4. The Dietary *Dispositif*

4.1 *Dispositifs* of the Anthropological Form

An abstract-conceptual reconstruction of the anthropological form provides a framework for understanding the structural conditions for human domination over non-human animals in capitalist societies, and opens to historical-social analysis certain configurations of animal domination. The anthropological form materializes as three specific *dispositifs* to be explored historically:

1. The dietary *dispositif*: the network which enables the exploitation of nonhuman animals for human feeding. Textile and clothing production with animal-derived components are interconnected to the food supply chain as well, as in the case of leather;
2. The pharmaceutical-experimentation *dispositif*: the network regarding the exploitation of non-human animals as experimental subjects both in the development of new drugs (for use in humans and other animals, such as farm animals, to augment productivity) and in various other fields of scientific research (bioengineering, cognitive science, ethology, etc.);
3. The entertainment-pet *dispositif*: the network regarding the exploitation of non-human animals for human "leisure" (zoos, theme parks, movies, safaris, dog and cat breeding, wild animals trafficking, etc.).

To grasp the qualitative transformation, the birth of the dietary *dispositif* will be explored historically, with respect to meat production. Since the latter half of the nineteenth century, the dietary *dispositif* in capitalist society has been centered upon meat. As Baics and Thelle put it, "meat, in particular, occupies a critical juncture for nineteenth-century food systems because no other food item was so intricately connected to urban modernity".[1] Urbanization was a fundamental process of the nineteenth century, with the urbanized population growing rapidly between 1820 and

1 Gergely Baics and Mikkel Thelle, "Introduction: Meat and the Nineteenth-Century City", *Urban History*, vol. 45, no. 2 (2018), p. 184.

1914 (the level of urbanization of Western countries increased from approximately 12 percent to 36 percent).[2] More and bigger cities, with an expanding populations coming from the countryside and a rise in the standard of living for the middle class generated an urbanized set of issues surrounding meat supply, namely the scale of production and demand, leading to the rise of meat as a staple commodity. The relationship between urbanization and the commodification of meat, however, is not a direct causality, and the previous system based upon household production and private slaughterhouses was still present, if waning. As a *dispositif* perspective makes clear, this was the outcome of a specific, historical trajectory, involving different elements within specific sets of power relations.

Moreover, meat's privileged role in the capitalist transition, especially red meat, along with other foodstuffs of animal origin, also known as animal source food – milk and dairy products, fish, and eggs – developed differently across different regions and over time.[3] The commodification of liquid milk was particularly dependent upon the railway expansion, for example, thus becoming a phenomenon of the late nineteenth and early twentieth centuries.[4] The fishery sector also transformed in the late-nineteenth century (around 1880), thanks again to the railroad, steam-powered fishing vessels, "power lifters", beam trawl and the first attempts in developing marine hatchery.[5] Finally, in the 1910s and the 1920s, chicken meat and egg production shifted from subsistence, household production – in which backyard hens recycled organic house waste converting them to eggs, manure and eventually meat – to commercial production, the emergence of the poultry industry and the subsequent specialization between broiler and egg production.[6]

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2 Paul Bairoch and Gary Goertz, "Factors of Urbanisation in the Nineteenth Century Developed Countries: A Descriptive and Econometric Analysis", *Urban Studies*, vol. 23, no. 4 (1986), pp. 285–305.

3 Analogous changes in meat consumption affected Mediterranean Europe only after 1900 and East Asia only after 1950. Vaclav Smil, "Eating Meat: Evolution, Patterns, and Consequences", *Population and Development Review*, vol. 28, no. 4 (2002), pp. 599–639.

4 For an account of milk as a commodity, from its origin in the 1860s and 1870s to 1940, conducted in terms of "the heterogeneous relations that it embodies and mediates", see Richie Nimmo, *Milk, Modernity and the Making of the Human: Purifying the Social*, Routledge, London, 2010.

5 John M. Knauss, "The Growth of British Fisheries During the Industrial Revolution", *Ocean Development & International Law*, vol. 36, no. 1 (2005), pp. 1–11; and Colin E. Nash, "Aquatic Animals", Kenneth F. Kiple and Kriemhild Ornelas (eds.) *The Cambridge World History of Food*, Cambridge University Press, New York, 2000, pp. 459–61.

6 For case studies in Australia, see Andrea Gaynor, "Fowls and the Contested Productive Spaces of Australian Suburbia, 1890–1990", Peter Atkins (ed.), *Animal Cities: Beastly Urban Histories*, Ashgate, Farnham, 2012, pp. 205–19. For case studies in the U.S., William Boyd, "Making Meat: Science, Technology, and American Poultry Production", *Technology and Culture*, vol. 42, no. 4

During the nineteenth century, the emergence of centralized slaughterhouses and intensive farming led to government regulation and public health reforms, and other transitions within the market, family, zootechnical practices, culinary practices, the fields of nutrition science and dietetics (based upon chemistry and biology), media and communication representations and related, individual practices of self-regulation through consumer choices. Through this *dispositif*, in Western modernity, meat has experienced a change of purpose and function describable as "hygienizing meat", a process imposing the sanitation and more efficient organization of both human and non-human exploitation.

4.2 The Dietary *Dispositif*: Beginning with the Slaughterhouse

A network, even if it has a finite extension, does not have a beginning or an end, unlike, for instance, a chain where its first and its last link are easily identifiable. The same is true for a molecule. Thus, given the analogy between molecule and *dispositif* established in Section 2.3, where to start untying this dietary *dispositif*? Which knot-atom to start with? Meat is a complex and multiple object during modernity, varying greatly across contexts and times, it always involves the act of killing animals. Excluding cannibalism, necrophagy, and in-vitro meat research projects,[7] because of their exceptionalism, meat can be essentially defined as flesh of *killed* animals. Thus, the institution of the public slaughterhouse is the main subject of this inquiry.

Two books, *Meat, Modernity and the Rise of Slaughterhouse*[8] and *Animal Cities: Beastly Urban Histories*[9] are primarily used here to outline the dietary *dispositif* and its relational, heterogeneous elements (starting from the slaughterhouse) and trace the patterns and trends in its development, based upon on first-hand historical accounts and specific case-studies. Rapid political, social and economic integration of Europe, first, and the rest of the world in the second half of the century under capitalism, in other words, "globalization", determine the general *dispositif* and

(2001), pp. 631–64; and Donald D. Stull and Michael J. Broadway, *Slaughterhouse Blues: The Meat and Poultry Industry in North America*, Thomson/Wadsworth, Belmont, 2013.

7 The unsuccessful promise of in vitro meat is to create animal protein without the death of an individual creature. Erik Jönsson, "Benevolent Technotopias and Hitherto Unimaginable Meats: Tracing the Promises of in Vitro Meat", *Social Studies of Science*, vol. 46, no. 5 (2016), pp. 725–48; Carlo Salzani and Zipporah Weisberg, "The Ethics and Politics of Cultured Meat: Food Transition, Big Business, 'Humanewashing'", Donald Bruce and Ann Bruce (eds.), *Transforming Food Systems: Ethics, Innovation and Responsibility*, Brill-Wageningen Academic, Wageningen, 2022, pp. 428–33.

8 Paula Y. Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, University of New Hampshire Press, Lebanon, 2008.

9 Peter Atkins (ed.), *Animal Cities: Beastly Urban Histories*, Ashgate, Farnham, 2012.

shape its recurrent relational patterns.[10] For example, slaughterhouse reforms were widespread in Europe, following the Napoleonic public abattoirs in Paris of 1818. Rouen inaugurated its central slaughterhouse in 1830, followed by Marseille in 1848, Lyon in 1858, Brussels in 1840, Vienna in 1851, Edinburgh in 1852, Manchester in 1872, Milan in 1863, Zurich in 1868, Frankfurt in 1861, Munich in 1865, Hamburg in 1872, Berlin in 1881, Rome in 1888, Barcelona in 1891 and Valencia in 1902. Paris opened a new slaughterhouse structure, La Villette, in 1867. Moreover, there was frequent and comprehensive exchange of knowledge between scientific communities in different countries regarding slaughterhouses. For instance, Scottish veterinarian John Gamgee, the leading critic of farm conditions such as diseased animals and threats to public health in Britain, spent several years in continental Europe, touring the principal veterinary schools in France, Germany and Italy.[11]

Since the 1870s, an international food system or food regime emerged[12]. Lasting until 1914 this "first food regime" was centered on European, especially British, imports of basic grains and meat from settler colonies (Argentina, Canada, the Americas, Australia and New Zealand) and of sugar, tea, coffee, palm oil, etc. from tropical colonies. At the same time, European was experiencing a crisis of grain production and expanded farming and soil mining in settler states. British hegemony in the world market thanks to its industrial and finance capital was legitimized by the rhetoric of free trade.[13] Along these lines, the food regime analysis involves international relations of the dietary *dispositif*.

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10 Kevin H. O'Rourke and Jeffrey G. Williamson, *Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy*, MIT press, Cambridge, 1999.

11 John Francis, "John Gamgee (1831–1894): Our Greatest Veterinarian", *British Veterinary Journal*, vol. 118, no. 10 (1962), pp. 430–8.

12 The perspective of food regime analysis "links international relations of food production and consumption to forms of accumulation broadly distinguishing periods of capitalist accumulation". Harriet Friedmann and Philip McMichael, "Agriculture and the State System: The Rise and Decline of National Agricultures, 1870 to the Present", *Sociologia Ruralis*, vol. 29, no. 2 (1989), pp. 93–117. Food regime analysis focuses on the following question: "Where and how is (what) food produced in the international economy of capitalism?; Where and how is food consumed, and by whom? What types of food?; What are the social and ecological effects of international relations of food production and consumption in different food regimes?" Henry Bernstein, *Food Regimes and Food Regime Analysis: A Selective Survey*, paper presented at "Land Grabbing, Conflict and Agrarian-environmental Transformations: Perspectives from East and Southeast Asia" conference, 5–6 June 2015, Chiang Mai University, 2015, p. 1 https://www.iss.nl/sites/corporate/files/CMCP_1-_Bernstein.pdf accessed 9th June 2025. In recent years this perspective has been revisited in Philip McMichael, "A Food Regime Genealogy", *The Journal of Peasant Studies*, vol. 36, no. 1 (2009), pp. 139–69; Philip McMichael, *Food Regimes and Agrarian Questions*, Fernwood Publishing, Halifax, 2013; and Bernstein, *Food Regimes and Food Regime Analysis*.

13 Bernstein, *Food Regimes and Food Regime Analysis*, table 1, p. 5.

At the same time, certain case studies reveal local characteristics and politics of this *dispositif*, at the country or city level. In line with Victorian Britain's role as the "workshop of the world",[14] its cities provide some of the best-documented cases of urban meat production in historical literature.[15] In the U.S., literature endowed cities such as Chicago the reputation, of "slaughterhouse to the world."[16] Western

14 Eric J. Hobsbawm, *Industry and Empire: from 1750 to the Present Day*, The New Press, New York, 1999, p. 112 ff.

15 Chris Otter, "Civilizing Slaughter: The Development of the British Public Abattoir, 1850–1910", Ian MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth-Century Britain", and Richard Perren, "Filth and Profit, Disease and Health: Public and Private Impediments to Slaughterhouse Reform in Victorian Britain" Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 89–152; Ian MacLachlan, "A Bloody OKal Nuisance: The Persistence of Private Slaughter-Houses in Nineteenth-Century London", *Urban History*, vol. 34, no. 2 (2007), pp. 227–54; Atkins, "Animal Wastes and Nuisances in Nineteenth-Century London"; Ian MacLachlan, "'The Greatest and Most Offensive Nuisance that Ever Disgraced the Capital of a Kingdom': The Slaughterhouses and Shambles of Modern Edinburgh", *Review of Scottish Culture*, no. 17 (2004–5), pp. 57–71; Ritvo, *The Animal Estate*; Harriet Ritvo, "Animals in Nineteenth-Century Britain: Complicated Attitudes and Competing Categories", Aubrey Manning and James Serpell (eds.), *Animals and Human Society: Changing Perspectives*, Routledge, London, 2002, pp. 106–26; Brian Harrison, "Animals and the State in Nineteenth-Century England", *The English Historical Review*, vol. 88, no. 349 (1973), pp. 786–820; and Anne Hardy, "Food, Hygiene, and the Laboratory: A Short History of Food Poisoning in Britain, Circa 1850–1950", *Social History of Medicine*, vol. 12, no. 2 (1999), pp. 293–311.

16 Dominic A. Pacyga, "Chicago: Slaughterhouse to the World", in Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 153–67; William Cronon, *Nature's Metropolis: Chicago and the Great West*, WW Norton & Company, New York, 1991, pp. 207–59; and Upton Sinclair, *The Jungle*, Pennsylvania University Press Electronic Classic Series, Philadelphia, 2008. On Cincinnati, see Steve C. Gordon, "From Slaughterhouse to Soap-Boiler: Cincinnati's Meat Packing Industry, Changing Technologies, and the Rise of Mass Production, 1825–1870", *IA. The Journal of the Society for Industrial Archeology* (1990), pp. 55–67. On New York, see Roger Horowitz, "The Politics of Meat Shopping in Antebellum New York City", and Jared N. Day, "Butchers, Tanners, and Tallow Chandlers: The Geography of Slaughtering in Early Nineteenth-Century New York City", Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 178–97. For a comparative study of planning regulation in New York, Baltimore, Boston and Philadelphia, see Catherine Brinkley and Domenic Vitiello, "From Farm to Nuisance: Animal Agriculture and the Rise of Planning Regulation", *Journal of Planning History*, vol. 13, no. 2 (2014), pp. 113–35. For a comparative study on market culture in New York, Paris and Mexico City, see Roger Horowitz et al., "Meat for the Multitudes: Market Culture in Paris, New York City, and Mexico City over the Long Nineteenth Century", *The American Historical Review*, vol. 109, no. 4 (2004), pp. 1055–83; and Lindgren Johnson, "To "Admit All Cattle without Distinction": Reconstructing Slaughter in the Slaughterhouse Cases and the New Orleans Crescent City Slaughterhouse", Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 198–215.

Europe's urban centers,[17] Paris, foremost, also boast literature about the meat industry.[18] Detailed research has been conducted also on Mexico City[19] and more recently on Buenos Aires,[20] Rio de Janeiro,[21] Barcelona,[22] Copenhagen,[23] and Moscow,[24] providing an image-set of this phenomenon as it emerged. While such literary sources are merely descriptive, they provide data to be historically, analytically, and institutionally examined.

Despite the contextual differences which make each abattoir unique across these cases, some recurrent, essential features include location, exterior and interior architecture, and inhabitants. A four-point analysis structured by these features is as follows:

1. Location. The abattoir is on the outskirts, distant from city centers, often near a river or canal, and connected to rural areas and urban centers through railways and shipping lines. An abundant fresh water source is fundamental for the well-functioning of the slaughterhouse complex. Waterways supply running water, fed by a system of pumps, and waste disposal (blood and unprocessed bodies or body parts), through a drainage system. The direction and intensity of the current of the water source are essential factors.

An example is New Orleans' Crescent City Slaughterhouse, located on the Mississippi River. The strong current of the river flows down and away from the city, thus

17 Dorothee Brantz, "Animal Bodies, Human Health, and the Reform of Slaughterhouses in Nineteenth-Century Berlin", Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 71–88.

18 Kyri Claflin, "La Villette: City of Blood (1867–1914)", Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 27–45; Sydney Watts, "The Grande Boucherie, the 'Right' to Meat, and the Growth of Paris", and Paula Y. Lee, "Siting the Slaughterhouse: From Shed to Factory", Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 13–26, 46–70.

19 Jeffrey M. Pilcher, "Abattoir or Packinghouse: A Bloody Industrial Dilemma in Mexico City, c. 1890", Lee (ed.), *Meat, Modernity, and the Rise of the Slaughterhouse*, pp. 216–36.

20 Fabiola Lopez-Duran and Nikki Moore, "Meat-Milieu: Medicalization, Aestheticization and Productivity in Buenos Aires and its Pampas, 1868–1950", *Urban History*, vol. 45, no. 2 (2018), pp. 253–74.

21 Maria-Aparecida Lopes, "Struggles over an 'Old, Nasty, and Inconvenient Monopoly': Municipal Slaughterhouses and the Meat Industry in Rio de Janeiro, 1880–1920s", *Journal of Latin American Studies*, vol. 47, no. 2 (2015), pp. 349–76.

22 Manel Guardia et al., "Meat Consumption and Nutrition Transition in Barcelona, 1709–1935", *Urban History*, vol. 45, no. 2 (2018), pp. 193–213.

23 Mikkel Thelle, "The Meat City: Urban Space and Provision in Industrial Copenhagen, 1880–1914", *Urban History*, vol. 45, no. 2 (2018), pp. 233–52.

24 Anna Mazanik, "'Shiny Shoes' for the City: The Public Abattoir and the Reform of Meat Supply in Imperial Moscow", *Urban History*, vol. 45, no. 2 (2018), pp. 214–32.

