

46 Richardson 1876, Morris 1890.

> The slaughter-houses of the city are all public, and are separated by a distance of a quarter of a mile from the city. They are easily removable edifices, and are under the supervision of the sanitary staff … All animals used for food … are subjected to examination in the slaughter-house, or in the market, if they be brought into the city from other depots. The slaughter-houses are so constructed that the animals killed are relieved from the pain of death. They pass through a narcotic chamber, and are brought to the slaughterer oblivious of their fate. The slaughter-houses drain into the sewers of the city, and their complete purification daily, from all offal and refuse, is rigidly enforced … The buildings, sheds, and styes for domestic food-producing animals are removed a short distance from the city, and are also under the supervision of the sanitary officer; the food and water supplied for these animals comes equally, with human food, under proper inspection.[47]

Patrick Joyce sees the public abattoir as symbolizing a new attitude to death: that it had to be invisible and anonymous, thereby mitigating one of the 'deep anxieties of governing' but at the same time objectifying it and thereby seizing control of nature.[48] Joyce argues that the unreformed cattle markets and slaughter-houses had been perceived as a threat to social order and that producing new, architecturally-designed buildings with routinized and regulated regimes of action was a key aim of larger city authorities in the transition to modernity. He gives a good account of the shift to suburban industrial slaughtering in the second half of the nineteenth century, starting with the opening of the new Metropolitan Cattle Market in London (1855), the Union Stock Yards in Chicago (1865) and La Villette, Paris (1867). Chris Philo adds that slaughter-houses were among those institutions, such as asylums and cemeteries, that were removed because of their troubling association with madness or death; and they were among the features of the Victorian cityscape that were thought to be responsible for the spread of disease.[49] But these geographical otherings or 'exclusions' were balanced by 'inclusions' of animals that were considered acceptable, notably pets, and also, from the 1820s, by ethical debate and action concerning cruelty and animal welfare.[50]

Abattoirs were public, regulated spaces where the slaughter trade in theory was monitored and controlled in order to ensure that it measured up to the new science of hygiene. This was a very different world from the chaos of Smithfield and the dingy and sordid private slaughter-houses that encircled it like flies around a rotting carcase. Abattoirs were 'part of the engineered landscape around which

47 Richardson 1876.

48 Joyce 2003: 77.

49 Philo 1998, Otter 2008a.

50 The Society for the Prevention of Cruelty to Animals was founded in 1824 and received its royal warrant in 1840.

abstractions like 'national health' would gather meaning'.[51] Chris Otter articulates a vision of modern abattoirs in which the animals are humanely stunned and dispatched, their carcases handled as little as possible.[52] There was also introduced a mechanized process of dismemberment but in most countries this was a twentieth century achievement, post-1945.[53]

Abattoirs were also exemplars of a new type of industrial process, with two motivations. The first was the felt need for greater hygiene in both the slaughter-house and the meat cutting plant. The second was the creation of organizational efficiencies, such as economies of scale. After all, it was from the 'disassembly lines' of the Chicago meat packers that Henry Ford got his idea on how to plan his car factories with attention to time and motion.[54] In America it was capitalist entrepreneurship, in the shape of the stockyards and meat-packing plants in Chicago and Cincinnati, which drove forward the modernization of killing and mechanized butchering.[55] Workers here were less skilled than those in the smaller rural slaughter-houses and their working conditions were often wretched but the sheer scale of operations amounted to an industrialization of death. Upton Sinclair's extraordinary book, *The Jungle*, about Chicago's meat packing industry, published in 1905, coincided with public concern about poor standards of meat hygiene, especially the spread of zoonotic diseases such as trichinosis and tuberculosis.[56] The publicity for Sinclair's exposé of filthy and heartless methods of slaughtering and the low quality of product reaching the consumer was enough to force the passing of America's first Pure Food and Drug Act the following year.[57]

It would *not* be correct to see the abattoir idea as carrying all before it. There was resistance to the centralization and standardization implicit in bringing slaughterers and butchers into large-scale facilities, partly because of worries by vested interests about the loss of restrictive practices and the increase in quality-surveillance at a time, in the mid and late nineteenth centuries, when cattle disease was rampant and there were significant losses from diseased meat.[58] Berlin did not have a modern abattoir until 1881 and innovation in England was slower even than Scotland.[59] The main reason for this stagnation was the strength in local politics of the various actors in the meat trade, who combined against the establishment of modern, centralized facilities for selfish reasons of business survival. The number of abattoirs opening did gather pace towards the end of the nineteenth century, after decades of making do with dirty, cramped and ill-designed buildings. By

51 Otter 2004, 2006: 528.
52 Otter 2008a: 96.
53 Collinge 1929.
54 Ford 1922: 78.
55 Cronon 1991.
56 Sinclair 1905.
57 Young 1985.
58 MacLachlan 2008.
59 Brantz 2008, Perren 2008.

1892 there were 48 municipally-owned and controlled facilities in Britain but this did not mean that they would necessarily replace private slaughter-houses.[60]

The original Parisian abattoirs were supplemented in 1867 by the opening of a vast new market and meat processing facility at La Villette. This was designed in a similar spirit of architectural modernism as Les Halles and represented an important step in the town planning – the Haussmanization – of Paris.[61] But large-scale did not necessarily mean efficient. The layout and practices in La Villette are said to have remained archaic and the whole amounted to little more than 'an agglomeration of private butchers stalls' that were unhygienic and poorly regulated.[62]

The political significance of market organization and architecture in the early modernization of urban food systems is brilliantly captured in Emile Zola's novel, *Le Ventre de Paris*.[63] In this the hero is an escaped political prisoner, Florent, who was deported to Cayenne after the 1848 revolution and has returned, penniless, to the corruption and conspicuous consumption of Second Empire Paris. Zola used an engaging naturalistic style which persuaded the reader that, through his innovative technique, he was seeking to mirror the earthquake of socio-political change that he was describing. Claude, a counterpoint character in the novel, saw the newly opened pavilions of Les Halles, designed by Baltard, as 'that colossus of ironwork, that new and wonderful town … the embodiment of the spirit of the times'.[64] But to Florent the buildings were more like

> some gigantic modern machine, some engine, some cauldron for the supply of a whole people, some colossal belly, bolted and riveted, built up of wood and glass and iron, and endowed with all the elegance and power of some mechanical motive appliance working there with flaring furnaces, and wild, bewildering revolutions of wheels.

To Florent's revolutionary eye, Les Halles

> appeared symbolical of some glutted, digesting beast, of Paris, wallowing in its fat and silently upholding the Empire. As he walked in the market he seemed to be encircled by swelling forms and sleek, fat faces, which over and over protested against his own martyr-like scragginess and sallow, discontented visage. To him the markets were like the stomach of the shopkeeping classes …[65]

60 Otter 2006: 529.
61 Brantz 2001.
62 Claflin 2008: 31.
63 Originally published in 1873.
64 Zola 1996: 34.
65 Zola 1996: 182.

Florent is used by Zola as part of the well-known mid-century discourse of the 'fat' (gras) and the 'thin' (maigre), the fat representing the moral depravity of satiety at a time when malnutrition remained common in the slums; but there is another theme in the planning of the markets.[66] Zola reproduces a common contemporary view, very much found also in London, that urban projects should be used as a means of cleansing the city, sweeping away dirty and diseased housing in order to regenerate on the basis of rational order and cleanliness.[67]

We may read across from Les Halles to La Villette, a similar contemporary project, and indeed to the architectural designs in London of Horace Jones – Smithfield Meat Market (1868), Billingsgate Fish Market (1877), and Leadenhall Market (1882). They all represented a 'symbolic potency' where the charivari of the street had been tamed or excluded.[68] They had rules, they had opening hours, they generated revenue, they could be inspected, and they could be kept clean. Even their monumental architecture was a coded message of control.

Bermondsey: 'Land of Leather'

In an important, agenda-setting comment some years ago, Martin Daunton called for an 'ecological history' of London's industry.[69] As one way of classifying factories and workshops, he saw a distinction between those that were clean and those that were polluting, and he firmly placed the history of the 'mass of dirty trades' south of the River Thames. The present chapter makes a small contribution to Daunton's ecological history by arguing that it is important to look in greater depth at the transformations of living organisms into industrial raw materials. In this sense, an ecological history of industry should start with the uses of animal bodies.

In what follows, it will become clear that certain elements of nineteenth-century London's blood and guts industries were locationally concentrated. It seems either that they gained an economic advantage by association or that their proximity was imposed upon them because of their 'noisome' characteristics. South and East London both had clusters of tanners, soap makers, gut scrapers and other 'noxious' industries, mainly operating at the workshop scale, but with some in the larger manufacturing units that were developing.

George Dodd called Bermondsey, on the south bank, the 'land of leather'.[70] The lives of the city's animals generally ended elsewhere, and it fell to this district to preserve for posterity their 'useful' vestiges. Skin and hide, for instance, when fossilized by the tanning process, were used to shoe the human population, bind

66 Scarpa 2000.
67 Johnson 2004.
68 Joyce 2003: 83.
69 Daunton 1996: 3–4.
70 Dodd 1842: 17.

their books, and provide drive belts for their machinery. Leather was absolutely central to the British economy: in the early nineteenth century it ranked second only in industrial turnover to textiles.[71] As Riello comments, it 'exemplified the complexity of the boundaries of what has been defined as an 'organic economy''.[72] In other words, the cluster of industries in Bermondsey was a key passage point through which animal organicism was processed into the human realm.

Noisome and noxious trades such as tanning started to be excluded from the intra-mural parishes of the City of London as early as the fourteenth century, not only from its physical neighbourhood but also from within the range of smells and airborne pollution.[73] In the late fifteenth century one branch of leather preparation, the white tawyers, were specifically sent to Southwark and Bermondsey, the journey across London Bridge apparently being a psychological threshold of banishment to the 'other' London. In this new setting they were at least able to continue enjoying 'the freedom of the City, although residing outside, inasmuch as they cannot exercise their art within the same without annoying their neighbours'.[74] As a result of many other forced migrations, which included services such as theatres and brothels, the south bank of the river gradually acquired a bad name as being polluted, poor and morally dubious.

An initial factor in Bermondsey's favour was the availability of sufficient water in the tidal streams of the Neckinger system to facilitate the processing of hides, but this was no more determining than were the sources of bark, another vital input.[75] It was this complex of slimy ditches that Dickens described when Oliver Twist visited Jacob's Island.[76] Poverty and pollution went hand in hand in this, one of the worst of London's many slums. According to Dodd, 15 years later, the area was still 'no credit to our sanitary age' and Bermondsey generally had a reputation for smells and a degraded urban environment.[77]

''What *is* this smell?;' 'Oh it's the leather'. 'But what is that *other* smell?' 'Oh, that's the glue!'' This was Dodd's impression of Bermondsey, which, by the time of his writing, had been the centre of English leather industries for centuries.[78] Here was such a concentration of tanners, curriers, fellmongers and skin dealers that this one small district was widely known and of significance nationally and internationally. As a result, it was monitored by investigative journalists, statistical surveyors and any number of voyeurs trying to understand the horrific essence of the animal industries there. Henry Mayhew, for instance, noticed a profusion of trades:

71 Church 1971.
72 Riello 2008: 75.
73 Beier 1986: 157, Barron 2004: 264.
74 London Letter Books, folio 133b, Ordinance 27th February 1478.
75 Malden 1912, Christy 1925, Hoover 1937.
76 Dickens 1838.
77 Dodd 1853: 463.
78 Ibid.