"the remarkable absence of all odor".[25] In Chicago's Union Stock Yard complex, by contrast, where the environmental conditions were not as favorable, the waterway could become a real "river of blood". The leader of the global meat industry, owned by the Union Stock Yard & Transit Company (USY & T Co.), opened on Christmas Day, 1865, and was located on the South Branch of the Chicago River. This swampy land posed drainage issues, and the huge amount of waste dumped in the shallow body of water contaminated it so much that it bubbled from the decomposition, giving it the name "Bubbly Creek", as it is still called. Moscow's abattoir, constructed between 1886 and 1888, demonstrates some solutions to the problem of low water levels. The shallow and slow Moskva River, flowing through a densely populated area downstream of the city, could not efficiently clean and remove the offal of meat production. A water filtration engineering project was implemented, in which each building of the complex was connected to a sewerage system that brought the waste to filtration fields at a large wetland south-east of Moscow.[26]

2. Exterior Architecture. The slaughterhouse is not a single building, but a complex of several different edifices, some of them connected by internal railways. A huge, enclosed area may comprise animals pens and stables, gates, a killing floor, a special abattoir for diseased animals, refrigeration rooms, a dressing room, a suspension room, carcass destruction facilities, farmed animals trading market, canning divisions, administrative offices, storerooms, apartments for employees, hotels for drovers and farmed animals producers, guardhouses, laboratories, biology museums (housing, for instance, waxworks, preserved examples of animal pathologies and parasites, as well as statistical materials on morbidities), libraries and auditoriums.

An interesting example is Mexico City's Peralvillo slaughterhouse, officially inaugurated in 1897 as part of the progressive reform program of urban improvement undertaken by the government of Porfirio Díaz (1876–1911) and the technocratic elite which surrounded him, known as the *científicos*, the scientific ones. They were intent upon making Mexico a modern nation according to the model of what they viewed as the technologically advanced societies of Europe and North America. In accordance with this mentality, a biology museum was located on the main floor of the slaughterhouse's administrative building, as a monument to scientific progress. The library, where health inspectors could keep up to date with the latest medical essays, was located upstairs, next to a laboratory equipped with microscopes for meat inspection.[27] A similar case is Moscow's abattoir where, in addition to the laboratory

25 Quoted in Johnson, "To 'Admit All Cattle without Distinction'", p. 210.

26 Mazanik, "'Shiny Shoes' for the City", p. 220.

27 Pilcher, "Abattoir or Packinghouse", p. 226.

and the museum, there was a 300-seat auditorium for scholarly lectures. Like the Peralvillo slaughterhouse, Moscow's slaughterhouse symbolized the commitment of municipal authorities to public health, in the image of European cities. For this reason, in both cases, the slaughterhouse is considered and presented to the public as a "technological and scientific masterpiece", and a center for scientific promotion and education.[28]

Sometimes, the abattoir complex also comprises meat and viscera markets. Generally, however, slaughter and butchery are disaggregated, especially after the introduction of refrigeration and canning technologies. In an organization in which production is separated from consumption, the slaughterhouse is entirely devoted to rendering "animal to edible" – to borrow the incisive title of the book by ethnographer Noëlie Vialles[29] – while dead-meat markets, private butchers stores dispersed along the streets, and meat stalls at municipal urban markets are places for the sale of a commodity which was starting to look more and more like every other commodity. The separation between slaughterhouse and market is a regulated and coordinated system, subject to policy.[30]

Facilities for the manufacture of animal by-products also constitute part of the slaughterhouse, located either inside its the fence or just close to it. They produced things such as blood fertilizer, or served as tallow factories, tanneries, soap makers, bone boilers, fat renders, plants for cleaning intestines, albumin factories, etc., in a word, the so-called "nuisance trades". The whole complex is separated and hidden from the outside by a fence, "cloaked in banality, […] purposely camouflaged by an inexpressive exterior that deflect visual attention".[31] Usually, the buildings are arranged with logical rigor to streamline the process of "decorporealization"[32] of the living animal body. This process takes place with a movement of living animals from pens, near railway platforms and docks to their fading into thin air through the smokestacks of the by-products factories, passing through the "inner sanctum"[33] of the slaughterhouse – out of sight both from people outside and inside the facilities. A similar process of decorporealization is accomplished, in some cases,[34] with a top-

28 Mazanik, "'Shiny Shoes' for the City", p. 230.

29 Noëlie Vialles, *Animal to Edible*, trans. J. A. Underwood, Cambridge University Press, Cambridge, 1994.

30 See the study on Barcelona in Guardia et al., "Meat Consumption and Nutrition Transition in Barcelona"; and the comparative study on Paris, New York, and Mexico City in Horowitz et al., "Meat for the Multitudes".

31 Lee, "Siting the Slaughterhouse", p. 51.

32 Johnson, "To 'Admit All Cattle without Distinction'", p. 211.

33 This is the most common case. The idea of this kind of movement is elaborated by Johnson from an 1875 lithograph of the Crescent City Slaughterhouse but can be easily applied to other slaughterhouse complexes. *Ibid.*

34 Pacyga, "Chicago", p. 156.

down, vertical movement. The edifice of the abattoir is three to seven stories, and animals are taken up ramps to the slaughter hall on the top floor. Through openings in the floor, various parts are removed from the animal – paws, skin, viscera, fat, etc. – that fall into the tables below where other workers further divide meat, tendons and bones. They are then moved to a lower floor, where respective manufactures are located. The meat goes to the butcher's shop, the bones, to degreasing or gelatine manufacture, the tendons and waste, to make industrial saws, fatteners, glues. Due to the size and complexity of abattoirs, they were often called "cities" or "towns", like the famous "City of Blood", i.e. La Villette abattoir,[35] or "Meat City", i.e. the first major slaughterhouse in Copenhagen, or "Pakingtown", i.e. Chicago's Union Stock Yard.[36]

3. Interior Architecture. The interiors of slaughterhouses are mechanized and "truly modern". Washing and transportation are two of the most highly mechanized functions. There is plenty of running water, well-functioning drainage systems, broad paved streets lit by gas or, later, electricity, separate, large, open, well-lit and well-ventilated, climate controlled halls for different species of animal and meat. Mechanical apparatuses such as waterproof floors, lifts, transporters, weighing machines, aerial rails, pulleys, rails, hooks, sausage-mincers, hog-scraping devices, bullets, pistols, bolts, carbon monoxide, coal gas, telegraphs, electric currents (used for the "civilized" slaughter, stunning of the animal before killing it) replace human labor more and more.

This increasing mechanization reached its peak with the introduction of the conveyor belt and, above all, the pulley, or wheel,[37] which completed the two-story disassembly line. The pulley could lift and transport live animals through the workstations for the various slaughtering phases, making it very significant for slaughterhouse

35 La Villette, opened in 1867 beside Paris' fortifications in the Nineteenth Arrondissement, was part of Baron Georges-Eugène Haussman's renovation project of Paris, aimed at concentrating those noxious activities related to meat, while, at the same time, distancing them from the great boulevards of bourgeois Paris. La Villette was the greatest market and slaughterhouse establishment in the continent with 40 pavilions on a 54 hectares area. Claflin, "La Villette", p. 28.

36 In 1864, the stockyard covered 129 hectares. By 1900, it grew to 192 hectares. Pacyga, "Chicago", p. 154.

37 "At the head there was a great iron wheel, about twenty feet in circumference, with rings here and there along its edge. Upon both sides of this wheel there was a narrow space, into which came the hogs at the end of their journey […] It began slowly to revolve, and then the men upon each side of it sprang to work. They had chains which they fastened about the leg of the nearest hog, and the other end of the chain they hooked into one of the rings upon the wheel. So, as the wheel turned, a hog was suddenly jerked off his feet and borne aloft". Sinclair, *The Jungle*, p. 38.

development. In the 1840s, Cincinnati's slaughterhouses suspended hooks from an overhead horizontal wheel and gambrel sticks transported gutted hogs from the killing floor to the cooling room. Still, manual lifting of the dressed hogs from station to station was required. By the early 1860s, the system was further improved by mounting a grooved wheel on a continuous overhead rail, eliminating the need for manual lifting of the carcass from the dressing table to the cooling room. Finally, in 1867, a suspension apparatus for weighing hogs refined the system. They were removed from the drying room, hung on hooks and transported along a horizontal rail, when a worker then pulled a lever, elevating the carcass above the rail and measuring its weight.[38] "The consolidation and increased mechanization of Cincinnati's meat packing industry set the stage for the flow production systems of the early 20th century",[39] especially the Union Stock Yard's system, in which the disassembly line was perfected and brought to complete effectiveness, inspiring Henry Ford's assembly line at the Ford Motor Company.[40]

4. Inhabitants. Depending on the degree of mechanization, there may artisanal master butchers and other skilled workers in abattoirs.

At La Villette, for example, according to traditional French meat culture, the "philosophy of French *abattage*" remained almost intact in the transition from the private slaughterhouses scattered all over Paris to consolidated, public abattoirs. This philosophy dictated the coordinated work of six men under the supervision of a *patron boucher* – a *maître garçon*, two or three *garçons bouchers*, a *baladeur* (literally, "walkabout"), who brought the animals from their holding pens, a *dégraisseur* ("degreaser"), who removed the fat and the organs from the abdominal cavity and, finally, a young apprentice called the *agneau* ("lamb").[41] Chicago's Packingtown also had skilled laborers. Alongside salaried men who were paid a regular wage despite fluctuations in the supply of farmed animals, there were "pacemakers", who sped up the lines.

Alongside the skilled workforce, unskilled laborers hired for precarious hours through a contingent process. At the Union Stock Yard, for example,

> At the crack of dawn, men and women assembled outside the meat plants. Sometimes crowd of hundreds or even thousands would wait for the straw bosses and employment agents to appear and chose new employees. Representatives of the company went out into the crowd and picked those that seemed the strongest

38 Gordon, "From Slaughterhouse to Soap-Boiler", pp. 64–5.

39 *Ibid.*, 66.

40 As Ford stated, "The idea came in a general way from the overhead trolley that the Chicago packers use in dressing beef". Henry Ford, *My Life and Work*, Garden City, New York, 1922, p. 81.

41 Claflin, "La Villette", pp. 34, 36.

> or most skilled. There was no bargaining as to wages or hours; the agent simply tapped the man or woman he chose and told them, "Come along!".[42]

Day laborers were common in Europe, as well. At La Villette, people, almost exclusively men, gathered in the early morning outside the front gates on rue de Flandre and, on high-volume days, the *patron boucher* hired workers from these groups.[43] When women were first hired at slaughterhouses, they worked only on meat inspection. For example, in 1887, Berlin's Central Viehhof, where inspectors were often trained veterinarians, hired its first female trichinosis inspectors. This development, celebrated by contemporaries as an epochal change, aligned seamlessly with the prevailing gender stereotypes and the associated division of labor. As one author wrote at the time,

> A new era has come for the city administration two dozen young ladies were hired as meat inspectors. From the critical eye and judicious care of these ladies – and who would want to doubt the presence of these attributes in gentle widows and blossoming maidens – we can confidently expect that they will stop the insidious attack of the terrible hair worm that has caused so much damage in Berlin.[44]

Since the time of its opening, Chicago's Union Stock Yard employed a large number of women in the packinghouse. They were not allowed to use knives, however, and were restricted to canning. A strike in 1894 ended this restriction, and women were employed in every department, except the slaughter floor. Many workers were Polish and Lithuanian immigrants, the most represented immigrant groups. Others included Irish and Germans and, later, African Americans in the packinghouse. Children from the so-called "Back of the Yards" – i.e. the extremely poor and haphazard working-class neighborhood that developed to the south and the west of the packing plants – also had to work, for very low pay, in Packingtown. To contribute to their families, they continued to work, and often falsely reported their ages after 1893, when the State of Illinois prohibited child labor under the age of fourteen.[45] In addition to the employees in productive roles, other professionals and subjects, such as public health inspectors, veterinarians, meat inspectors, police officers, animal welfare associations' inspectors, administrative staff, sellers, buyers, train drivers, cleaners, guards, animal handlers, wholesale butchers, commissioners, market professionals, cows (beeves, calves), pigs, horses, sheep, hogs, chickens and microbes were part of the slaughterhouse.

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42 Pacyga, "Chicago", pp. 156, 157.

43 Claflin, "La Villette", p. 37.

44 Quoted in Brantz, "Animal Bodies, Human Health, and the Reform of Slaughterhouses in Nineteenth-Century Berlin", p. 84.

45 Pacyga, "Chicago", pp. 155–9.

A utopian slaughterhouse, envisaged by the British physician, leader of the temperance movement, and sanitation campaigner, Benjamin Ward Richardson, served as a model. In 1876 in his book *Hygeia*, he writes,

> 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.[46]

4.2.1 Excursus: Abattoir or Packinghouse? A False Dilemma

In the literature, an essential, qualitative distinction is drawn between the European and the American slaughterhouse model.[47] The designated prototypes are, respectively, La Villette and the Union Stock Yard, or the abattoir and the packinghouse. For example, the construction of the new Peralvillo slaughterhouse in Mexico City brings about a common, "bloody industrial dilemma" regarding the adoption of one model over the other.[48] The key difference lies in their levels of industrialization and automation: the abattoir is seen as less sophisticated in machinery, while the packinghouse has a higher degree of technological integration. For instance, the workers at La Villette, "believed that they were working in concert, unlike the automatons in an industrial American factory".[49] Similarly, as Lee reports, a British Journalist in 1905 commented that, "at Chicago there are […] no slaughter-*houses* at all".[50] Unlike Europe, Chicago had only slaughter "factories", where animals were treated as raw material to be processed for maximum profit. Many Europeans were horrified by Packingtown's conditions, although some admired the facility.[51] European slaughterhouses were often naively appreciated as bucolic. For instance, in 1910, the

46 Quoted in Peter Atkins, "The Urban Blood and Guts Economy", Atkins (ed.), *Animal Cities*, p. 87.

47 Marcus Doel, *Geographies of Violence: Killing Space, Killing Time*, Sage, London 2017, p. 76.

48 Pilcher, "Abattoir or Packinghouse".

49 Claflin, "La Villette", p. 37.

50 Lee, *Meat, Modernity, and the Rise of the Slaughterhouse*, p. 7. [emphasis added]

51 Kenneth D. Rose, *Unspeakable Awfulness: America Through the Eyes of European Travelers, 1865–1900*, Routledge, London, 2014.

American consul C.P.H. Nason, examining a series of reports on the organization of municipal slaughterhouses in Europe requested by the U.S. government, praised the Grenoble abattoir for its resembling a "pleasure resort or a miniature exhibition grounds".[52] As Lee underlines, "Nason may have found the Grenoble establishment to be like 'a pleasure resort' because it retained a small-scale, artisanal sensibility alien to the American factory system". In the eyes of French commentators, such as sanitation specialist Jean de Loverdo, the Grenoble project was like every other French slaughterhouse, "a bland box that strove for functional efficiency".[53]

As ideal types, the abattoir and the packing house are situated within a continuum, punctuated by analogous technological innovations, scientific discoveries, and reforms. The contingent dynamics and diverse contexts surrounding every real slaughterhouse and its development give different shape and trajectory to these elements. Taking into account hygienic reforms and meat inspection regulations reveals this multi-trajectoried continuum. Hygienic concerns are deeply intertwined with the institution of the slaughterhouse. Indeed, the hygienic movement was a prominent actor in the setting up of European municipal slaughterhouses, while a lack of concern for hygiene in favor of profit was considered as a characteristic of American models, such as in Chicago. There are two major facets of this issue.

First, the meaning or definition of "hygienic" changes over time, as we shall see in more details below. La Villette, for example, responded to mid-century hygienic needs, based on the so-called miasma theory, focused upon environmental concerns about the presence of farmed animals and private slaughterhouses in the city of Paris. Nevertheless, since the 1880s, La Villette started to be considered an obsolete, "repulsive", "unhealthy" and an "inconvenient" system, according to Loverdo.[54] Another observer noted in 1906, "This establishment has no unity of design. Groups of pavilions are crowded together, separated by streets where animals, vehicles, meat, manure all mix and mingle. […] As a result, surveillance is impossible, sanitary inspection is insufficient and filthiness is the rule".[55] This quote reflects concern along the lines of miasma theory, and by the end of the nineteenth century, bacteriology and the discovery of microbes compounded these environmental concerns, and La Villette became completely hygienically untenable. Also in the 1906, the US responded to similar hygienic concerns. The Pure Food and Drug Act and the Federal Meat Inspection Act, signed by President Theodore Roosevelt, federally regulated the adulteration of meat and meat products and ensured sanitary conditions and inspection of production facilities. These laws drew upon many precedents, provisions, and legal experiments from individual states, and upon meat inspection laws

52 Quoted in Lee, "Siting the Slaughterhouse", p. 46.

53 *Ibid.*, 47.