> On every side are seen announcements of carrying on of the leather trade … The signboards announce, in thick profusion, dealers in bark, tanners, curriers, French tanners and curriers, leather-dressers, morocco and roan manufacturers, leather-warehousemen, leather factors, leather dyers, leather enamellers, leather sellers and cutters, hide salesmen, skin salesmen, fellmongers, tawers, parchment makers, wool factors, woolstaplers, wool warehousemen, wool dealers, wool dyers, hair and flock manufacturers, dealers in horns and hoofs, workers in horn, glue makers, size makers, and neat's-foot oil makers.[79]

Bermondsey, then, was one of London's many specialist industrial districts but unique in making possible, indeed encouraging, a human dependence upon animalness. A virtue was made here of a clustering of trades that were closely related, each one representing a stage in processing or recycling of waste. In death, the animals that fuelled this local economy were utilized to the very last particle of their blood, bone, flesh and skin. All that was left of them was the same pall of offensive odour that had hung over Bermondsey for 400 years. Dead animals here had taken control of the air.

A great deal has been written recently about 'industrial districts'.[80] Following the ideas of Alfred Marshall, economic geographers have pointed to the importance of local factors of location, such as horizontal and vertical linkages, along with less tangible social processes like easy communication and the conventions of trust.[81] Together, these ensure that the whole is more than the sum of its parts. The type of vibrant localities described have been identified in northern Italy and in other countries, and their flexibility and their adaptability have led to them acquiring the label 'learning regions'.

Bermondsey's animal industries met some of the criteria of Marshallian districts, but not all. They had little scope for scale economies in the early nineteenth century and they seem to have been owned on the whole by local entrepreneurs who shared a pool of trade skills. They were not especially attractive to innovation-seeking capital because their production processes were so firmly embedded in the organic nature of their raw materials. Intra-district trade was vital, with each successive trade in the processing of hides providing the raw material of the next. Labour seems to have been skilled or semi-skilled, but wages were low due to a system of piece-mastership and there were regular lay-offs when trade was slack.[82] There was, of course, in London, a vast supply of ox and cow hides from the many slaughter-houses and wholesale butchers, along with those imported. Under the

79 Mayhew 1850.

80 Asheim 2000.

81 Marshall 1920.

82 Piece-masters were contracted by the employers and they, in turn, hired the necessary labour. This system was open to abuse. Skills were of a higher order in the leather finishing trades than in tanning. Booth 1903.

Flaying Act (1803)[83] these had to be taken for inspection, mainly to Leadenhall,[84] but from 1833 onwards sheep and calf skins were traded in the new leather market in Bermondsey, one of the largest in Europe.[85]

The district's profile fits that predicted by Scott and Walsh:

> The literature suggests that Marshallian externalities are likely to be of particular importance for mature industries not subject to rapid technological change, which gain important benefits from access to pools of local trade knowledge and long-term cooperative relationships fostered through repeated interactions between firms.[86]

But there was none of the institutional density here expected of Marshallian districts. On the contrary, the South Bank was bereft of the gild and local authority strength of its dialectical other, the City of London.

Most of the eighteenth-century Bermondsey tan-yards were modest in output but, because of their need to have open sites, each with maybe 100–150 pits, their footprint in the townscape was extensive.[87] This created unfavourable ratios between, on the one hand, the rents they paid and, on the other, their employment and turnover. In the 1820s there were 164 leather firms in London insured with fire offices but 80 per cent of them had a capital of less that £3,000.[88] One problem throughout the eighteenth and early nineteenth centuries was that the tanning of the thicker hides was a very slow process, taking as much as 18 months in some cases before they could be passed on to the currier.[89] It is hardly surprising, therefore, that speculative entrepreneurial energy and capital were at first drawn elsewhere.

The 1851 census contains detailed occupational information for each district of London. Table 4.1 selects the industries associated with animal by-products and demonstrates clearly the prominence of the South Bank and the East End. A location quotient of >1.0 shows a concentration above the national average.[90] Some of the figures are astonishingly high, for instance those in Bermondsey for tanners, fellmongers and curriers, and must be amongst the highest for any industry in the capital or any other city at this date. By way of comparison, the 1911 location

---

83 43 Geo. III, c.106.

84 See the evidence given to the Committee on the Bill to Repeal Acts Relating to Use of Horse Hides in Making Boots and Shoes, P.P. 1826 (323) vii.183.

85 Dodd 1842, Greenwood 1867.

86 Scott and Walsh 2004: 115.

87 Spate 1938.

88 Barnett 1998: 67, Riello 2008.

89 Burridge 1824.

90 Ball and Sunderland 2001 also use location quotients but they compare London as a whole with the rest of the country. As a result, they miss some of the extraordinary concentrations discussed here.

quotient for the Borough of Bermondsey in skins and leather was 14.2, indicating a steady decline in concentration in the second half of the nineteenth century.

The 1870 factory returns record the number of large tanning and currying establishments around the country.[91] The problems with this source are well known and so we cannot draw definitive conclusions, but the county of Surrey – for which read Bermondsey – was listed as having eight out of 50, and 1,149 employees out of 5,644 for the country as a whole.[92] According to James Statham, this date was the high tide of tanning in Bermondsey, although he goes on to establish that light leather goods manufacture and merchanting continued to congregate here well into the early twentieth century.[93]

Vertical integration in leather manufacture had been prohibited in theory by a statute of 1603 that was not rescinded until 1830.[94] The leather trades were nevertheless interlinked horizontally and co-presence was therefore an advantage and provided agglomeration economies. The skin-dealer, the fellmonger, the tanner, the currier and the leather cutter and dresser all worked in series, and the Bermondsey cluster also included their suppliers, such as skin-dealers, bark peelers and bark shavers. In addition, end users of leather were numerous locally, such as shoe-makers, leather enamellers, gilders, stampers and stainers, the saddle and harness trades, glovers, makers of leathern pipes, buckets, jackets, hats and caps, and makers of luggage, pocket-books and various other trades such as bookbinders and upholsterers. In addition, there were the users of by-products and waste, such as wool-staplers, flock mattress-makers and glue and size makers, and there were also parchment makers and the various hair trades that sourced their raw materials here.

Tanners processed the thicker hides, for instance those of cattle and horses, used in shoe soles and harness, whereas the fellmongers and leather dressers specialized in the suppler skins of other species. It was the thinner sheep and goat skins processed by the fellmonger that became 'Morocco' leather for coach-linings, chair-covers, book-binding and ladies' shoes, 'roan' for shoes, slippers, and common book-binding and 'skiver', an inferior leather, for hat-linings, pocket-books, work-boxes and toys.[95] Kid and lamb skins went for gloves and shoes, and sheep and deer skins became chamois wash leather.[96]

It was well into the nineteenth century before large leather factories emerged.[97] In 1851 Bermondsey was home to about one-third of the country's leather industry

91 Return of Number of Manufacturing Establishments in which Hours of Work are regulated by Act of Parliament in each County of United Kingdom, P.P. 1871 (440) lxii.105.

92 Jenkins 1973, 1978.

93 Statham 1965.

94 1 Jas I, c. 25. Select Committee on Petitions Relating to Duty on Leather, P.P. 1812–13 (128) iv.609. Evidence of Mr Brewin.

95 Dodd 1843: 162.

96 Watt 1906.

97 For the chemical processes applied in the second half of the nineteenth century, see Stevens 1890, Procter 1893, Watt 1906, Bennett 1920.

employees and most of those in London.[98] It seems to have specialized at this time in shoe leather.[99] In the mid nineteenth century, Hepburns of Long Lane was formed from what had been five separate tanneries shown on Rocque's map of 1746. By 1850 they were one of the largest operations in London, tanning over 45,000 bullock and 10,000 horse hides a year, as well as a number of calf skins. Their 250 employees compared with the 85 of the more famous Bevingtons of Neckinger Mills, who eschewed bullock hides for the thinner and softer leathers of seal, deer, lamb and kid. Bevingtons used sumach (*Rhus coriaria*), alum, the yoke of eggs and various oils in what strictly speaking was not tanning but leather preparation, and in this way they processed about half a million skins a year.[100] A third Bermondsey factory was that of Learmonth and Roberts, who employed 290 tanners and dyers to produce high quality morocco leather. Their throughput was 350,000 calf, sheep, deer and goat skins a year.

Tanning had a reputation for being amongst the dirtiest and most malodorous of trades. One reason for this was that hides often arrived in a state of advanced putridity and the first task was 'fleshing' or removing the fat adhering to the inside. Second, the hair on the outside was loosened either by immersion for a few days in a solution of quick lime or by putting the skin in a closed chamber to encourage fermentation. Again, the subsequent scraping created offensive smells that would have been unacceptable in most other parts of London. Third, the 'pelts' were softened or 'mastered' for a short period in a solution of hen, pigeon or dog faeces[101] and, finally, they were steeped for months in pits and cisterns in a chocolate coloured 'ooze' that contained a tanning agent such as oak bark.[102] They were then hung up to dry, and beaten or rolled to make them supple and ready for further dressing by a currier, whose job it was to make leather smooth, flexible and waterproof.[103] Up to a third by weight of a currier's output was the various oils that were added to the leather.[104]

Far from being a learning region of the industrial districts literature, Bermondsey was more about forgetting. In Foucault's terms it was a heterotopic space, a parallel world where the norms of society were in a sense suspended. Here were the essential processing and manufacturing animal industries but their smells and polluting waste products could only be tolerated at a distance.

98 Sheppard 1971: 161. Sources for this statement include the population census and Kelly's directories.

99 Select Committee on State of Laws relating to Manufacture of, and Duties on, Leather, P.P. 1816 (386) vi.99.

100 Bevington 1993.

101 In London there were professional collectors of dog mess. Mayhew, 1861 edition, vol. 2: 142, Turvey 2000: 4.

102 Aikin 1836, Herbert 1836, Mayhew 1850, Collins 1876, Ballard 1878: 182–99, Clarkson 1983, Procter 1903, Wood 1912.

103 Tomlinson 1854.

104 Statham 1965.

Table 4.1 1851: Districts of London with High Concentrations of Employment in Selected Animal Industries