54 Quoted in *Ibid.*, 62.

55 Quoted in Claflin, "La Villette", p. 27.

from the 1890s related to exportation.[56] Likewise, Upton Sinclair's 1906, muckraking novel, *The Jungle*, was not the first criticism of the meat industry's hygiene. An outcry over unsanitary conditions and inadequate inspection was already in the air, fomented, for example, by *Progressive Era* publications of the day. Sinclair's book acted as catalyst for what became a public emergency of meat consumption and slaughterhouse conditions. In Europe, epizootics and zoonoses triggered epidemic conditions, which similarly raised the issue of slaughterhouses to public debate. For example, slaughterhouse reforms in Berlin and the creation of the Central-Viehhof abattoir were triggered by the discovery of trichinosis in relation to numerous deadly outbreaks.[57] In Britain, the first legislative steps toward slaughterhouse and livestock markets inspections were triggered by the outbreak of a cattle plague in 1865.[58] These debates were heavily carried out by the newspapers, in which a French veterinarian wrote, about La Villette's need for hygienic improvements,

> The refusal to implement changes made no sense […]. Was it because municipalities did not want to spend money to reconfigure the spaces, or because butchers were unwilling to abandon traditional methods? Most likely, he concluded, it was because the general public had no opinion: it just wanted its meat, cheap and in large quantities.[59]

4.3 Industrial Farming: An Interlude

The modern slaughterhouse, defined here as a centralized and mechanized space for the killing and dismembering of animals, could not have functioned without the concurrent evolution of animal husbandry. This other fundamental institution of zootechnics underwent significant changes, partly influenced by shifting slaughter requirements and capitalist interests. For efficient disassembly of animals, it is necessary that, "The specimens arriving from the farm are equivalent products to each other and all of them are commensurate with the machines that have to handle them, which in turn are calibrated to the size, strength, weight of the *normalized* animal body".[60]

For machines to properly grip the bodies of animals, they have to be of standardized form and measurements, or "the exemplary body of a species, in the sense that

56 Food and Nutrition Board Institute of Medicine (US), *Cattle Inspection: Committee on Evaluation of USDA Streamlined Inspection System for Cattle (SIS-C)*, 1990, pp. 8–9.

57 Brantz, "Animal Bodies, Human Health, and the Reform of Slaughterhouses in Nineteenth-Century Berlin", pp. 74–5.

58 Perren, "Filth and Profit, Disease and Health", pp. 140–5.

59 Quoted in Lee, "Siting the Slaughterhouse", p. 62.

60 Piazzesi, *Così perfetti e utili*, p. 152.

it is an interchangeable piece of a model of a species".[61] In other words, "the species is perfected and specialized in the same way as the tools used for its containment, for its nourishment, for its killing. They are made for each other".[62] Benedetta Piazzesi, in a study on the genealogy of zootechnics and industrial farming, highlights the shed, or the regime of perpetual housing, as the fundamental zootechnical apparatus to standardize the body. In this regime, unlike the seasonal housing formula, animals only leave their cages when they have to be transferred to another facility to fulfill another function (e.g. from a growth plant to a fattening one) or to be slaughtered. Feeding, manuring, reproduction, etc. are all performed inside the shed.

Feeding, or, better said, fattening operations under this model fully preclude the animals' "self-sufficiency" and freedom which they would have, for example, during the grazing period in seasonal housing formula, or when they are raised in backyards or, left free to wander the city (as in the case of pigs and poultry). Continuous housing enables the constant management and control of the feeding and movement of animals, and often leads to their immobility. Alongside the sheds, barns and haystacks stock large amounts of long-lasting food to feed ever larger masses of animals throughout the year. Improvements in chemistry made this feed more and more artificial, less expensive and more profitable. The zootechnical branch of "rational feeding", which started to develop as early as the 1770s, merged with the nutrition science to generate calculated feed analyses to determine nutrient supply.[63]

Diet experiments were conducted by comparing heterogeneous combinations of food to determine the basic elements of animal nutrition that led to the most efficient weight output. The first experiments were still tied to old agricultural products, such as wheat, peas, potatoes, and milk, and, were therefore, limited by the seasonality of fodder crops.[64] At the beginning of the nineteenth century, however, industrial waste and grains coming mainly from the dairy industry, distilleries and breweries were experimentally introduced. Cheaper, spent grains from breweries and distilleries spread in urban farms as a feedstuff for cows and pigs. Given the proximity of these urban factories, it was more convenient to buy their nutritionally richer spent grains, than buying large quantities of fodder from the countryside. This facilitated a new synergy between factories and farming that took the place of the old one between fields and farming. These new industrial, manufactured and

61 *Ibid.*, 82.

62 *Ibid.*, 137.

63 See, for example, *Experiments on fattening hogs* in Arthur Young, *Annals of Agriculture: And Other Useful Arts. Vol I*, Bury St. Edmund's, London 1784–1815, Vol. 1, pp. 332–51.

64 In 1810, a German scientist named Albrecht Daniel Thaer developed the first feed standards by comparing potential feedstuffs to meadow hay and assigning a 'hay value' as a comparative measure. Donavyin Coffey *et al.*, "Review of the Feed Industry from a Historical Perspective and Implications for its Future", *Journal of Applied Animal Nutrition*, vol. 4 (2016), p. 1.

concentrated feedstuffs were easier to transport and to store, as well as more nutritious than the traditional fodder transported from the countryside.[65]

Under the perpetual housing regime also animals' excreta, or manure, became an object of rational management, orientated toward dung collection and sale, and, after the introduction of chemical fertilizers, toward disposal. The "charmed circle", to use the expression of one commentator, between cities and their peri-urban manured region also experienced this process.[66] In the late-eighteenth century until the 1880s, large cities across Europe and North America had implemented a circular system of constant recycling of vast quantities of dung from urban animals, mostly horses, cows and sheep. In some cases, such as in Paris, human waste was also turned into agricultural fertilizers, called *poudrette*, when mixed with other substances (charcoal, gypsum, ashes, earth, peat, or sawdust) and after having undergone a drying process in special plants. Manure was collected and transported by wagons and by train to a peri-urban region, where it was utilized in horticulture and hay-making. These in turn provided sustenance for urban animals and humans. The system of collection was based mainly on private deals between owners of individual stables, farmers and gardeners, but there were also collection points where vast amounts of manure were accumulated. An observer in London recalls,

> Here we have a striking example of town and country reciprocation. The same wagon that in the morning brings a load of cabbages, is seen returning a few hours later filled with dung. A balance as far as it goes is thus kept up, and the manure, instead of remaining to fester among human beings, is carted away to make vegetables.[67]

This circle gradually broke. By the 1860s, hay and oats from the peri-urban areas was struggling to compete with imported corn, which produced cheaper provender. The practice of feeding urban animals with spent grains from distilleries also

65 The animal feed industry took off in the 1880s. The first corn gluten was manufactured in 1882. In the 1890s, meat scraps were the first by-products to be recognized for their superior nutritional value and adopted by the commercial feed industry. The 1890s also introduced the incorporation of brewing by-products into animal feed, and the Purina Mills in 1894. *Ibid.*, 2.

66 Quoted in Peter Atkins, "The 'Charmed Circle'", Atkins (ed.), *Animal Cities*, p. 63.

67 London had a flourishing manure-horticulture integrated system, although probably not as intensive as in Paris, where at its peak between the 1840s and the 1880s, one million tons of town dung was responsible for 100,000 tons of primeur vegetables delivered to the central markets. In London, "the broader manured region […] was initially the radius of convenient cartage, about five to ten miles at the beginning of the century, expanding with better roads to perhaps 15 to 20 miles and, later, with railway carriage, as far as 50 miles". It was ideally organized in concentric circles; the outer one was devoted to the production of fodder and the inner one to that of fruit and vegetables. *Ibid.*, 53, 54, 58.

contributed to this decline. The usage of fresh animal manure declined under the competitive pressure of guano imported from Peru[68] and more affordable industrial chemical fertilizers. As Peter Atkins noted, "manure became a 'bad' after having for so long generated a virtuous circle of fertility and prosperity".[69] It went from being profitable to being useless and associated with disease, creating bad smells and dust and attracting flies. Manure was to be discarded, and its removal often cost a fee.

New fertilizers, like the new feeds, were more concentrated, more powerful, and more practical to transport; in short, more effective. In the nineteenth century, calcium superphosphate and industrial fertilizers were rapidly produced, marketed and distributed. The chemical compound was developed by treating bone purchased from slaughterhouses with sulfuric acid, in the early 1840s by English entrepreneur, John Bennet Lawes, and English agronomist, Joseph Henry Gilbert.[70] Additionally, German scientist Justus von Liebig's identification of the mineral nutrients of nitrogen, potassium, and phosphorus and their essential role in plant growth led to the development of nitrogen-based fertilizers.[71] As Piazzesi underlines,[72] the advent of fertilizers in the fields and artificial mashes in sheds' troughs is preceded by a long process of discovery within modern chemistry concerning the transformation of matter, inaugurated in 1661 with *The Skeptical Chemist* by Robert Boyle. English agriculturist Jethro Tull and Scottish physician and medical professor Francis Home did a lot to advance the chemistry of soils, plant and animal products, leading to a better understanding of fertility and spontaneous functionality. In the 1730s, Tull identified the fundamental process of crushing soil and improved the seed drill.[73] In the 1750s, Home experimented with different substances for fertilizers, comparing the performance of manure with compounds extracted artificially, such as organic nitrogen, ammonium carbonate. Home was looking for the single active, extractable and reproducible ingredient underlying plant nutrition, setting the path towards industrial chemical fertilizers.

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68 Gregory T. Cushman, *Guano and the Opening of the Pacific World: a Global Ecological History*, Cambridge University Press, Cambridge, 2013.

69 Atkins, "The 'Charmed Circle'", p. 66.

70 For an overview, see A. E. Johnston, "Lawes, John Bennet and Gilbert, Joseph Henry", *Encyclopedia of Soils in the Environment. Vol. 2*, ed. by Daniel Hillel, Elsevier, Amsterdam, 2005, pp. 328–36.

71 William H. Brock, *Justus von Liebig: The Chemical Gatekeeper*, Cambridge University Press, Cambridge, 1997.

72 Piazzesi, *Così perfetti e utili*, pp. 53–66.

73 Laura B. Sayre, "The Pre-History of Soil Science: Jethro Tull, the Invention of the Seed Drill, and the Foundations of Modern Agriculture", *Physics and Chemistry of the Earth, Parts A/B/C*, vol. 35, no. 15–18 (2010), pp. 851–9.

Animals were no longer working in the fields, eliminating yet another reason to leave the shed. Animate energy, i.e. provided by oxen and horses, had long been used for hauling plows and harrows, pulling carts and grinding corn, using a horse mill. In the 1790s, rudimentary experiments with the steam engine in agriculture signaled the first mechanization, leading to the replacement of animal labor-power with steam power.[74] David Grigg writes,

> The availability of cheap iron and the need for more powerful equipment led to the rise of the modern agricultural implements industry which from the 1840s provided iron ploughs, drills, reapers, steam threshing engines, in the 1870s reaper-binders and elevators, in the 1890s the first milking machines, combine harvesters and tractors.[75]

Between the end of the 1850s, when John Fowler patented the first practical cable-drawn system of steam plowing, and the mid-twentieth century, horses virtually disappeared from the fields.[76] The high cost of engines and implements, however, made this equipment inaccessible to small farmers. Horses were also useful on farms with small awkwardly shaped fields.

The need to leave the shed for reproduction was also eliminated. The first artificial insemination experiment was conducted in 1779 by Italian Catholic priest, biologist and physiologist, Lazzaro Spallanzani, using dogs.[77] This was a crucial step in the development of eugenic systems that transformed the zootechnical sector during the nineteenth century. This technology, together with selection and crossbreed-

74 For further reference on steam power, see Clark C. Spence, *God Speed the Plow: The Coming of Steam Cultivation to Great Britain*, University of Illinois Press, Champaign, 1960; and Raine Morgan, *Farm Tools, Implements, and Machines in Britain: Pre-history to 1945: A Bibliography*, University of Reading and the British Agricultural History Society, Reading, 1984. On mechanization of English agriculture in general, see W. Harwood Long, "The Development of Mechanization in English Farming", *The Agricultural History Review*, vol. 11, no. 1 (1963), pp. 15–26; and Edward J.T. Collins, "The Rationality of 'Surplus' Agricultural Labour: Mechanization in English Agriculture in the Nineteenth Century", *The Agricultural History Review*, vol. 35, no. 1 (1987), pp. 36–46.

75 David Grigg, "The Industrial Revolution and Land Transformation", M. Gordon Wolman and F.G.A. Fournier (eds.), *Land Transformation in Agriculture*, John Wiley and Sons, Hoboken, 1987, p. 93.

76 "Prior to the third quarter of the nineteenth century the impact of machinery in agriculture was slight compared with that in manufacturing industry. Some operations such as barn work and hay and corn harvesting had been largely mechanized by 1880 but, up to the Second World War, many were still performed by hand labour and large numbers of workers were still required for seasonal tasks such as hop- and fruit-picking and vegetable cultivations". Collins, "The Rationality of 'Surplus' Agricultural Labour", p. 36.

77 Ernesto Capanna, "Lazzaro Spallanzani: At the Roots of Modern Biology", *Journal of Experimental Zoology*, vol. 285, no. 3 (1999), pp. 178–96.

ing, was called "rational breeding", and optimize animal reproduction to satisfy urban growth. Robert Bakewell is one of the firsts to use "rational breeding" for commercial purposes. His Leicester Longwool sheep still remains the most successful modern long-wool cross. His two-pounder ram and his Midland black horse, for example, were famous across the U.K. because of their high-quality, which refers to their capacity to mature quickly, or "natural propensity to acquire a state of fatness, at an early age, and, when at full keep, in a short space of time". In achieving this, "Bakewell's success as a breeder was founded on his ability to meet market demands by producing a better beast for the butcher".[78] Breed societies and prize competitions emerged around the practice of rational breeding. In 1799, the Smithfield Club, which was the most well-known, organized the first public expo. Clubs were devoted to collect and protect ideal prototypes of animal strains, while prize competitions connected these models with the zootechnical population of the country, encouraging breeders to innovate existing phenotypes.

Innovations in eugenics are driven by the separation and fragmentation of productive sectors and of the processes to which animals are subjected. Selection procedures aim to design breeds to serve specific purposes. Animals are shaped in view of a single, exploitable characteristic, which thus becomes their sole value. This, together with the export of the most successful breeds, leads to a drastic decline in the range of breeds and, consequently, of diversity.[79] The rationalization of eugenic practices inside farms is advanced, first, by the scientific recognition of Darwin's theory of evolution and, second, by the establishment of genetics,

78 David L. Wykes, "Robert Bakewell (1725–1795) of Dishley: Farmer and Livestock Improver", *The Agricultural History Review* (2004), pp. 38, 44.

79 For example, after England's pursuit of Argentina's wheat and meat industry, cattle barons in Argentina began to import English cattle breed designed to produce fattier and more desirable meat, such as English Shorthorn, as early as the 1820s. In 1879, Scottish Aberdeen Angus were interbred with Argentine Criollo cattle, which were heartier and able to reproduce at higher rates under nutritional constraint. This process sacrificed the initial potential for cross-fertilization and increased diversity. "In sync with the majority of commodity producing agribusinesses, which thrive on assembly line processing of like products for efficiency, the range of cattle breeds available to the market dwindled from 57 registered breeds to the active use of less than five dominating breed type". Lopez-Duran and Moore, "Meat-Milieu", p. 259. In some cases, imported European breeds suffered from the unfamiliar climate and environmental conditions of tropical and semi-tropical areas, such as in Brazil. "The quality of animals in Brazil, in relation to the vegetation […], also hindered livestock improvement in several areas across the country. The local *crioulo* was quite small and lean, 'weighing on average not more than 400 lbs. when dressed'; by way of comparison, a purebred weighed approximately 1,000 lbs. European breeds did not adapt easily to the tropical climate of central Brazil, and as a result, contrary to experiences in temperate areas of the continent, these imported animals were severely affected by heat, humidity and cattle ticks". Lopes, "Struggles over an 'Old, Nasty, and Inconvenient Monopoly'", p. 355.

incorporating Mendel's discoveries. There is a certain degree of circularity between Darwin's theory and the breeding farm, because Darwin's own scientific methods were dependent upon intuitive zootechnical practices and rational breeding of the late-eighteenth and nineteenth centuries.[80] As Piazzesi underlines, Darwin and Pasteur both consider scientific laboratories a *conditio sine qua non* in the production of "highly-selected – and therefore serialized – animals of the new factory farming".[81] The normalized animal becomes an exchangeable specimen, suited to the methods of the laboratory. The perpetual housing regime at the center of industrial farming symbolizes the modern and capitalist restructuring of rural economy and of the birth of zootechnics as such, in which animal farming is separated from agriculture. The coinage of the word "zootechnics" by French agronomist De Gasparin in *Cours d'agriculture*, published between 1843 and 1851, definitively established the separation of the two kinds of knowledge and practices on a descriptive and normative level. Unlike the circularity of the previous model based upon the sixteenth-century farm,[82] the patriarchal rural industry, and the peasant family – to recall Marx's expression introduced in the previous chapter – where the field and the shed create a closed, autarchic system by integrating fodder, manure, and animal labor-power, the new, zootechnical complex of modern agriculture is an open, *input* and *output* system, which functions according to capitalist commodity production. To use again Piazzesi's words:

> Fodder, manure and labor-power are the substances of this exchange [between livestock farming and agriculture] which is only defused when each of them finds a substitute by the industrial world: feed, fertilizers and steam engines are the new

80 Charles Darwin, *The Origin of Species by Means of Natural Selection: or, the Preservation of Favored Races in the Struggle for Life*, Cambridge University Press, Cambridge, 2009, pp. 22–5; and Piazzesi, *Così perfetti e utili*, pp. 101–9.