Occupation	London districts
Soap boiler	St George in the East (13.1), Whitechapel (10.2), St George Southwark, Shoreditch, Stepney, Camberwell
Tallow chandler	Lambeth, St Saviour Southwark
Comb maker	Bethnal Green, St George Southwark
Others dealing in grease and bones	Bermondsey (13.6), Holborn, Whitechapel, Shoreditch, Clerkenwell, Bethnal Green, St George Southwark,
Fellmonger	Bermondsey (42.0), St Olave Southwark
Skinner	Bermondsey (17.6)
Currier	Bermondsey (41.7), St Olave Southwark, St George Southwark, Newington
Tanner	Bermondsey (62.6), St Olave Southwark
Other workers in Leather	Bermondsey (25.3), Clerkenwell (14.6), St Luke (10.1), St Saviour Southwark, Strand, Shoreditch, City of London, St Giles, Newington, Camberwell, St Olave Southwark
Feathers, quills	St George Southwark (18.5), St James Westminster (12.5), Whitechapel (13.9), Shoreditch (10.0), Bermondsey, Holborn, Newington, Bethnal Green, Camberwell, St Luke, Islington, City of London, Strand, St Pancras, Clerkenwell
Hair manufacture	Bethnal Green (15.8), St Luke (14.9), Shoreditch (13.8), Bermondsey, Whitechapel, St George Southwark
Brushes and brooms	St George Southwark (12.1), Clerkenwell, Newington, St Luke, Shoreditch, Bethnal Green
Other workers and Dealers in hair	St George Southwark, St Olave Southwark

Source: Population census.

Note: All of the districts listed have a location quotient over 5.0, and those over 10.0 are shown in brackets.

Because these functions were beyond scrutiny until the mid nineteenth century, they retained a certain transgressive and destabilizing potential. The district was a portal into the profane world of dead animals; it was brought into existence as a dustbin into which were swept the left-overs of the re-orderings of city space that were responsible for gradually crystallizing the features of modernity.[105] This industrial cluster was therefore formed as a result of the spatial play of difference and deviance.[106]

105 Hetherington 1997.
106 Cenzatti 2008.

For all its frantic processing and manufacturing activity, it is really no surprise that this was the poorest part of London and a district without a voice.[107] Even the ancient common law of nuisance did not operate here, because, as one judge declared, 'what would be a nuisance in Belgrave Square would not necessarily be one in Bermondsey'.[108] What one has to remember about nuisance is that the plaintiff had to pay the costs of bringing an action and in poor areas, where employment opportunities were limited to the very workshops that were producing noxious vapours, smoke, smells and noise, it is hardly surprising that cases were few. Anyway, according to Brenner and Hamlin, the very definition of nuisance had undergone a sea-change in the nineteenth century that favoured industrialists.[109]

The spatial organization of the leather trades was restructured in the nineteenth century. The dominance of London waned in the face of competition from northern industrial cities, particularly Liverpool and Leeds. Various factors were involved, including changing routes of hide imports, and lower port charges and cheaper rents for large tanning yards in cities such as Liverpool.[110] In addition, the innovation of chemical means of processing leather overcame the time barriers implicit in traditional tanning methods, and capital therefore became more involved.[111] But Bermondsey gradually declined as a leather centre once the organic lock-in at the heart of its success had gone. Also its markets were changing, particularly when demand for leather goods for horses (saddles and harness) disappeared at the beginning of the twentieth century. One saving grace was that, in terms of volume, shoes were the main destination of British leather, about half in the 1830s, rising to 80 per cent in the early twentieth century.[112] People were buying more shoes at the latter date but shoe leather was not enough to save Bermondsey.

Other trades followed suit as their path dependency had directly or indirectly been linked to leather.[113] Take the strange case of hats. In the first half of the nineteenth century, Bermondsey was London's centre of hat manufacture. Christy's of Bermondsey claimed in 1841 to be the world's largest hat factory, producing a quarter of a million hats a year and employing about 500 operatives.[114] These were the felt or beaver hats that were popular in the early nineteenth century. But by 1850 beaver was being replaced by silk and eventually both the fashions and the jobs moved elsewhere.[115] The centre of gravity of hat-

107 Green 1995.
108 Brenner 1974: 414.
109 Brenner 1974, Hamlin 2002.
110 Booth 1903, Church 1971.
111 Bennett 1909.
112 Church 1971.
113 For more on lock-in and path dependency, see Belussi and Sedita 2009.
114 Sheppard 1971: 161.
115 Brayley 1850, vol. 5: 27–8. Beavers were being hunted to near extinction in many parts of North America and so the raw material was becoming rare and expensive.

making shifted westward to Southwark St George and St Saviour, where labour was cheap and plentiful. There was no longer a need for close proximity to the furriers and curriers of Bermondsey.

David Green has argued that London's industrial prosperity was unstable, with many fluctuations in individual sectors.[116] He and Paul Johnson have shown that, apart from agriculture and mining, London's mix of industries was not unlike the national profile, and that the presence of small workshops was a sign of a flexible, not an archaic, economic structure.[117]

In the mid nineteenth century Bermondsey was also home to most of the glue-making in London.[118] This was because the raw materials were readily at hand in the tan yards. First there were the so-called 'wet' materials such sheep-pieces or 'spetches' from fellmongers; 'fleshings' from leatherdressers and tanners; roundings of hides previously limed; animal ears; portions of bones to which tendons were still attached; and the clippings of salted and alumed skins used for covering cricket balls. Second, 'dry' materials included damaged pelts; salted ox feet; calves' pates; horn 'sloughs' – the pith or core of horns; clippings and roundings of parchment; glue pieces from fellmongers, leather dressers, tanners, and trotter boilers; rabbits' pelts and shreds from furriers.[119] These raw materials were first limed, then washed in tanks or pits, and dried on racks. After that they were boiled in huge vats.[120] In one factory in Bermondsey that Ballard visited, 12 tons of fleshings were boiled with one ton of water, yielding about 1.25 tons of glue. The liquid glue was drawn off and allowed to solidify into lumps, before then being dried in a heated chamber. The residue, known as 'scutch' was raked out of the pan and sent to a local manure factory.[121] In the twentieth century animal glues were replaced by vegetable-based adhesives (starch and starch products) and casein from milk. Bermondsey's role in this particular industry therefore largely disappeared.

Fat, Blood and Bone

The dismembered urban animal had lost its life but not its value; and meat was only part of that value. Animal by-products were an integral and essential part of the butchering industry.[122] Take offal, for instance. This represented 40 to 45 per cent of the body weight of British cattle in the mid nineteenth century, and

116 Green 1996.
117 Johnson 1996.
118 Dodd 1842: 30.
119 Ballard 1878: 202–6.
120 Lambert 1905.
121 Ballard 1878.
122 Cronon 1991: 251. In the Chicago meat packing industry no body parts were wasted and the sale of hides, fat and meat scraps represented the difference between profit and loss.

Table 4.2 Weight of the body parts of fat cattle

Body parts	Weight in lb.	
	Simmonds (1873)	McConnell (1897)
Hide and horns	32–56	90–100
Tallow	24–80	72–319
Head and tongue	16–28	40–51
Kidneys	2–4	–
Back collop	2–4	–
Heart	6–9	6–7.5
Liver, lungs, windpipe	12–16	28–30
Stomach and entrails	80–112	50–81
Contents of stomach	–	180–220
Blood	24–32	42–56
Meat	–	428–522
Bones	–	87–186
Spleen	–	3–3.5
Diaphragm	–	6–7.5

respectively one-third for pigs and a half for sheep and horses.[123] For fat cattle, the breakdown is shown in Table 4.2, although Simmonds and McConnell clearly had different ideas about the total weight of a fat beast.

An important point to make here is that offal was not regarded as 'waste' in poor households. Apart from the ever popular black pudding and tripe, other organs and body parts were valued and popularly thought to be nutritious, not as delicacies as in some countries but as basic foods.[124] Thomas Archer, writing about pauper lives in Shoreditch and Bethnal Green in the 1860s, celebrated the role of such food in the diet:

> I have already mentioned the shops for the sale of offal. Many of these may supply some really good articles of food – amongst which may be classed cows' heels and those baked sheep's heads, the appetising steam from which, as they frizzle in the long japanned kettles, salutes the nostrils of many an expectant family who have been hungry all the week, and look forward to this as the crown and reward of their week's work on Saturday night. It may readily be believed that in a business where all the family must, if they are fortunate enough to

123 Dodd 1856: 217.

124 Over 600 tons of black puddings, polonies and saveloys were sold from London cookshops every year. Gordon 1890.

> obtain employment, help to keep the wolf from the door – the cookshop is a convenient substitute for the kitchen of more favoured households.[125]

But the non-meat part of carcases had many uses beyond food. As far as blood is concerned, for instance, its peak of use in London was probably in the 1850s, when 800,000 gallons were collected and processed annually. By far the largest portion of this was converted into concentrated agricultural and gardening manure.[126] In addition, the albumin in the serum was used in clarifying wine and cider and as a mordant for fixing the colours in dyes. The haemoglobin was employed in the manufacture of the pigment 'Turkey Red'.[127] Blood was also valuable in the preparation of adhesive cements, as a thickener for heavy duty paints, an ingredient in the bleaching process, and as an additive in stucco.[128] There was also a predecessor of Bakelite, known as 'bois durci', that was made of a mixture of cattle blood and sawdust, heated and pressed into moulds.[129] It was manufactured in Paris from the 1850s until the 1920s.

Scientifically, blood came to be known through the 'animal chemistry' of Berzelius and Liebig in the early nineteenth century and, following the work of James Blundell in the 1820s and 1830s, it was the subject of medical experiments with transfusions.[130] Animal to human xeno-transfusions had been tried in the eighteenth century and continued to be advocated in Germany as late as the 1870s. This belief in the potential of animal bodies as raw material for human health is paralleled in the apparent popularity of visiting abattoirs to drink warm blood. Many such people were suffering from anaemia or from tuberculosis. In 1875 Lafacadio Hearn in his journalism for the *Cincinatti Commercial* described a similar daily ritual:

> It may not be generally known that, like New York, Cincinnati has its blood drinkers – consumptives and others who daily visit the slaughter-houses to obtain the invigorating draught of ruddy life-elixir, fresh from the veins of beeves … Lowensteins, on John Street … has perhaps half a dozen visitants … Between the hours of two and four o'clock almost any afternoon, the curious visitor may observe many handsomely dressed ladies and others enter the cleanly, well-kept establishment in question, and waiting, glass in hand, for a draught of crimson elixir yet warm from the throat of some healthy bullock. Just as soon as the neck of the animal is severed by one slash of the 'schochet's' long blade, glass after

125 Archer 1865: 17–18.
126 Simmonds 1873: 77.
127 Simmonds 1877, Ballard 1878.
128 Dodd 1851: 383.
129 Campbell 2006: 118.
130 Coley 2001, Pelis 1997, 2001.