81 The link between farm and evolutionism is of primary importance. "As Darwin started to use animal breeding to explain the natural history, linking them in a mutual epistemological field, he naturalized zootechnics on the one hand, and artificialized nature on the other. The main concept of evolutionism is that of 'natural selection'. In Darwin's choice of these two otherwise oxymoronic words, we can begin to understand and evaluate the importance of his indebtedness to breeders' knowledge and to its conceptual implications. By speaking of nature through the concepts and categories of zootechnics, Darwin radically transformed the representation of nature itself. Natural history, based on the model of zootechnics, is thus combined with industrial production to become a colossal factory of living beings. Industrial breeding appeared to Darwin and to his – and our – contemporaries as the rationalized continuation of nature". Benedetta Piazzesi, "Scientific Bestiarium: The Living, The Dead, and The Normal", Mariaelisa Dimino et al. (eds.), *Bestiarium. Human and Animal Representations*, Mimesis International, Milano, 2018, pp. 95–6.

82 Piazzesi, *Così perfetti e utili*, pp. 25–39.

> factors in a relationship that no longer links agriculture and livestock farming, but both to the rest of the industrial production apparatus.[83]

Consequently, the restructuring of the zootechnical institution can be seen as the precipitate of previous scientific rationalization processes that only intervene *over the course* of the distancing of animal farming from the countryside. It is generally accepted that the introduction of crop rotation and enclosures encourages the adoption of the perpetual housing regime and contributed to consolidating it.[84]

4.4 Notes on Pre-Capitalist Slaughter

Overall, the modern abattoir is defined by several essential architectural features, both exterior and interior, *mechanization* being one of them. The abattoir is "a directional, heavily (but not totally) mechanized space set aside for the purpose of mass sanitized killing".[85] It functions as a big, enclosed area, a "town", where every phase of meat production and every actor involved, are concentrated and under the purview of one actor, the owner (whether a private or public subject). The large-scale slaughterhouse is a specialized place for the killing of animals for consumption. *Centralization*, or "agglomeration", is abattoir's second essential feature. The peculiarity of the nineteenth-century abattoir, on a descriptive level, can only be understood via an understanding of the pre-industrial, pre-capitalist system of institutionalized animal killing for food based on small-scale private and artisanal slaughterhouses, characterized by dispersal and privacy.[86]

Regarding dispersal, there was no single, nor mono-functional space where animals were slaughtered and carcasses were dressed. Instead, there were many scattered places where these operations occurred, such as household backyards in the cases of chickens and hogs, and butcher's sheds in the case of cattle. Such dispersion and variety of place was matched by the variety of equipment and tools for slaughter and carcass-handling (poleaxes, knives, hooks of various dimension, ropes, pulleys, boxes wrappers, hampers, packages, work tables, rings fastened to the floor or walls,

83 *Ibid.*, 129.

84 Mark Overton, *Agricultural Revolution in England: The Transformation of the Agrarian Economy 1500–1850*, Cambridge University Press, Cambridge, 1996; Robert C. Allen, "Tracking the Agricultural Revolution in England", *conomic History Review* (1999), pp. 209–35; and Robert C. Allen, "The Nitrogen Hypothesis and the English Agricultural Revolution: A Biological Analysis", *The Journal of Economic History*, vol. 68, no. 1 (2008), pp. 182–210.

85 Otter, "Civilizing Slaughter", p. 105.

86 *Ibid.*, 90, 94.

wooden bars, prytches),[87] from very domestic and rudimentary ones to more sophisticated ones in butchers' stalls and shops. Slaughterhouses were typically small, composed of one or two rooms. This made the separation of living animals from fresh meat impracticable, so that cattle and sheep witnessed in terror as other animals were killed. Not only were slaughterhouses small, they were also dark, often windowless, poorly ventilated, and without tap water-supply.

Privacy, both in the sense of out of public sight and in the sense of property rights, was a central feature of pre-modern slaughterhouses. Only the master butcher and his assistants, if there were any, were allowed to be inside slaughterhouses, together with animals and microbes. Non-desired attention from public inspectors or others was easily barred. Small slaughterhouses implied a sort of "one to one" ownership; animals were the private property of those who killed them. Families slaughtered their own poultry and hogs raised in their backyard. Butchers bought cattle at the market, which they personally slaughtered and sold as meat. As Otter describes,

> In the early nineteenth century, […] butchers bought living animals from local or large regional markets, killed them in innumerable small private slaughterhouses and then sold the meat themselves or to markets […]. When contemporaries used this word "slaughterhouse", though, they did not refer to a structure built with the explicit and sole purpose of killing animals and dressing carcasses. They simply referred to any building in which slaughter happened to take place. So there was usually *nothing technically or architecturally distinct about the slaughterhouse* […] Elsewhere, we find references to "shed" or "old washhouses" being used for slaughter. […] Slaughterhouses thus intermingled with domestic houses: sometimes the former were entered through the latter, and from the outside both might be indistinguishable. Butchers might even dispense with all pretense of distinction and choose to kill animals in their own front rooms.[88]

An 1845 report states,

> 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

87 "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'". Quoted in Atkins, "The Urban Blood and Guts Economy", p. 85.

88 Otter, "Civilizing Slaughter", pp. 90–91. [emphasis added]

> bloody matter, moreover, flows in streams along the open channels towards the covered sewers in the streets.[89]

Slaughter sites were quite literally innumerable, considering the almost complete absence of a systematic counting of them. For example, in London alone in 1873, before the first national regulation of slaughterhouse structures (the 1874 Slaughterhouse & c. Metropolis Act and the 1875 Public Health Act), there were 1500 estimated licensed private slaughterhouses,[90] which does not account for illegal and unlicensed ones. In addition to butchers, there were other meat vendors, such as peddlers, meat-sellers with mobile stands, or female meat-sellers, known in French as *regratières*,[91] meat purveyors who sold food from their homes or corner stalls or plied regular routes with horsedrawn carts.[92] All these figures often sold their own illegally butchered meat, as well as recycled meat scraps.

During the late nineteenth century, this heterogeneous scenario was gradually replaced by the modern institution of the slaughterhouse. Small-scale slaughterhouses, however, endured well into the first half of the twentieth century, coexisting with the new system.[93] Nevertheless, the introduction of the centralized abattoir system qualitatively redefined whole meat production and distribution, eventually winning out over the former customs. This came with conflicts, new political trajectories and adjustments stemming from the emerging rapport between the slaughterhouse (the production and supply of meat) and the capitalist dietary *dispositif*.

4.5 Forming the Dietary *Dispositif*: Context and Knowledges

4.5.1 Context Analysis: Slaughterhouse Reforms in the Conflict between Health and Wealth

Following the first phase of HMPA, i.e. context analysis, the structural backdrop of new slaughterhouse policy and related conflicts within the formation of the dietary

89 Quoted in Atkins, "The Urban Blood and Guts Economy", p. 84.

90 MacLachlan, "A Bloody Offal Nuisance", p. 247, Figure 1.

91 Watts, "The Grande Boucherie, the "Right" to Meat, and the Growth of Paris", p. 20.

92 Horowitz, "The Politics of Meat Shopping in Antebellum New York City", p. 173.

93 For example, there were around a hundred private slaughterhouses in Manchester in 1897, 131 in Birmingham. Otter, "Civilizing Slaughter", p. 103. There were still 450 private slaughterhouses in London in 1898, killing an average of only two cattle per week. MacLachlan, "A Bloody Offal Nuisance", p. 248.

dispositif is marked by a bigger conflict "between Health and Wealth".[94] Bruno Latour summarizes it as follows,

> The conflict between health and wealth reached such a breaking point in the mid [nineteenth] century that wealth was threatened by bad health. "The consumption of human life as a combustible for the production of wealth" led first in the English cities, then in the continental ones, to a veritable "energy crisis". The men, as everyone said constantly, were of poor quality. It could not go on like that. The cities could not go on being death chambers and cesspools, the poor being wretched, ignorant, bug-ridden, contagious vagabonds. The revival and extension of exploitation (or prosperity, if you prefer) required a better- educated population and clean, airy, rebuilt cities, with drains, fountains, schools, parks, gymnasiums, dispensaries, day nurseries […] Such an upheaval of cities was seen not as a revolution but as a harmonization, in Stokes's words, between "national health" and "national prosperity and morality". The favorite metaphor of the time, the difference in potential, defined a vast energy source into which all the actors of the period could plug themselves in order to advance their concerns for the next fifty years.[95]

In this upheaval of cities, slaughterhouses played a crucial role, along with, and sometimes prior to,[96] drains, sewage systems, parks, etc. Meat embodied, in a quasi-literal sense of nutrition science and the discourse on protein and *calories*, that energy crisis, as well as a conflict between affordable (wealth) and nourishing (health) meat for the working classes and soldiers.

This general conflict in terms of health and wealth aligns with the structural reconstruction presented in the third chapter, particularly the structure and relations represented in Diagram 3 and the ensuing conflict. This conflict is structurally rooted in the contrasting logics governing the production of goods and the reproduction of individuals, the social reproduction *stricto sensu*. Capital's imperative of

94 Bruno Latour, *The Pasteurization of France*, trans. Alan Sheridan and John Law, Harvard University Press, Cambridge, 1993, p. 19.

95 *Ibid*., 18.

96 This is the case of Moscow's abattoir. In Moscow, slaughterhouse reforms were opposed because they were considered of lesser importance than other public services, such as the sewerage system. As a municipal deputy claimed in 1885, "Considering the absence of public services in the city, the organization of the new slaughterhouse can be compared to the following: we were given a man, sick from eternal dirt, crippled, in rags, uncombed and hungry and were told to put him in order – but instead of cleaning, dressing and treating him, we would only wash his feet, only the toes, and give him shiny shoes. In my opinion, the slaughterhouse is no more than shiny shoes in the matters of urban accomplishment". Quoted in Mazanik, "'Shiny Shoes' for the City", p. 221.

endless valorization (production of wealth), here related to the processes of production of absolute surplus value, constitutes an immanent tendency toward the destruction of labor-power (bad-health), the reproduction of which is still organized according to pre-capitalist forms. Historically speaking, "in the liberal competitive capitalism of the 19th century […] the imperative of production and [social] reproduction appeared to stand in direct contradiction with each other". In the nineteenth century, men, women and children equally were squeezed into factories and mines, working long hours in unsustainable conditions, women and children being paid a pittance or even nothing. Human health clashes with wealth, leading to the era's "energy crisis", "a crisis of social reproduction among the poor and working classes, whose capacities for sustenance and replenishment were stretched to breaking point".[97] On another level, it is a moral crisis, or a moral panic among the middle classes, who were scandalized by this situation.

The historical process of crisis resolution unfolds through multiple transformations at the level of *dispositifs*, beginning in the late nineteenth century and solidifying in the twentieth. In this context, transformations and conflicts within the *dispositifs* of the capital-form and nation-state form also play a significant role. Fordism, in which standardized mass products were produced on the assembly line for mass consumption, became part of the means of subsistence and wages were raised (for white, full-time production workers). Concomitantly, under the aegis of the incipient welfare state, the response to social crisis had two distinct trajectories of conflict. On the one hand, the rise of workers' struggles and the formation of strong trade unions, labor parties and socialist parties led to the successful introduction of a legal workday,[98] regulations concerning occupational health and safety and a legal minimum wage. As Heinrich writes, " If capital does not encounter resistance in the form of strong trade unions or similar associations, then excessively long working time, unhealthy and dangerous working conditions, and starvation wages will be imposed that prevent the reproduction of labor-power".[99] On the other hand, the ascendance of middle-class reformers and measures to address the physical and moral well-being of workers, necessary for the long-term utilization of their labor-power created a bridge between capitalism and the conditions of life. This led to the emergence of the concept of "hygiene" and the bourgeois hygienists' movement. As underlined by Coleman, hygienists had extensive and expansive biology-based concerns,

> The hygienist attended to the essential conditions of existence – food; supply and purity of water; *presence and absence of human, animal,* and other wastes; the condi-

97 Nancy Fraser, "Contradictions of Capital and Care", in *New Left Review*, vol. 100 (2016), pp. 100, 105.

98 Marx, *Capital I*, Chapter 10, pp. 340–411.

99 Heinrich, *Karl Marx's Capital*, p. 207.

> tions of bodily and mental activity, including above all work, shelter, or protection from the elements – and realized that all of those possessed an underlying economic character.[100]

The major structural transformation occurring in the solution of the crisis, however, is the formation of the anthropological form, as illustrated in Diagram 2. The anthropological form qualifies life as distinctly human, which capital puts at risk. Hygienists refer to this concept of life as *bíos*, as essentially *human* existence. Along these lines, the anthropological form contends that social reproduction is qualified as the reproduction of the human population. It is precisely within the historical process of this form's materialization that the hygienist movement questions the meat-slaughterhouse-animals complex and its reforms.[101] The slaughterhouse becomes a "political space" because, to echo Rancière, it is the subject of conflict, a dispute over the social/political, private/public divide. Are meat provisioning and production private or public affairs? What role do animals occupy? Does this alter the spatial allocations determined by the prevailing police order? Are these spaces being relocated or reshaped?

4.5.2 Knowledge I: Meat and Nutrition Science

There were two key nodes of the slaughterhouse reform debate: meat and animals. Hygienists and various other scientists made the case for the importance of meat in the framework of national health and class concerns, i.e. inside the physical and moral hygiene framework vs. wealth. For example, already in 1783, in the French *Encyclopédie* the "bread and meat"[102] binomial was established, sanctioning the idea of meat as a vital food for the whole population. In 1864, zoologist and degeneration theorist, Edwin Lankaster, proclaimed, "We find in the history of man that those races who have partaken of animal food are the *most vigorous, most moral*, and

100 William Coleman, *Death is a Social Disease: Public Health and Political Economy in Early Industrial France*, University of Wisconsin Press, Madison, 1982, p. 202. [emphasis added]

101 With regard to the production of human individuals, the constitution of a specific *dispositif* comprising different institutions, knowledges and practices is crucial. This includes the formation of the nuclear family and "sexuality". Foucault, in *The History of Sexuality*, identifies "four great strategic unities" performed by the *dispositif* of sexuality: hysterization of women's bodies; pedagogization of children's sex; socialization of procreative behavior; psychiatrization of perverse pleasure (pp. 104–5). Other elements of the *dispositif* are: the ideal models of "housewifization", the creation of a new, intensified meaning of gender difference and sexual binarism and masculine authority over women and children, especially within the family. Maria Mies, *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labour*, Zed Books, London-New York, 1998; Fraser, "Contradictions of Capital and Care", pp. 195–208; and Aloe and Stefanoni, "Anatomia della nazione", pp. 373–4.

102 Quoted in Watts, "The Grande Boucherie, the "Right" to Meat, and the Growth of Paris", p. 23

most intellectual races of mankind".[103] A British veterinarian asserted, in 1875, "The consumption of flesh appears to be proportioned to the degree of activity of a people [...] Its use is largely on the increase [among the British]".[104] A popular nineteenth-century saying, "meat is muscle",[105] uses the consumption of animal meat to metaphorize human muscular strength. As doctor and hygienist Benjamin Ward Richardson stated in 1893, "the animal substance which today may be beef, mutton or pork, may tomorrow be human substance, part and parcel of man, bone of his bone and flesh of his flesh".[106] Meat not only was a power source for people, but it also made them. According to economist Otto Hausburg, the first director of Berlin's public slaughterhouse, "Healthy and inexpensive meat is a question of survival for these [lower] classes, especially for the large number of manual laborers".[107]

Meat's increased importance, production and consumption marked a nutritional transition in Western Europe, North America and Australia.[108] The scope of this major dietary change, "ranged from eliminating any threat of famine to the founding of highly frequented restaurants and the emergence of *grande cuisine*".[109] The transition is not a "result of long and slow evolution". Rather, "traditional diets were revolutionized by economic and social changes that took place in the nineteenth and early-twentieth centuries, changes all associated with the industrial revolution",[110] and, significantly, with the advent of the capitalist society.

The modern diet was mainly based upon the rise of animal products – surely meat, but also milk, cheese, eggs, butter, and fish – and on the decline of the starchy staples – bread, potatoes and legumes, which dominated the early-nineteenth-century diet. Considering the total calories available per capita per day, in the early nineteenth century, starches accounted for 65–75 percent, and constituted the main source of protein, while animal source food products rarely provided more than 15 percent. In Germany, for instance 16 kg of meat were consumed per capita per annum in 1816, which increased to 51 kg by 1907. French meat consumption rose from 117 calories per capita per day in 1803–12 to 275 calories in 1894–1904.[111] Britain

103 Quoted in Otter, "Civilizing Slaughter", p. 89. [emphasis added]

104 Quoted in *Ibid*.

105 Brantz, "Animal Bodies, Human Health, and the Reform of Slaughterhouses in Nineteenth-Century Berlin", p. 71.

106 Quoted in Otter, "Civilizing Slaughter", p. 89.

107 Quoted in Brantz, "Animal Bodies, Human Health, and the Reform of Slaughterhouses in Nineteenth-Century Berlin", p. 71.

108 Barry M. Popkin, "Nutritional Patterns and Transitions", *Population and Development Review* (1993), pp. 138–57.

109 Smil, "Eating Meat", p. 609.

110 David Grigg, "The Nutritional Transition in Western Europe", *Journal of Historical Geography*, vol. 21, no. 3 (1995), pp. 247, 250.

111 *Ibid.*, 248, 254.

was accelerated in this process, earning, already in 1890, the description of "the greatest beef-eating country in the world".[112] British per capita consumption rates roughly tripled during the nineteenth century to almost 60 kg by the year 1900.[113] Other countries in Europe, especially Mediterranean ones, which were slower in transitioning to capitalism, looked at meat consumption in leading Western cities, such as London and Paris, as an example to be reached. Meat was the food of the progress, "the food of the future",[114] as an enthusiastic Spanish journalist wrote in 1881.

Addressing the knowledge dimension of the *dispositif*, this new special status for meat was authorized by several scientific discourses in the mid-nineteenth century, most of all by processes of "nutritionalization of the modern food system", a "socio-technical process"[115] based upon nutrition science. The very idea of "nutrition transition" was legitimized by the empirical and statistics-based discourses around calories, protein, per capita, etc. Nutrition science has its origins in the early to mid-nineteenth century, along with other disciplines such as physiology, biochemistry, and physics, leading to dietetics as a distinct paramedical profession.[116] Its first area of incubation, experimentation, and application is the production of animal feeds, which started as early as the 1700s with "rational feeding". German chemist, Justus von Liebig, drawing on the work of Antoine Lavoisier, Francois Magendie, Jons Berzelius, William Prout, Gerrit Mulder and others, is deemed the father of nutrition as a biochemical science. His influence and fame, also tied to the development of fertilizers, has been compared with that of Louis Pasteur in the field of microbiology. Geoffrey Cannon writes, of von Leibig and Pasteur, "Both men possessed astounding energy, both courted the ruling classes; both smashed the reputations of fellow scientists whose views were holistic and ecological; and both facilitated the supremacy of current conventional science and practice".[117]

It is plausible to argue that Latour's theory of Pasteur's success is also applicable to Liebig's. Latour argues that bacteriologists' success largely resulted from a process of mutual translation and "mutual appropriation" guided by a "common cause".[118]

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112 Quoted in Otter, "Civilizing Slaughter", p. 89.

113 Smil, "Eating Meat", p. 610.

114 Quoted in Guardia et al., "Meat Consumption and Nutrition Transition in Barcelona", p. 205.

115 Jane Dixon, "From the Imperial to the Empty Calorie: How Nutrition Relations Underpin Food Regime Transitions", *Agriculture and Human Values*, vol. 26, no. 4 (2009), pp. 321–33, p. 321.

116 Geoffrey Cannon, "The Rise and Fall of Dietetics and of Nutrition Science, 4000 bce-2000 ce", *Public Health Nutrition*, vol. 8, no. 6A (2005), p. 702.

117 *Ibid*.

118 Latour, *The Pasteurization of France*, pp. 26–34, 41–9; Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life*, Harvard University Press, Cambridge, 1999; Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865–1900*, Cambridge University Press, Cambridge, 2000; and Anne Hardy and Mikael Hård, "Common

As we shall see more in details below, bacteriologists translated in their own terms the hygienists' precepts and sanitary agenda, addressing topics set by them to get financial support for their research. Conversely, the hygienists translated in their own terms the doctrine of microbes and to seek more solid and structured explanations of disease. Liebig, and nutrition science in general, adopted the hygienists' sanitary agenda to address the need of feeding the poorer classes. This complementarity is reflected in the 1884 hygiene exhibition in London, which brought together "several fairly complex orders of knowledge, constituting in short whatever may render life healthy and even comfortable",[119] as one reporter of the time put it, among which one could find Liebig soup (see below) alongside with pasteurized milk.

Indeed, nutrition science establishes a one-to-one link between food components, previously separated in laboratories, (fat, protein, minerals, water, carbohydrates, salts, etc.) and the physiological functions each of these nutrients performs (increase in muscle mass, protection, etc.). According to the health-wealth dyad, food must be selected on the basis of its components. Its appearance and taste do not matter. What matters is the "metabolic fate of food".[120]

From this perspective, it is possible to account for the fact that the birth of nutrition science coincided with protein isolation and the discovery of its role in accelerating the growth of plants, animals and humans by von Liebig in the 1840s. Protein, a term coined in 1838 by the Dutch agricultural chemist Gerrit Mulder, was then identified as the "master nutrient"[121] of the Western diet. This implicitly meant animal protein was. Von Liebig, indeed, identified meat and especially muscle tissue, which was believed to contain special nutritive qualities, as the richest source of this powerful component. Thus, "eat meat and eat more of it" was the command. As Cannon states,

> It was then that von Liebig and his followers throughout Europe and then the USA blazoned chemistry as the solution for plant, animal and human breeding, and even as containing the secrets of life itself. This was the time when the priorities of chemical nutrition ceased to be conceptual and experimental, and became dictated by social, economic and political factors. *Its prescription was protein of animal origin*. "A vastly more important question than even the victualling of the navy […] is that of victualling of the masses at home", wrote a British commentator. "What

Cause: Public Health and Bacteriology in Germany, 1870–1895", *East Central Europe*, vol. 40, no. 3 (2013), p. 324.

119 Quoted in Latour, *The Pasteurization of France*, p. 24.

120 John Coveney, *Food, Morals, and Meaning: The Pleasure and Anxiety of Eating*, Routledge, London, 2006, p. 23.

121 Cannon, "The Rise and Fall of Dietetics and of Nutrition Science", p. 702.

> is at the moment deteriorating the lower stratum of the population? – the want of a sufficient supply of nitrogenous food […] why should we not have meat too?".[122]

Von Liebig's Extract of Meat structures the problem around social class reproduction. In his suggestion for a "rational system of diet"[123] outlined in 1847, von Liebig included a formula for producing beef extract. He considered its diffusion to the public and to governments as a "matter of conscience"[124] and committed himself to discover every viable means of producing beef extract on a commercial scale. He believed that the extract would be a cheaper substitute for meat, delivering its nutritional benefits to those unable to afford the real thing. Von Liebig launched the Liebig company in the middle 1860s, in partnership with George Christian Giebert, a German engineer building roads and railroads in Brazil, after rejecting a number of offers from entrepreneurs in Mexico, Australia, and North America, in the 1850s. The company was headquartered at Frey Bentos on the Uruguay River on twenty-eight thousand acres of land purchased by Giebert, along with cattle. The company "was foundational to the industrialization and growth of enormous cattle industries in Argentina, Uruguay, and southern Brazil".[125]

During this time, chemical nutrition was in an experimental phase and an emerging capitalist phenomenon, co-opted by social, political and economic factors; it was both a "philosophy of life" and an "instrument of the state".[126] A key element of bourgeois progressivism is common to both areas. Von Liebig was, as were other men of science, caught up in this conflict and, therefore, inserted in blending the trajectories of physical and moral hygiene. He too, with his government-supported laboratory in Giessen, is concerned with the "victualling of the masses". Wilbur O. Atwater, disciple of von Liebig and the "Father of American Nutrition" pioneered nutrition science in the U.S., and was devoted to analyzing animal rather than human food, until the late 1870s.[127] During his studies in Germany,

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122 *Ibid.* [emphasis added]. The difference between nitrogenous and nonnitrogenous foods was stressed by von Liebig who assumed that nitrogenous foods and proteins were responsible for building tissue, whereas nonnitrogenous aliments maintained body heat and respiration.

123 Justus von Liebig, *Researches on the Chemistry of Food*, Taylor and Walton, London, 1847, p. XXX; and Mark R. Finlay, "Quackery and Cookery: Justus von Liebig's Extract of Meat and the Theory of Nutrition in the Victorian Age", *Bulletin of the History of Medicine*, vol. 66, no. 3 (1992), pp. 404–18.

124 *Ibid.*, 111.

125 Archie Davies, "Unwrapping the OXO Cube: Josué de Castro and the Intellectual History of Metabolism", *Annals of the American Association of Geographers*, vol. 109, no. 3 (2019), p. 839.

126 Cannon, "The Rise and Fall of Dietetics and of Nutrition Science", p. 702.

127 Buford L. Nichols, "Atwater and USDA Nutrition Research and Service: A Prologue of the Past Century", *The Journal of Nutrition*, vol. 124, no. suppl_9 (1994), p. 1725S; Harvey Levenstein, "The New England Kitchen and the Origins of Modern American Eating Habits", *American Quarterly*, vol. 32, no. 4 (1980), p. 371.

he became acquainted with the so-called Wolff standards for animal feed based on digestible nutrients, brought them to the attention of American researchers in 1874, and finally published them in 1880.[128] Atwater saw the analogy between animal food intake and bodyweight and human food intake and labor power. In the 1890s, provided scientific backing for a Democratic Party, *lasseiz-faire* businessman who campaigned on, "breaking through the Malthusian knot [to] improve the lot of the working classes without resort to labor unions, unnatural increases in wages, or other measures which went against the immutable laws of supply and demand".[129] A nutritious diet, which was synonyms with higher intakes of cheap protein and fat was crucial to accomplish this task. "It was their greater intake of protein and fat that made American workers more productive than their German counterparts,"[130] wrote Atwater in a letter to the democrat.

The imperative to eat animal protein went hand in hand with the adoption of the calorie as the metric for human energy requirements. Quantifying human energy required a modified calorimeter, not to be used to measure the combustive energy of explosives as it had been designed to do, but to measure human energy expenditure under controlled conditions. Carl von Voit, with German government support, built a human calorimeter with a chamber designed to measure individual protein requirements. Rubner, one of von Voit' students, further improved his mentor's calorimeter by making it first self-registering. He used it on a dog to prove that the first law of thermodynamics applies also to living organisms.[131] In the 1880s, Rubner was the first one to determine energy equivalence among foodstuffs and to outline "standard values". His studies included infants, growing children and the elderly. Rubner reached worldwide fame by the early twentieth century, and held positions of prominence, including chair of hygiene in Marburg and Berlin. From this position, he advocated for a "rational nutrition" program for mass feeding.[132]

As mentioned, von Voit supervised Atwater during his studies in Germany, where Atwater and Rubner worked together as colleagues under his guidance. Indeed, the first U.S. human calorimeter, developed in 1894 by Atwater, was based upon von Voit and Rubner's. Atwater also revised Rubner's caloric intake recommendations, defining the energy equivalents of the American Diet. As a scientist employed by the U.S. Department of Agriculture, he strenuously advocated for the

128 Coffey et al., "Review of the Feed Industry from a Historical Perspective and Implications for its Future", p. 2.

129 Levenstein, "The New England Kitchen and the Origins of Modern American Eating Habits", pp. 371–72.

130 Quoted in *Ibid.*, 372.

131 For an analysis of the importance of Max Rubner in the history of nutrition science, see Corinna Treitel, "Max Rubner and the Biopolitics of Rational Nutrition", *Central European History*, vol. 41, no. 1 (2008), pp. 1–25.

132 *Ibid.*, 2.

incorporation of the calorie system within public policy, obtaining great success and influencing U.S. Foreign Policy, "as the calorie was deemed to be an 'irrefutable and passionless yardstick'".[133] Atwater's legacy reached from Germany and Britain to the U.S., though Britain was leading nutrition science between roughly 1850 and 1920.

By correlating nutrition science with food regimes analysis, scholar Jane Dixon shows the fundamental role that the discipline has played in social reproduction and in developing the two food regimes. She writes, "The social history of nutrition politics reveals that food regimes were in part based on the trade in human energy and health as much as a trade in commodities and capital". Thus, "food regimes are nutritional regimes". From this perspective, the first food regime coincides with the regime of "the master nutrient and the imperial calorie […] The calorie and protein as quantifiable sources of human energy exchanged for a quantifiable sum of money or money equivalent ('credit') was pivotal to the legitimacy of the 1st Food Regime".[134]

4.5.3 Knowledge II: Animals and Miasma Theory

Within the health vs. wealth polemic, a particular issue raised by hygienists is that of public nuisance caused by slaughterhouses. As Otter points out, chronicles on animal nuisance are, "rather monotonous […] Phrases are repeated, recycled, muttered seemingly without needing conscious manipulation". In their repetitiveness they "tell […] us one thing: the public presence of blood was becoming a problem worth commenting on at length".[135] Not only blood, but also fecal matter, guts and manure feature in reports of the animal nuisance caused by slaughterhouses.

In 1847, a *Times* editorial described the Smithfield Market in London as a "monster nuisance". It read,

> 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.[136]

A butcher liveryman observed in the same 1847,

133 Dixon, "From the Imperial to the Empty Calorie", p. 324.
134 *Ibid.*, 323, 324, 325.
135 Otter, "Civilizing Slaughter", p. 91.
136 Quoted in Atkins, "The Urban Blood and Guts Economy", pp. 80, 82.

> The filth, garbage, and impurities of every description generally to be found in slaughter-houses, in almost every stage of decomposition, contribute their quantum of deadly exhalations to the atmosphere of the slaughter-house, and then, after having impregnated the neighbourhood with offensive and unwholesome effluvia, are consigned to the sewers, by which they are ultimately conveyed to the Thames, to increase the noxious exhalations from its banks, or, detained in their progress through those notoriously defective channels, to breathe forth at every loophole putrescence and disease![137]

Another source of animal nuisance was urban dairy cowsheds. A commentator reported in 1852 that, "Animals, fed upon improper food, give milk scarcely fit for use, their sheds reek with an abominable odour; and not long since the public mind was disgusted with an account of cows kept […], in underground sheds, where, for a long time, they never saw the light of day".[138] This description pales in comparison to the description of a nightman's yard, given by a doctor exploring the East End of London in 1848:

> On two sides of this horrid collection of excremental matter, was a patent manure manufactory. To the right in this yard, was a large accumulation of dung, & c.; but, to the left, there was an extensive layer of a compost of blood, ashes, and nitric acid, which gave out the most horrid, offensive, and disgusting concentration of putrescent odours it has ever been my lot to be the victim of.[139]

As John Simon, the first Medical Officer of Health for the City of London, stated in 1854,

> Tallow-melting, whalebone-boiling, gas-making, and various other chemical proceedings, if not absolutely injurious to life, are nuisances, at least *in the ordinary language of the law*, or are apt to become such. It is the common right of the neighbourhood to breathe an uncontaminated atmosphere; and, with this common right, such nuisances must, in their several degrees, be considered to clash.[140]

One public health official commented in 1895 that, "the sounds heard and smells carried from the slaughter-houses, makes them perhaps the greatest of all nuisances in a large city".[141] Slaughterhouses were considered never-ending sources of noisome

137 Quoted in MacLachlan, "A Bloody Offal Nuisance", p. 238.
138 Quoted in Atkins, "Animal Wastes and Nuisances in Nineteenth-Century London", p. 38.
139 Quoted in *Ibid*., 26–7.
140 Quoted in *Ibid*., 30. [emphasis added]
141 Quoted in Otter, "Civilizing Slaughter", p. 91.

filth, affecting the sanitary conditions of neighborhoods and corrupting the general air of the city.

The concept of "nuisance" was a precise legal concept, referring to something injurious or obnoxious to the community, due to "environmental wrongs".[142] In the medieval period, a nuisance could be subjected to trial in the magistrate's court. In the 1830s, 40s and 50s the category became one of the principal legal tools of public health movement.[143] A nuisance came to be viewed as "injurious to the life" of the community, a degree of hazard that nullified the difference between the purely legal meaning and the health meaning. As highlighted by Atkins, it was animal nuisance that acted as, "a catalyst to both medical and sanitary theories of the environment".[144] Until the first regulations against animal nuisance and the establishment of boards of health in the nineteenth century, European and American cities were full of animals, everywhere. The animals were not solely those *en route* to cattle markets or private slaughterhouses, but also those employed in urban animal agriculture, which the cities relied on for transportation, waste management and food supply.[145]

The exclusion of farm animals from cities was often marked by conflicts amongst various interest groups, such as city councils, boards of health, inhabitants of poor neighborhoods, butchers, owners of piggeries, owners of urban cows and distilleries and their respective Leagues or Corporations. Removal of pigs from the urban environment proved particularly challenging in most cities, not only because of the opposition to reforms by interest groups, but also because, pigs served the function of household waste disposal. This implementation of industrial waste disposal systems made pigs disappear from the cities and secluded them in industrial farms at the peripheries.[146] Poultry were the last farm animals to be banned in the early twentieth century.