> glass is held to the spouting veins and quickly handed to the invalids, who quaff the red cream with evident signs of pleasure, and depart their several ways.[131]

In addition to blood, animal bones were also valued, so much so that their importation increased, and this caused nuisances from the bone vessels in the Port of London, from which 'the smell was exceedingly sickening, and was perceptible at a great distance'.[132] The majority of domestic supplies of bones came from cities because that was where the slaughter-houses were situated until their better regulation in the later nineteenth century. A principal use of bones was in powdered form as an agricultural fertilizer and also phosphorus extracted from bones was a key raw material of the match industry.[133] The Medical Officer of Health for Rotherhithe reported in 1857 that

> in the mile length of Rotherhithe Street there are no less than nine factories for the fabrication of patent manure [superphosphate], that is to say, nine sources of foetid gases. The process gives out a stench which has occasioned headache, nausea, vomiting, cough, &c. Many complaints have been made by the inhabitants.[134]

The bones were ground/milled into different sizes: inch bones, half-inch bones and bone-dust.[135] The vast majority were then boiled in order to extract the oil and most of the gelatine, both of which were sold on to candle and soap makers.[136] Other uses included bone ash, prepared by calcining bones and powdering them, and animal charcoal or bone black, which was used by sugar refiners and in black paint, inks and dyes.[137] Animal charcoal was also a component in water filters.[138] A final use was as a material for knife handles and other articles.[139] Two million ox shank bones were used in Sheffield each year for knife-handles and spoons, for instance. They were also made into tooth brushes, combs and fans.[140]

Gut scraping was another of the most objectionable of animal-related trades in towns. The intestines used were usually those of sheep and pigs and the products varied from sausage skins to the catgut spun for violin strings, tennis rackets

131 Hughes 1990: 197–8, 338.

132 Royal Commission on Improvement of Health of Metropolis, Minutes of Evidence (Ch: Robert Grosvenor), P.P. 1847–8 (895) xxxii.60.

133 Barles 2005.

134 Jephson 1907: 114.

135 Dodd 1851: 398–99, Ballard 1878: 262–4.

136 From the 1870s onwards gelatine was used in photographic emulsions and as a gelling agent in food processing.

137 Lambert 1913.

138 Late in the nineteenth century bone was replaced by cheaper and less smelly alternatives. Barles 2005.

139 Desrochers 2001.

140 Simmonds 1877: 146.

and certain types of machinery. The 'scraping' was the handy work of someone, usually a woman, who passed the gut between her fingers from one tub of water into another, pushing the contents along with a wedge-shaped wooden tool. The process was repeated until the gut was clean and it was then soaked in brine for over a week, followed by a spell in cold water. For spinning, a number of guts were interwoven for added strength, as many as 700 together for an industrial-strength rope. Finished strands of catgut were bleached, stretched and dried on a frame for a number of days. Only the best quality guts were used for musical instruments.

> Speaking generally-of gut-scraping and gut spinning establishments … they are the most intolerable of nuisances wherever they may chance to be located. Within the workshops the stench is inconceivably horrible: few persons unaccustomed to it could bear to remain for a single minute in some scraping rooms that I have visited, and I myself have sometimes had a difficulty to restrain vomiting and to carry on the inquiries I was bent upon. The stench, after I have been in some of them for twenty minutes or half-an-hour, has so pertinaciously attached itself to my clothing and hair, that only repeated ablutions have removed the odour from my hair, and my clothing has retained the stench for days. It spreads from the workshop and yard all round the neighbourhood, and often gives rise to such loud complaints that local authorities in some towns have insisted upon entire removal …[141]

Some of the smell was due animal fats boiled down from the waste portion of carcases processed in city slaughter-houses and scraps – so-called 'town stuff' – collected from butchers and tanners.[142] This was mostly cattle and sheep fat; pig fat, or lard, was too expensive. 'Kitchen stuff', essentially domestic scraps, was also used, suggesting that the quality and condition of the inputs fats was not a key consideration. These materials were first rendered by boiling in large copper vats, in order to remove impurities, and then boiled again for several days with a caustic alkali to achieve saponification: sodium or potassium hydroxide for hard and soft soaps respectively. George Dodd described the large works of Messrs Hawes in Southwark, which made 2,000 tons of soap and 800 tons of candles annually.[143] Their prosperity had been boosted by gradual reductions in the soap duty (1833–52) and changes in ideas about personal hygiene, which together increased demand. Soap factories were still found in most towns in the middle of the nineteenth in the same way that slaughtering was universal.[144] But eventually the mass-market success of

141 Ballard 1878: 256–7.

142 Anon. 1818: 355–61, 382–7.

143 Dodd 1843: 187–202. See also Brayley 1850, vol. 5: 40–42. Other large works were located in Lambeth and Wandsworth, also in south London.

144 London manufacturers produced 20.8 per cent of British dutiable soap in 1835 and 22.4 per cent in 1845. Soap: accounts of soap made in each town in Great Britain, P.P. 1836 (292) xlv.635; P.P. 1846 (81) xliv.413.

Gossage and, later, of Lever Brothers, increasingly using vegetable oils with better lathering properties, ruptured the local connexion with animal fats and solved the many complaints about smells. Scale was an advantage in soap-making because of the increasing need for capital investment in heating and refining technologies.[145]

In the late 1870s Edward Ballard visited 60 fat melting, candle dipping and soap factories. By then there had been a decline in tallow candles, which were being overtaken by gas lighting, the increased use of vegetable fats, and the discovery of paraffin wax. The tallow came from the stearin in animal fat and it was cheaper than wax, but its disadvantages were smell and a low level illumination in an age when 'the desire for brilliant lighting is insatiable'.[146]

Knackers and Other Animal Industries

There is one estimate that 400 horses died of exhaustion and disease on the streets of London each week.[147] The figure is difficult to verify but certainly incidents of horses collapsing were common and not considered as horrific as they would be now. The dead horses rarely lay for long.[148] Rigor mortis reduced the value of the carcase, so the knacker took possession quickly. Worn out horses were also delivered to knackers' yards by 'crock collectors', being walked through the city in strings of up to 15 at a time, nose to tail.[149]

In the second half of the nineteenth century there were 20 to 30 horse-slaughterers' yards, mostly clustered in east and south London. They had contracts with the larger users of horses, such as omnibus companies, cab firms, brewers and coal merchants. In the 1890s London's largest knacker's yard was in Garratt Lane, Wandsworth, processing 26,000 horses a year.[150] Their output was 70 tons of dog and cat meat a week, amongst other products. The yard worked 24 hours a day and was the ultimate disassembly line, from which there appears to have been no 'waste' in the sense of useless leftovers. To get a sense of the craft of killing, it is worth recounting a part of Gordon's description.