Urban pigs and milk cows also disappeared because of the hygienist's opposition to the integrated system of piggeries, cowsheds and distilleries, responsible for the particular public scandal of "drunken pigs". After long and fierce debates, municipal acts dismantled this system. This problem was sometimes related to opposition to the consumption of alcoholic beverages, as in North America. The temperance movement frequently played a pivotal role in advocating against urban animals, such as

142 Atkins, "Animal Wastes and Nuisances in Nineteenth-Century London", p. 27.

143 *Ibid.*, 28.

144 Peter Atkins, "Introduction", in Atkins (ed.), *Animal Cities*, p. 14.

145 Brinkley and Vitiello write, "Horses were the fastest means of transport. Hogs cleaned up household slop. Chickens scratched at the waste that the pigs left behind. Sheep and goats grazed on the commons, keeping the grasses short. Many urban families kept or boarded dairy cows for a supply of fresh milk." Brinkley and Vitiello, "From Farm to Nuisance", p. 113.

146 On urban farming (milk cows and pigs) in London and the U.K. see Atkins, "Animal Wastes and Nuisances in Nineteenth-Century London", pp. 38–46.

in New York in the 1840s, when it prompted criticism of milk dairies, attributing the contamination of milk to the alcoholic diet of distillery cows.[147]

Odor is evoked insistently and with more disgust and disapproval than any other animal nuisance. Commentators wrote of, "intolerable stench", "deadly exhalations", "offensive and unwholesome effluvia", "abominable odour", "the most horrid, offensive, and disgusting concentration of putrescent odours". Blood, guts and manure are the worst nuisances because their main property is foul smell. For example, in London, "the Metropolis Buildings Act (1844) defined offensive trades mainly with smell in mind: blood boilers, bone boilers, fellmongers, slaughterers of cattle, sheep, or horses, soap boilers, tallow melters, and tripe boilers".[148] The depth of aversion to bad smell is explained by the process of "miasmification", accepted within medicine from the late eighteenth century until at least the 1890s. This perspective began to wane with the groundbreaking discoveries of Pasteur and Koch in microbiology, which established germ theory, proving that microorganisms – not toxic miasmas – were responsible for infections, thereby revolutionizing medicine. According to the miasma theory of disease, simply put, "all smell is disease".[149] This theory in part underwrote the first Public Health Act in 1848. *Copland's Dictionary of Practical Medicine* (1834–1856) describes the perceived hazards of urban animals and their by-products within this framework,

> Certain […] causes of disease, of no mean importance, particularly marsh miasmata, and noxious animal exhalations, act directly upon the organic nerves of the lungs, and on the blood itself, through the medium of absorption.
> The putrefaction of animal substances has been supposed by many to occasion disease in those who come within the sphere of the exhalations thus produced, and even to generate a malady which has become infectious, and has, partly thereby, and partly from other concurring causes, prevailed to an epidemic, or even pestilential, extent. It is not, however, merely dead animal bodies, or considerable collections of putrid matter, but also heaps of filth exposed in the streets, or animal excretions and exuviae, subjected to a warm and stagnant air, and neglect of domestic and personal cleanliness, that are thus injurious. These latter may be less energetic agents than the foregoing; but they more frequently exist, and are more common concurrent causes.[150]

147 Brinkley and Vitiello, "From Farm to Nuisance", pp. 123–5.

148 Atkins, "Animal Wastes and Nuisances in Nineteenth-Century London", p. 29.

149 Edwin Chadwick, the prominent English sanitary and social reformer author of the fundamental *Report on the Sanatory Condition of the Labouring Population of Great Britain* (1842) is Quoted in MacLachlan, "A Bloody Offal Nuisance", p. 240.

150 Quoted in Atkins, "Animal Wastes and Nuisances in Nineteenth-Century London", p. 23.

The language of this entry reflects a broader orientation to the aerist theory dominating medicine since ancient times, based on the sense of smell and the idea that epidemics were airborne diseases, caused by corrupt air or noxious exhalations. The study on miasma was a main branch of this in the nineteenth century. Alain Corbin explains,

> The nose, as the vanguard of the sense of taste, warns us against poisonous substances. Even more important, the sense of smell locates hidden dangers in the atmosphere. Its capacity to test the properties of air is unmatched. The increased importance attributed to the phenomenon of air by chemistry and medical theories of infection put a brake on the declining attention to the sense of smell. The nose anticipates dangers; it recognizes from a distance both harmful mold and the presence of miasmas. It is repelled by what is in a state of decomposition. Increased recognition of the importance of the air led to increased acknowledgment of the importance of the sense of smell as an instrument of vigilance. That vigilance produced the guidelines for the reordering of space when the rise of modern chemistry made that reordering unavoidable.[151]

Corbin, in his robust social-historical investigation on olfactory theories and smell in the eighteenth and nineteenth centuries, shows that odor was a medical concept, olfaction was medicine's privileged sense, and the nose was a precise instrument with an ancient origin. These ideas were rooted in the fifth and fourth centuries B.C. in the work of Hippocrates and his disciples at Kos which had underlined the influence of air on fetal development, the formation of temperaments, passions and language and stressed the virtues of perfumes against diseases and plague.[152]

Galenus' and Crito's beliefs in Hippocrates and ancient medicine spanned the centuries, integrating with other knowledge, particularly from the mechanistic tradition. This culminated in a set of medical principles that shaped neo-Hippocratic medicine, epidemiology, and the "pneumatopathological" interest in the latter years of the eighteenth century.[153] These were the disciplines on which "atmospheric vigilance", also called "olfactory vigilance", was based. The fundamental principle of the aerist theory asserted that,

> As the physical properties of air acted collectively and individually, so the composition of its contents governed the health of organisms. Sulfur, stinking emanations, and noxious vapors threatened its elasticity and posed threats of asphyxia;

151 Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imagination*, trans. Miriam L. Kochan et al., Berg Publishers, Oxford, 1986, p. 7.

152 *Ibid*., 13, 17.

153 *Ibid*., 62.

> metallic acid salts coagulated the blood of the capillary vessels; emanations and miasmas infected the air, incubated epidemics.[154]

Since the 1770s, chemists pursued the study of olfactory elements and atmospheric toxins, and outlined a scientific vocabulary based upon smell. The science was called osphresiology (literally, the science of smells). It started with Linneaus, followed by Dr. Hippolyte Cloquet's *Traite des odeurs, du sens et des organes de l'olfaction* published in 1821, updated in 1845 and finally expended in 1885.[155] These scientists strove to develop a nose-based lexicon to define the molecular components of atmosphere and to identify the stages of putrefaction with the objective of eliminating "the vagueness of the putrid" and better comprehending infection. Corbin writes,

> Air was no longer studied as the area of generation or of the burgeoning of vitality, but as the laboratory of decomposition […] Henceforth this vigilance had manifold aims: to detect irrespirable gases and particularly 'airs', and to discern and describe hitherto imperceptible viruses, miasmas, and poisons.[156]

Olfactory vigilance was key. The science sometimes generated confused, tricky and ambiguous classifications, beyond a few certain elements, such as fixed air, sulfuric acid, inflammable air, volatile alkali and liver of sulfur. Fixed air, humidity and the process of lysis were the central elements of putrefaction theory since the studies conducted by the German physician Johann Joachim Becher in the latter half of the seventeenth century.

Decomposition was considered to be an internal, continuous movement, kept in check by the natural cohesion of the parts, represented by fixed air transmitted by the blood. The humidity and fetid odor that emanated from decomposing or diseased bodies was understood as the odor of fixed air in search of new combinations. If someone accidentally inhaled these putrid miasmas, their equilibrium of internal forces (decomposition-cohesion) was compromised, making them vulnerable to plagues, fevers, gangrene, syphilis, scurvy. Thus, to prevent the escape of fixed air, aromatics were administered to dead or sick bodies.[157]

If it was believed that blood transmitted fixed air, it is easy to understand why urban slaughterhouses had to be under "special surveillance" within the smellscape of the city. As Corbin puts it,

> The urban slaughterhouse was an amalgam of stenches. In butchers' narrow courtyards odors of dung, fresh refuse, and organic remains combined with foul-

154 *Ibid.*, 13.

155 *Ibid.*, 36.

156 *Ibid.*, 14–15, 16.

157 *Ibid.*, 16–34.

> smelling gases escaping from intestines. Blood trickled out in the open air, ran down the streets, coated the paving stones with brownish glazes, and decomposed in the gaps […] The malodorous vapors that impregnated roadways and traders' stalls were some of the deadliest and the most revolting; they "make the whole body susceptible to putridity". Often the stifling odors of melting tallow added to this foul-smelling potpourri.[158]

The revolution in chemistry brought about by Lavoisier not only discredited the theories of the aerists, but also favored physicochemical analyses over sensory impressions, questioning the equation between stench and bad air. Nevertheless, the scientific discourse on miasma was not affected, at least until it was superseded by bacteriology. Miasma, indeed, was not air, rather "a substance added to air". As a physician made clear in 1838, "The dangerous thing […] chemistry has not taught us about; but our senses are more discerning than chemistry; they clearly demonstrate to us the presence of noxious putrid matter in air where men have stayed for a long period".[159]

The dichotomy between the healthy and the unhealthy stayed rooted in olfaction in a systematic way, entrenched within new public health reforms, until Pasteur's and Koch's discoveries. The hygienist movement was particularly concerned with social health and order, and sense of smell was a faculty possessed by the general public. They promoted *olfactory vigilance*, that is, the reading of city's olfactory state through miasmatic networks. Such social measurement of odor, however, inscribed and codified a social dichotomy of stench, with the "deodorized bourgeoisie" on the one hand and "the foul-smelling masses" on the other.[160] Corbin explains,

> Olfaction was caught up in the refinement of nineteenth-century practices and divisions. The subtle interplay of individual, familial, and social atmospheres helped to order relationships, governed repulsions and affinities, sanctioned seduction, arranged lovers' pleasures, and at the same time facilitated the new demarcation of social space.[161]

Such an attitude represented the waning fascination with body odors of late eighteenth-century vitalist thought, which looked to odors for their benefits to physical and sexual performance and linked them to diet, climate, occupation, and temperament.[162] It was also a move away from Neo-Hippocratic analysis based on the influ-

158 *Ibid.*, 31.

159 Quoted in *Ibid.*, 113–4.

160 *Ibid.*, 55.

161 *Ibid.*, 141.

162 "Strong-smelling effluvia were a sign of intense animalization and evidence of the vigor of the individual and the race. Thus it was discovered that very ancient therapeutic practices

ence of topography, nature of the soil, climate, direction of winds, etc. The problem was now the "stench of the poor" or the "secretion of poverty". This stench, according to medical science, was an animal one. This characterization only became more entrenched after the cholera pandemics of the 1830s. Not surprisingly, knackers, gutters, butchers, cattle drivers and urban cow herds, along with sewer workers, drain cleaners and workers in refuse dumps, were at the top of the list of "stinkers" (in its double meaning: olfactory and moral). In a framework where "all smell is disease", "doctors and sociologists had just detected that a type of population existed which contributed to epidemic[s]: the type that wallowed in its fetid mire".[163]

The concept of animal nuisance has both social significance and class content. "The unpleasant odor of the proletariat remained a stereotype for at least a quarter of a century, until the attempts at moralization, familialization, instruction, and integration of the masses began to bear fruit".[164] Animals' smells and miasmas, which emanated from carcasses, blood, dung, skin, hair, clothes, the sweat of slaughtermen, butchers, etc., were anathema to the hygienist dream of a deodorized, healthy city. *Hygeia* is a utopia described in an address to the British Health Department of the Social Science Congress as model of the healthy city of the future. In Hygeia there are pollution controls, factories are out of town, railroads and sewage are underground, roads are all paved, slaughterhouses are publicly supervised, no dwellings are underground and many have roof gardens, hospitals are efficient; public street cleaning and laundries are under state supervision, burials are performed without embalming or a caskets, there are no carpets, no one smokes or drinks alcohol and everyone exercises.

Animal nuisance's intrinsic connection with the miasmification of medicine, rather than a vague repulsion toward animals or cruelty *per se*, accounts for hygienists' efforts to reform slaughterhouses from the mid-nineteenth century onward. Accordingly, sight, visibility and concealment are decreasingly important within social attitudes towards slaughterhouses.[165] Blood flowing in the streets, the presence of live animals in markets and their excrements and secretions are not so

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had a scientific basis. The cure for any ailment arising from insufficient animalization was traditionally sought in stables containing young animals". For more detail see *Ibid*., 25–43. An interesting example of this change concerns stables. In the vitalist conception, the warm air in the barn, soaked in animal odors and humors, is beneficial for both animals and humans. Cows could maximize the milk yield and men could be reinvigorated. For this reason, stables were almost windowless, non-ventilated and in a perpetual semi-shade. In the framework of miasma theory this stagnant and fetid air come to be regarded as very unhealthy.

163 *Ibid*., 142–61.

164 *Ibid*., 148.

165 Fitzgerald and Taylor, "The Cultural Hegemony of Meat and the Animal Industrial Complex"; and Twine, "Revealing the 'Animal-Industrial Complex' – A Concept and Method for Critical Animal Studies".

much repellent to the sight, as to the sense of smell. Visibility belongs instead to the discourses against cruelty to animals and humanitarians, which argues that the spectacle of violence towards animals is morally degrading, especially to children, and advocates for its concealment.[166]

4.5.4 Knowledge III: Meat, Animals, and Bacteriology

Despite the proximity of animals to urban life and the frequency of epizootics, panzootics[167] and zoonoses in the nineteenth century, a connection between the health of animals and that of the humans who depended on them for food, labor, or companionship went conspicuously unnoticed.[168] As historian Anne Hardy highlights:

> Although animal disease became a concern of central government following the disastrous epidemic of cattle plague of 1865–66, it was not until the very end of the century with the spread of new bacteriology that any significant attention began to be paid to possible direct connections between human and animal disease.[169]

Hygienist concerns about diet, nutrition science, animal nuisance and smell-based theory of miasmas and decomposition were the primary motivator of health reforms and laws dealing with animals (slaughterhouse reforms, meat inspection laws, cattle disease acts). The chief risks to human health coming from animals could be mitigated via the centralization of meat production, and the resulting removal of animals, carcasses and manure from urban streets. Meat poisoning, as it was called,[170] was also explained by miasmatic theory. By the nineteenth century, two kinds of diseases associated with foodstuffs were recognized: one linked with adulteration

166 See Chiara Stefanoni, "The Politics of Smell and The Morality of Sight: Challenging 'Slaughterhouses with Glass Walls' in Animal Advocacy", Gwen Hunnicut, Richard Twine and Kenneth Mentor (eds.), *Violence and Harm in the Animal Industrial Complex: Human-Animal Entanglements*, Routledge, New York, 2024, pp. 71–83.

167 Clive A. Spinage, *Cattle Plague: A History*, Springer Science & Business Media, Berlin, 2003.

168 Anne Hardy, "Animals, Disease, and Man: Making Connections", *Perspectives in Biology and Medicine*, vol. 46, no. 2 (2003), pp. 200–15.

169 Anne Hardy, "Pioneers in the Victorian Provinces: Veterinarians, Public Health and the Urban Animal Economy", *Urban History*, vol. 29, no. 3 (2002), p. 374.

170 "It was not until the later 1880s that the generic term 'food poisoning' emerged: before this, and still occasionally for decades thereafter, episodes were usually described by the precise item of food involved: 'cheese poisoning', 'meat poisoning', 'pork-pie poisoning'. It was only when the central medical department began collecting outbreaks in the 1880s that the term food poisoning came into use, initially in inverted commas. The 1880s was the key decade in which the concept of bacterial food poisoning displaced that of ptomaine poisoning, among interested researchers and public health administrators". Hardy, "Food, Hygiene, and the Laboratory", pp. 294–5.

and the second with foods apparently incapable of adulteration, such as meat and fish. Decomposition theory, however, could explain the corruption of animal-based foods. Illness was ascribed to chemical poisons, to putrefactive alkaloids or to toxins known as "ptomaines" released in the process of putrefaction without affecting the texture and taste of the food. In these cases, sanitary inspections, which consisted of seizing and destroying consignments of diseased or decayed (i.e. smelly) meat, presented a problem of identification. Additionally, the consumption of meat from diseased animals was prohibited not because it may transmit disease, but because the flesh of sick animals was thought to decay more rapidly.[171] The concept of disease transmission and contagion was largely unpopular within the scientific community, rendering the notion of animal-human contagion seem like science fiction.[172]

Miasma theory is an essentialist theory of "morbid spontaneity", the anticontagionist belief that disease arises spontaneously from within the body itself.[173] As the French clinician Hermann Pidoux, a champion of anticontagionism in the debate over tuberculosis around 1865, put it, "When I speak of spontaneity […] I am considering the organism in its milieu, that is […] surrounded by agents of hygiene, […] by stimuli that are sufficient or insufficient, regular or irregular, favorable or harmful, healthy or unhealthy".[174] He identified three categories of influencing causes: "appreciable external causes" (e.g. "ignorance, overwork, malnutrition, unsanitary housing, [and] deprivation of all sorts"), "appreciable internal or pathological causes" (e.g. "laziness, habits of luxury and flabbiness, excess at

171 Hardy, "Pioneers in the Victorian Provinces".

172 "At the root of this entrenched indifference to the potential for the transfer of disease between man and animals lies the opaque nature of that transfer itself. The major infectious scourges of the animal kingdom – distemper in dogs, cattle plague and foot-and-mouth, sheep rot, liver fluke, bovine pleuropneumonia and swine fever – do not apparently transmit to man. Salmonella and other food-poisoning organisms of animal origin are usually transmitted in apparently wholesome foodstuffs: it was only with the advent of the public health laboratory after 1918 that they began to be commonly related to the ingestion of contaminated foodstuffs. Tuberculosis, tapeworms and trichinosis take long enough to develop that the pathway of causation can be obscure. Of the animal diseases that were known by the Victorians to be transmissible, glanders, rabies and anthrax were all of relatively rare occurrence in man. Moreover, glanders and rabies were transmitted by inoculation – by the entry of infected pus through wounds and abrasions on the skin, by the saliva in the bite of a rabid dog. Anthrax was transmitted by the handling of infected hides and hair, and only very rarely through the consumption of infected meat. These three, it could be argued, were essentially accidental transmissions, which could be avoided by due care and attention. In any general context, they did not represent a large threat to human public health". *Ibid.*, 375.

173 David S. Barnes, *The Making of a Social Disease: Tuberculosis in Nineteenth-Century France*, University of California Press, Berkeley, 1995, p. 43.

174 Quoted in *Ibid*.

table, [and] the torment of ambition") and "constitutional predisposition".[175] Anticontagionism's interests intersected with those of the hygienists in the search for external causes for disease. As Pidoux asserted, "we partisans of the spontaneous degeneration of the organism under the influence of [various] causes that we are *seeking out everywhere*, in order to combat the disease at its roots".[176] Contagionism and anticontagionism, however, were sometimes conflated. Early-nineteenth-century medical textbooks were known to include descriptions of "contagious miasms [sic]".[177] The only consensus seemed to be, as underlined by Latour, that diseases had,

> strange and erratic behavior […] Disease appeared sometimes here, sometimes there; sometimes at one season, sometimes at another; sometimes responding to a remedy, sometimes spreading, only to disappear. […] Sometimes cholera passes, sometimes not; sometimes typhus survives, sometimes not. Indeed, the doctrine of "morbid spontaneity" was the only really credible one.[178]

The biggest source of frustration for the hygienists was this unpredictability of diseases which could be caused by almost everything and thus had to be fought everywhere at once, dependent upon "the heavens, weather, morals, climate, appetites, moods, degrees of wealth, and fortune",[179] as Latour puts it. This variability and the consequent diagnostic schema – "accumulation of advice, precautions, recipes, opinions, statistics, remedies, regulations, anecdotes, case studies"[180] – resonates with the method of "seeking out everywhere" inherent in anticontagionism. "At the time – that is, before Pasteur had made himself necessary to the hygienists – one thing was certain: the doctrine of contagiousness was inadequate to fulfill the hygienists' goals".[181]

Thus, the formation of the dietary *dispositif* from the perspective of the knowledge represented by the hygienist movement is anchored primarily to the miasmatic theory. As Latour points out about the relationship between hygienists and Pasteur's bacteriology,

> Where would the hygienist movement have gone without Pasteur and his followers? In its own direction. Without the microbe, without vaccine, even without the

175 Barnes, *The Making of a Social Disease*, p. 44.
176 Quoted in *Ibid.*, 46. [emphasis added]
177 Dorothy Porter, *Health, Civilization and the State: A History of Public Health from Ancient to Modern Times*, Routledge, London, 2005, pp. 61–147.
178 Latour, *The Pasteurization of France*, pp. 21, 32.
179 *Ibid.*, 63–4.
180 *Ibid.*, 20.
181 *Ibid.*, 22.

> doctrine of contagion or the variation in virulence, everything that was done could have been done: cleaning up the towns; digging drains; demanding running water, light, air, and heat.[182]

Building mechanized and centralized slaughterhouses could be added to this list.

> What the hygienist movement did with Pasteur it would have done anyway without him. It would have made the environment healthier. The vague words "contagion," "miasma," and even "dirt" were enough to put Europe in a state of siege, and it defended itself by cordons sanitaires against the infectious diseases. Of course, terrible diseases got through the cordons, but sometimes there were victories, and that was no small achievement.[183]

The anticontagionist miasmatic framework, however, that supports the doctrine of morbid spontaneity, had a practical issue that seems to acknowledge bacteriology. Latour, again, writes,

> [Miasmatic doctrine] encouraged skepticism. Steps could be taken, of course, but against what? Against everything at once, but with no certainty of success. It was difficult to arouse enthusiasm and sustain confidence in programs of reform and sanitation that all rested on this inconstant constant: "Confronted by this periodically recurring fatality, we remained powerless, unarmed, and, as the poet has it, 'weary of all, even of hope".[184]

Although large sums of money were put towards public health measures and disease prevention, illness continued to rage. Political debate and conflicts arose around this issue, and certain powerful groups, particularly slaughterhouse organizations, claimed that reforms advocated by the hygienists were detrimental. Hardy describes the situation thusly, "The urban meat trade and the wider national agricultural system were too powerful for any minority medical opinion to achieve effective influence".[185] In London, as an exemplary case, weather sometimes masked animal smells and miasma, and it was not always possible to define where a certain animal nuisance came from. As a sanitary report on sickness and mortality affecting London's poor East End in 1838 stated,

> Dwellings thickly crowded with inhabitants stand all around the slaughterhouses, yet here, where the materials for the production of the worst form of

182 Latour, *The Pasteurization of France*, p. 23.

183 *Ibid.*, 25.

184 *Ibid.*, 33

185 Hardy, "Pioneers in the Victorian Provinces", p. 377.

> fever are most abundant, scarcely a case has occurred, even during the present epidemic. On the other hand, in the passages, courts, and alleys, on the very opposite side of the street from the houses of which there are no drains into the common sewer, fever of a fatal character has been exceedingly prevalent.[186]

Latour again points out,

> What the microbe and the transformation of microbiology into a *complete* science did was to make long-term plans of sanitization *indisputable*. They offered, literally, a real guarantee of municipal investments. How could the hygienists convince city councils to throw themselves, for instance, into a public drainage program if there were still any dispute "in high places" as to its harmlessness? However, as soon as the scientific argument was closed, they could guarantee the municipalities a good return on their investments.[187]

Thus, it was in the interest of the hygienists to settle the scientific dispute, hence their enthusiastic adoption-through-translation of bacteriology.[188] The new bacteriology was grafted onto morbid spontaneity, replacing the miasmatic doctrine as to the etiology of disease through a process of translation. The task of the period was "to reconcile contagions and morbid spontaneity". What had to be explained was "not contagion but *variation* in contagiousness in terms of environmental circumstances".[189] Indeed,

> Contagionism as a general doctrine was powerless, but the Ariadne's thread, making it possible to connect a ship, a train, a particular topography, a system of water supply, brought together both the traditional investigation and the new agent. Before, *everything* had to be taken into account, but in a disconnected fashion; now the hygienist could also take everything into account, but *in the order* laid down by the microbe's performances. It is easy to imagine the extraordinary enthusiasm of all the hygienists called upon to discover the traces of an enemy that seemed so

186 Quoted in MacLachlan, "A Bloody Offal Nuisance", p. 238.

187 Latour, *The Pasteurization of France*, p. 54.

188 Latour reconstructs the process of translation between the hygienists and the Pasteurians as, "'We want to sanitize,' say the hygienists, expressing in their own way the forces of the period and the conflicts between wealth and health. 'All your good intentions are diverted, confused, parasitized,' say their enemies. 'This parasite that diverts and confuses our wishes, we see it and reveal it, we make it speak and tame it,' say the Pasteurians. 'If we adopt what the Pasteurians say, seizing the parasite with its hand in the bag, we can then go as far as we wish,' say the hygienists. 'Nothing will be able to divert our projects and weaken our programs of sanitization.' In spreading the notion of the Pasteurians as revealers of microbes, the hygienists, who claimed to be the legislators of health, spread themselves". *Ibid.*, 41.

189 *Ibid.*, 64.

> erratic as to summon up the whole explanation of morbid spontaneity. Without abandoning anything of the past, they were becoming stronger.[190]

In the end, "what were once miasmas, contagions, epidemic centers, spontaneous diseases, pathogenic terrains, by a series of new tests, were to become visible and vulnerable microorganisms".[191] The microscope – and the faculty of vision – replaced the nose and the sense of smell as privileged instrument of medicine.[192] The laboratory gradually took the place of the smell-cartography of the city and its socially dispersed methods. As Corbin notes,

> The alliance between germs and dirtiness – now identified with filth and dust – remained unchallenged. There were fifty to sixty times more microbes in the poor man's dwelling than in air from the most evil-smelling sewer, declared Marie-Davy in 1882. Stench was no longer morbific, but it signaled the presence of disease. The masses had lost their monopoly on infection, but they remained the greatest threat.[193]

Thus, the establishment of bacteriology alleviated *in part* the contradiction between health and wealth "by shifting the interest from 'sick paupers' to 'dangerous microorganisms'".[194]

Within the framework, living animals and meat (the latter here considered in relation to poor health outcomes, including illnesses, rather than as a source of energy, as is the case in the perspective of nutrition) were no longer constituted as noisome bodies. Animal smells, one might say, were no longer pursued in the air. Rather animals' bodies were "micro-corporealized" in terms of the microorganism inhabiting them.[195] Blood and intestines were not a health hazard because they stank, but because they contained microbes. Animals and meat were uniformly subjects of inspection (before and post-slaughter), as advocated since at least the 1850s by

190 *Ibid.*, 45.

191 *Ibid.*, 82.

192 "The macrocosm of the town, sanitized by the hygienists, and the microcosm of the culture of the bacilli, sanitized by the Pasteurians […] All the great macroscopic problems of hygiene, it was believed, had been found to be solvable by the Pasteurians on the small scale of the laboratory: the same went for the main disinfectants, the safety of the Paris drains, the harmlessness of the sewage farm at Gennevilliers, problems of quarantine. In each case, thanks to this identification of the macro- and microcosm, Pasteur's laboratory was expected to provide the final opinion that would settle the matter". *Ibid.*, 67.

193 Corbin, *The Foul and the Fragrant*, p. 226.

194 Latour, *The Pasteurization of France*, p. 254.

195 The foundation of parasitology by the scientist and poet Francesco Redi in 1684 was eloquenlty entitled *Osservazioni intorno agli animali viventi che si trovano negli animali viventi* (*Observations on Living Animals, that are in Living Animals*).

an emerging group of veterinarians[196] that campaigned for greater involvement in the public health. It became more and more fundamental as new human-animal transmissible diseases and bacilli were discovered (trichinosis, pleuro-pneumonia, foot-and-mouth disease, anthrax, chicken cholera, salmonella, swine tuberculosis, bovine tuberculosis), especially after Koch's discovery of the tubercle bacillus in 1882.

The growing "bacteriologyzation" of medicine and veterinary medicine made inspection procedures indispensable, even if their widespread implementation was questioned,[197] representing another push – originating within the knowledge dimension of the *dispositif* – for the reform and centralization of slaughterhouses. Indeed, supervision and daily inspections both of animals and meat were almost impossible where the slaughter trade was decentralized. A case in point was the pathway to reform in Berlin.[198] Following the discovery of the causes of trichinosis in the 1860s, and the dissemination of trichinosis-related anxieties, medical experts and hygienists promptly advocated for state involvement in meat inspection procedures. It wasn't until 1881, however, that the Berlin Central-Viehhof finally opened its doors.

Bacteriology seemed indisputable by the 1880s, much to the favor of hygienistist arguments. Newly built slaughterhouses, from Mexico City to Moscow, were constructed based upon modern scientific principles, and were thus viewed as state-of-the-art. In this field of knowledge, the veterinarian is the sole expert and highest authority. The physical, or architectural homes of this knowledge were the library, the auditorium and above all the laboratory. Latour explains the need for the laboratory on slaughterhouse campuses thusly,

> All the Pasteurian [bacteriological] "applications" were "diffused," as we say, only if it was previously possible to create *in situ* the conditions of a laboratory. The pasteurization of beer or milk, hermetically concealed containers, filters, vaccines,

196 See Hardy, "Pioneers in the Victorian Provinces".

197 "The dangers of diseased meat, or meat from diseased animals, were not suddenly regarded as serious just because of the new scientific understanding of tuberculosis. Science neither initiated the matter nor settled it. The chain from beasts diagnosed with tuberculosis to meat on a domestic table was a long one. The links were as contested in the era of bacteriology as they had been in the 1860s when pleuropneumonia was the chief cause of anxiety. Science moved understanding on, but questions of the transference of disease from animals to the humans that consumed them, and the unpredictability of the consequences of eating meat from livestock diseased in one degree or another, remained […] A complex web of changing sanitary, veterinary, municipal and commercial contests, conducted through professional and personal conflicts and rivalries, fuelled a public debate about the dangers of unwholesome food and turned it into a major political issue". Paul Laxton, "This Nefarious Traffic: Livestock and Public Health in Mid-Victorian Edinburgh", Atkins (ed.), *Animal Cities*, p. 109.

198 Brantz, "Animal Bodies, Human Health, and the Reform of Slaughterhouses in Nineteenth-Century Berlin".

> serums, diagnostic kits-all these served as proof, were demonstrative and efficacious, only in the laboratory. If these applications were to spread, the operating room, the hospital, the physician's office, the wine grower's winery, had to be endowed with a laboratory.[199]

4.6 Politics: Actor Analysis in the Struggle for Slaughterhouse Reforms

According to the second step of HMPA, the analysis of the various actors involved in this conflict will be developed, outlining their hegemony projects. This takes into account the general strategy to solve the wealth vs. health contradiction, the implementation of this strategy in slaughterhouses-animal-meat policies and their social basis, and, finally, the power resources of these actors.[200] Beyond this scope, there remain other strategies, practices, and actions which do not directly pertain to any hegemony projects, yet remain relevant to the field of struggle.

4.6.1 The National-Social Hegemony Project: Hygienists and Animal Advocates

The general strategy of the national-social hegemony project to solve the national wealth vs. health conflict was to call for the state to meet national health needs through administrative, legislative and institutional means. The dominant approach of the project is primarily statist:

> An approach which appealed to persons of varying political persuasions, […] characterized by the belief that the state, by administration and legislation, should assume the main role in public health reform and management. Public health could not be left up to individuals. Statists believed it was the state's responsibility to maintain the health of its citizenry, and public health experts should function as advisors to the state.[201]

The project, however, also incorporates some liberal elements.[202] In the first half of the century, certain prominent fractions of the project, such as Villermé in France, argued for the installation of factories by justifying or minimizing their polluting effects. Since the 1860s, after the assimilation of bacteriology, hygienist concerns could weld with large investments of capital both state-owned and private-owned

199 Latour, *The Pasteurization of France*, p. 90.

200 Buckel et al., *The European Border Regime in Crisis*, pp. 18–9.

201 Ann Elizabeth Fowler La Berge, *Mission and Method: The Early Nineteenth-Century French Public Health Movement*, Cambridge University Press, Cambridge, 1992, p. 1.

202 *Ibid.*, XII.

in the building of new infrastructures. Regarding strategies related to slaughterhouses-animals-meat policies, a call for public or state-run centralization was intended to enable control and regulation on the production processes of meat and by-products in order to guarantee public health and place limits on the free market and meat trade organizations.

The national-social project was based upon a constellation of medicine, pharmaceuticals, chemistry, statistics, civil and military engineering, public administration, and economy. The hygienists were predominantly physicians, traditionally considered the public health experts *par excellence*, but there were also pharmacist-chemists to perform laboratory experiments, veterinarians to manage epizootics and inspections, engineers and architects to design new infrastructures and administrators. The socio-structural base of the project, thus, was a middle bourgeoisie of scientific experts or professionals.[203] Central actors in the project were health councils, committees and commissions, and national academies that spread across Europe and to the Americas, riding hygienism's wave of institutionalization, professionalization, and disciplinary development.[204] These institutions were "government sponsored,"[205] and, although the hygienist movement was not an official movement or a party,

> many hygienists functioned in an official capacity. Most held government positions, or positions dependent on the good will of the "authority", working at hospitals, in the prison system, on vaccine commissions, and at medical faculties and professional schools […] Public hygienists were members of the "Establishment".[206]

They were also founders, editors, and frequent contributors to influential journals that served as an organ of propaganda, such as the *Annales d'hygiene publique* in France or the *Archiv für Hygiene* in Germany. From these positions, hygienists pursued their strategy mainly through sanitary reports and statistics, followed by recommendations for moralizing reforms. With ever-increasing influence inside public administrations, especially after their "marriage" with bacteriology in the 1870s, hygienists became more and more effective at enacting legislation.