> In two seconds a horse is killed; in a little over half an hour his hide is in a heap of dozens, his feet are in another heap, his bones are boiling for oil, his flesh is cooking for cat's meat. Maneless he stands; a shade is put over his eyes; a swing of the axe, and, with just one tremor, he falls heavy and dead on the flags of a spacious kitchen, which has a line of coppers and boilers steaming against two

145 Watt 1896, Hurst 1898, Lamborn 1918.
146 Williams 1876, Booth 1903: 115.
147 Simmonds 1873: 56.
148 McShane and Tarr 2007.
149 Mayhew, H. (1849) Letter XIII, *Morning Chronicle* November 30th; [Greenwood] 1883: 106–13.
150 Gordon 1893: 184–8.

Table 4.3 Horse Carcase By-products, 1873

Item	Weight (lb.)	Value	Uses
Hair	1	1s. to 1s.3d.	Haircloth, mattresses, bags for crushing oil-seed, plumes
Hide	50	12s.	Tanning, table cloths
Tendons	6	–	Glue and gelatine
Flesh	252	31s.6d.	Dog, cat and poultry food
Blood	60	3d.	Dye and manure
Intestines	25	1s.	Sausage skins
Grease	28	4s.8d.	Candles, soap
Bones	60	4s.6d.	Knife handles, manure
Hoofs	12	10d.	Gelatine, glue, prussiate of potash (potassium ferrocyanide); also made into pincushions and snuff boxes
Old horse shoes	10	8d.	Scrap iron

Source: Simmonds 1873, 56–7.

Table 4.4 London Traders in Animal Waste, 1873

Occupation	Number	Occupation	Number
Bladder and sausage-skin dealers	14	Grease manufacturers for coaches, carts, railway axles, &c.	32
Blood driers	2	Guano merchants	17
Bone dealers, bone boilers and crushers	16	Horn and bone merchants	14
Feather purifiers	12	Ivory-black and lamp-black makers	13
Fellmongers	15	Manure merchants and manufacturers	76
Felt makers	16	Melters and tallow chandlers	46
Gelatine makers	12	Plasterers' hair manufacturers	12
Glue and size makers	14	Scum boilers	2
Glue piece merchants	5	Tanners	54
Glycerine manufacturers or agents	8	Tripe dressers	113
Gold beaters' skin makers	8	Waste ivory, bone, and tortoiseshell dealers	3

Source: Simmonds 1873, 29–30.

> of its walls. In a few minutes his feet are hooked up to crossbeams above, and two men pounce upon him to flay him; for the sooner he is ready the quicker he cooks. Slash, slash, go the knives, and the hide is peeled off about as easily as a tablecloth ; and so clean and uninjured is the body that it looks like the muscle model we see in the books and in the plaster casts at the corn-chandler's. Then, with full knowledge gained by almost life-long practice, for the trade is hereditary, the meat is slit off with razor-like knives, and the bones are left white and clean and yet unscraped, even the neck vertebrae being cleared in a few strokes – one of the quickest things in carving imaginable.

After having their fat extracted, which was used for greasing harness and the wheels of carts, the bones were sent to manure merchants to make superphosphate or to the button-makers. The hoofs went to glue-makers and Prussian blue-makers, but there was also an extensive trade in 'neat's foot oil', a lubricant, and a small outlet for sheep's trotter oil, which was used as hair oil.[151] The tails and manes of the dead horses became the stuffing in furniture and their hides were tanned for a variety of purposes such as carriage roofs and whip-lashes. The average carcase weight of working horses was 905 lb. and this was divided up as shown in Table 4.3.

Since we are taking a broad definition of animal industries, we may also include brush makers. They used bristles and hair to make everything from tooth brushes to hair brushes. Along with fur-pullers and similar trades, this was women's work, often 'put out' to domestic situations rather than in a workshop or factory. Located mainly in east and south London, this was poorly paid labour.[152]

Conclusion

As Paula Young Lee points out, slaughter and the industries associated with animal waste products have rarely been analysed for their cultural politics.[153] This chapter has raised some relevant issues for London and has also added material of an economic nature. As pointed out, there is a great deal of work to be done at the local level and the lowest hanging fruit is undoubtedly the extraordinary animal-intense districts of south and east London, and their equivalents in Paris, Berlin, New York and other major nineteenth-century cities. There are potentially cultural, economic and political insights to be gained here that are urgently required to nuance and problematize our notions of the emerging human-animal, society-nature relations that helped to birth the modern world.

The present chapter has barely scratched the surface of this vast, yet neglected topic. If space had allowed, two further themes could have been explored. The first is the veterinary knowledge and expertise that became associated with urban

151 Simmonds 1873: 50, Ballard 1878: 223.
152 British Weekly Commissioners 1889.
153 Lee 2008: 2.

animals in the second half of the nineteenth century. Anne Hardy has discussed the role of municipal veterinarians in the control of animal disease, and meat inspection to protect human health.[154] We need further research and theorized narratives in order to understand the constructions of knowledge and the application of expert professionalism here if we are to understand this aspect of urban animal existence. Second, zoonotic disease was an often hidden aspect of the blood and guts economy. Here historians have published helpful national-scale accounts but fine-grained research for individual cities deserves further encouragement. In Chapter Five Paul Laxton will touch upon both of these themes.

154 Hardy 2002.