According to Rancière's *dictum* on politics, new or previously unaccounted-for political subjects on the stage suggests dissensus. But why was it the hygienists who brought this rupture and not the movement for animal rights, which emerged at the same time? The advocates of animal rights, drawing on philosophers like Jeremy

203 *Ibid.*, 9–41.

204 For an overview of national peculiarities of France, Germany, Britain, Sweden and the U.S., see Porter, *Health, Civilization and the State*, pp. 96–162.

205 La Berge, *Mission and Method*, p. 22.

206 *Ibid.*, 22–3.

Bentham in England and Wilhelm Dietler in Germany, could have raised the question of animals as "political subjects". When Henry Salt wrote *Animals' Rights: Considered in Relation to Social Progress* in 1892, a text at the apex of radicalism in the trajectory of the nineteenth-century reflection on animal treatment, he took seriously Thomas Taylors' parody of women's rights in his rhetorical question, "if women have rights, why not animals too?"[207] Salt answered "Yes, animals too". In doing so, he both affirmed a process of political subjectification, as women protested the denial of the principle of equality, and analogized or theoretically extended that principle via the actions of animal rights advocates.

Although animal rights theory was not directly aligned with the theory of Kantian, indirect moral obligations, according to which cruelty and violence against animals is prohibited to prevent cruelty and violence against humans, animal welfare associations adopted a position that, in practice, was not that different. According to Andreas-Holger Maehle, "A comparison between the conclusions of Kant and Bentham as exponents of the two concepts reveals an almost complete consensus: both of them accepted a speedy killing of animals in slaughtering or in the eradication of vermin".[208]

Thus, these two theories converged for a fairer treatment of animals, in part based upon the Bible or belief in animal souls. Animal protection societies, vegetarian societies, and anti-vivisectionist movements,[209] were committed to the enforcement of animal protection laws and the education of the general public. The "civilizing" or moralizing task primarily relied upon the argument that cruelty to animals would have a brutalizing effect on humans. Humanitarian pamphlets described the slaughterhouse as a primordial experience for children to peek in the doorway, or "peer through cracks in the fence, with the usual juvenile delight in sensational developments".[210] Such fear and repulsion were especially directed to

207 Thomas Taylor, "Quid Rides? [PSEUDONYM]," *A Vindication of the Rights of Brutes*, Edward Jeffery, London, 1792.

208 Andreas-Holger Maehle, "Cruelty and Kindness to the 'Brute Creation': Stability and Change in the Ethics of the Man-Animal Relationship, 1600–1850", Manning et al. (eds.), *Animals and Human Society*, p. 94.

209 The prevention of cruelty movement and the anti-vivisectionist movement can be referred to as the "two distinct but overlapping movements," which together compound "the first wave of the animal rights movement". Margo DeMello, *Animals and Society: An Introduction to Human-Animal Studies*, Columbia University Press, New York, 2012, p. 402. Anti-vivisectionist groups attracted a greater radicalism pushing toward the complete abolition of animal experimentation, while the societies against animal mistreatment aimed at regulating it, with a moderate and prudent strategy of lobbying the powerful (members of the governments, aristocrats, judges, lawyers) with whom they cultivated close contacts. Harrison, "Animals and the State in Nineteenth-Century England", pp. 804–9.

210 MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth-Century Britain", p. 110.

the lower classes, employed in the meat production sector from cattle transport to slaughter. According to Salt, the repugnant task of butchery could be delegated only to a "pariah class".[211] H.F. Lester, lawyer and founder of the Model Abattoir Society (1886), described the kill-floor worker as "an unclean creature", and stated, "the ranks of slaughter-men are habitually made up from dregs of the population".[212] This fear is primarily a classist and racist fear of social disorder, or phobia of the "low moral quality" of the poor and the marginalized, which was, once again, a hygiene issue. From the 1830s, a racist view related to animal welfare was increasingly directed towards the Mediterranean region, claiming the "inhumanity of southern European races."[213] Cruelty towards animals cast as particularly Latin, citing French vivisection, Italian brutalities and Spanish bullfights as examples. Moreover, the racist framing of Jewish ritual slaughter (*shehitah*) reflected a broader level of antisemitism, especially in Germany and Britain.[214] *Shehitah* was denounced by the humanitarians as a cruel technique because the traditional "casting" process (throwing the animal to the ground) and lack of stunning did not respect humane slaughter requirements. In sum, as Ritvo notes regarding the Royal Society for the Prevention of Cruelty to Animals (RSPCA), it "feared social chaos and tended to focus on what it viewed as the disturbingly irrational behavior of the uneducated and insufficiently disciplined segments of society".[215] The same was true for all other animal protection associations spreading in Europe and the U.S.[216]

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211 Salt, *Animal Rights: Considered in Relation to Social Progress*, p. 61.

212 Quoted in MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth-Century Britain", p. 111.

213 Quoted in *Ibid.*, 108.

214 Dorothee Brantz, "Stunning Bodies: Animal Slaughter, Judaism, and the Meaning of Humanity in Imperial Germany", *Central European History*, vol. 35, no. 2 (2002), pp. 167–93; Robin Judd, "The Politics of Beef: Animal Advocacy and the Kosher Butchering Debates in Germany", *Jewish Social Studies*, vol. 10, no. 1 (2003), pp. 117–150; and, MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth-Century Britain", pp. 115–7, 123–4.

215 Ritvo, "Animals in Nineteenth-Century Britain", p. 109.

216 The world's first animal welfare interest group, the Society for the Prevention of Cruelty to Animals, which in 1840 become the Royal Society for the Prevention of Cruelty to Animals under the patronage of Queen Victoria, was founded in 1824 in London by Richard Martin, a Member of Parliament from Galway, to enforce Martin's act of 1822, "to prevent cruel and improper treatment of Cattle". In 1837, the first German animal protection society was established in Stuttgart, followed by the foundation of analog associations in 1839 in Dresden and Nuremberg. In 1844 the first Swiss animal welfare society was founded. In 1843, the French *Société protectrice des animaux* was created. In 1857 Sweden passed a more radical law against the abuse of captive animals regardless of property aspects. In 1866, Henry Bergh, a New York City gentleman, who traveled in Europe and Russia as a diplomat, founded the American Society the Prevention of Cruelty to Animals, modeled after the RSPCA. In the late 1860s, the ASPCA served as model for other SPCAs and humane groups that sprung up around the country, be-

In the modern framework of capitalist rationalization, the previous organization of animal utilization for human purposes became antiquated, painful, and inefficient".[217] The principle that guided animal rights groups, imposing "their 'bourgeois moral sensibilities' as a corrective to lower class cruelty", was "that it was wrong to inflict *avoidable* suffering on any animal".[218] "Avoidable" meant without purpose in the normal functioning conditions of modern meat production.[219] For example, beating a cow while driving her to a private, urban slaughterhouse was no longer useful in a context where cows were easily driven to the kill floor through an accurately designed path of pens and corridors. Beating a cow in this context would be considered abusive, gratuitous violence. Actions and practices that would be considered abuse outside of this framework, such as the imprisoning of animals inside confined spaces, is considered functional and therefore legitimate. Hence, the reforms against cruelty to animals stood against an obsolete, "uncivilized" system of organization of animal exploitation (the pre-capitalist one), its institutions (decentralized slaughterhouses, city livestock markets) and its representatives (butchers, slaughtermen, urban cows' owners, cattle drivers, cattle dealers, meat traders, street vendors, etc.).

The chief objective of reform struggles was the abolition of old, private slaughterhouses and the introduction of municipal, centralized, and licensed abattoirs where the humane slaughter could be implemented and surveilled. MacLachlan writes,

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ginning with Pennsylvania, Massachusetts, and San Francisco. By 1890, thirty-one states had such organizations. Spain enacted its first animal protection law in 1877 prohibiting the maltreatment of dogs. These societies were variably connected: e.g. representatives from different countries mutually attended annual meetings of other European societies; RSPCA, undoubtedly the leader among the societies, launched in 1862 a special fund for continental operations or prevented the Prince of Wales from attending bullfights while visiting Lisbon and Madrid in 1876. Harrison, "Animals and the State in Nineteenth-Century England"; Ulrich Trohler and Andreas-Holger Maehle, "Anti-vivisection in Nineteenth-Century Germany and Switzerland: Motives and Methods", Rupke (ed.), *Vivisection in Historical Perspective*, pp. 149–87; Helena Striwing, "Animal Law and Animal Rights on the Move in Sweden", *Animal Law Review*, vol. 8 (2002), pp. 93–106; David Favre and Vivien Tsang, "The Development of Anti-Cruelty Laws During the 1800's", *Detroit College of Law Review* (1993), p. 1; DeMello, *Animals and Society*, pp. 403–5; Harrison, "Animals and the State in Nineteenth-Century England", p. 803; and Loïs Laimene Lelanchon, "Detailed Discussion of Anti-Maltreatment Laws in France and Spain", *Animal Legal & Historical Center* (2013), https://www.animallaw.info/article/detailed-discussion-anti-maltreatment-laws-france-and-spain

217 Otter, "Civilizing Slaughter", p. 93.

218 MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth Century Britain", p. 110.

219 Piazzesi, *Così perfetti e utili*, pp. 159–63.

> Such abattoirs would be large enough that they could provide vocational training in the butcher crafts before young men engaged in the huge responsibility of humane slaughter. A larger production scale would permit slaughtermen to become specialized and more skilled in their task within a more detailed division of labor. And new public abattoirs would be engineered so that cattle could walk calmly to the slaughter chamber unstressed and oblivious to their fate.[220]

The main principle for humane slaughter was the stunning of animals before killing. Experiments were made with electrocution and carbon dioxide gas, slaughter masks, and later with firearms in the form of a cartridge-propelled captive bolt.[221] This principle seems to reflect the purviews of hygienists, animal rights groups, and sanitation advocates, alike.

Animal rights societies, despite being actors in this *dispositif* with a trajectory of their own, fit within hygienists' strategy and social-national project. Moreover, some animal welfare advocates were also involved in the public health movement, deriving from the same social basis of urban, bourgeois scientific experts. There were other social bases, of course that also contributed to associations against animal suffering, such as educated rural and urban clergy and certain reform-minded aristocrats.[222] In anti-vivisectionist and vegetarian groups, spiritual and religious concerns drew those who were worried about "a scientocratic and materialistic view of the world"[223], while the welfarist groups, more characterized by professionalism and expertise, drew members from the medical and scientific communities, especially lawyers and veterinarians.[224]

4.6.2 The Conservative Hegemony Project: Butchers

The conservative project is essentially reactionary to the strategies of the other hegemony projects, and thus lacks a general strategy. Regarding the slaughter-

220 MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth-Century Britain", p. 115.

221 *Ibid.*, 117–21.

222 *Ibid.*, 111. The British Council of Justice to Animals counted two dukes, two duchesses, three earls, three countesses, five lords and ladies, a major-general, and an archdeacon among its eighteen vice-presidents in 1911. Lee, *Meat, Modernity, and the Rise of the Slaughterhouse*, p. 269.

223 Maehle, "Cruelty and Kindness to the 'Brute Creation'", p. 100; and Richard D. French, *Antivivisection and Medical Science in Victorian Society*, Princeton University Press, Princeton and London, 1975.

224 "By the 1860s [the RSPCA's expertise] was frequently being drawn upon by the public, by the police and by politicians". Moreover, it "encouraged the professionalization of groups concerned with animal welfare. It consistently upheld the veterinary surgeon's status, which needed 'to be raised higher for his own good, and for the better treatment of animals'". Harrison, "Animals and the State in Nineteenth-Century England", pp. 808–9.

houses-animals-meat policies, the conservative project's strategy is to carry on "the old regime's market culture of paternalism", where meat supply was entirely controlled by meat "cartels", powerful associations of urban, licensed butchers in reciprocity with cattle traders and rural agricultural interests, bounded by "tradition and a clear sense of hierarchy".[225] These associations, after struggling against competition from non-member meat vendors and butchers, caused by internal liberalization and the abolishing of apprenticeship requirements, arranged themselves against the threat posed by the new health reforms and "alien meat"[226] coming from foreign markets. The objective was to defend the butcher's private property interests and his "right to slaughter his cattle upon his own premises", as a British' parliament paper put it in 1847.[227]

The social basis of the conservative project was multilayered, reflecting the processes of enrichment of meat trade associations. On one side, it was composed of powerful family firms, connected to wealthy merchants and landowning nobles. On the other side was the more recent "growing middle class of shopkeepers and petty capitalists". Central actors in this project were butchers and meat craft organizations, such as London's Worshipful Company of Butchers, chartered in 1605, the National Federation of Meat Trades (NMFTA) established in 1888 and the *Syndicat de la Boucherie de Paris*, created in 1811. These societies inherit the sense of corporate identity and spirit of service that characterized eighteenth-century guilds and semi-guilds. They continued to advocate for apprenticeship and artisanal craft as routes to expertise in the field, challenging the qualification of outsiders (both humanitarian dilettantes and veterinarians) to regulate the trade. They also drew on private property rights and *lasseiz-faire* economic policies, safeguarding the interests and rights of master butchers and meat traders against the incursion of government and big capital. "They saw themselves as honest victims of a reform fad, heroic small traders whose dogged determination and craft organization would prevail over a growing agro-industrial monopoly and officious interference from municipal bureaucrats and public health authorities", according to MacLachlan.[228] These societies often had active political representatives, from the municipal to the national level. Butchers' associations also published specialist journals, such as the *Meat Trade Journal* in Britain where they "publicly refute the reckless and inaccurate assertions of reformers, and […] defend their craft from unflattering portrayals".[229]

225 Horowitz et al., "Meat for the Multitudes", p. 1065.

226 Lopes, "Struggles over an 'Old, Nasty, and Inconvenient Monopoly'", p. 372.

227 Quoted in MacLachlan, "A Bloody Offal Nuisance", p. 230.

228 *Ibid.*, 230.

229 MacLachlan, "Humanitarian Reform, Slaughter Technology, and Butcher Resistance in Nineteenth-Century Britain", p. 125.

4.6.3 The Liberal Hegemony Project: Meatpacking Companies

The liberal project's stakes in the health vs. wealth conflict were on the latter side. They promoted the primacy of economic growth, high-profit rates, and competitiveness by means of industrial exploitation in Europe and colonial expropriation. Regarding the slaughterhouses-animals-meat policies, the liberal project presents a schism between "national-liberal" and "international-liberal" fractions. The former was occupied with liberalizing national meat trade. The latter fraction, emerging in the 1870s, was framed around colonial and national relations and liberalized trade between European nations (cattle trade first and then, after the introduction of refrigeration, meat). The strategy was to take over the meat production and consumption process, centralizing them in for-profit corporations. In this context, big business interests intersected with the national-social project of sanitary reforms, posing a threat to local meat economies and local butchers. The strategy of liberal centralization peaked with the idea of meatpacking facilities embodying the promise of affordable, abundant and safe meat for the masses.

The liberal project's social basis reflected two main factions, the middle-class bourgeoisie and the industrial, financial bourgeoisie. Central actors in this project were large corporations, big meat and railroad companies, together with their allies in city halls and health departments. Federal governments, particularly those of the U.S. and Brazil, were paradigmatic in favoring, through federal research and financial support, the liberal strategies regarding meat production and new interest groups, such as cattle suppliers aligned with domestic and foreign investors.[230] In terms of power, the actors in this project possessed substantial material resources enabling lobbying, to influence state policies, as well as marketing and advertising. The project was also supported by scientific expertise and think-tanks, marked by a positivist attitude. Economic interests and new sciences (chemistry, nutrition, etc.) came together almost completely within the liberal project, harnessing amounts of political, material and social power.

4.6.4 Escape Strategies: Animals

Conflicts surrounding slaughterhouse reforms had tremendous impact, of course, upon the animals about whose bodies and skin these policies were made. These animals, however, were not merely a passive resource to be managed or governed according to this or that strategic or legal objective. From a non-anthropocentric perspective, cows, pigs, cattle, etc. can be considered political agents that enact escape strategies with their everyday practices of refusal, avoidance, sabotage. In

230 Brinkley and Vitiello, "From Farm to Nuisance"; Lopes, "Struggles over an 'Old, Nasty, and Inconvenient Monopoly'".

the last decade, different perspectives and reflections on the concept of animal's political agency and resistance have emerged broadly within the debate on human-animal relations, particularly in the field of CAS.[231] Foucauldian approaches (e.g. Piazzesi)[232], traditional Marxist and (post-)operaist approaches[233] and (liberal-)democratic theory (Kymlicka and Donaldson,[234] Meijer[235]) represent the main voices in this conversation and reflect a variety of modes of animal exploitation and human-animal power relations across many species and contexts. Despite their differences, each orientation to CAS undermines a fundamental *topos* of anthropocentrism which sees non-human animals as voiceless, and therefore excluded from politics.

One important approach to the issue of animal political agency in the conflict around slaughterhouses and meat is the framework proposed by Sarat Colling called "animal without borders" inspired by transnational postcolonial feminist.[236] This perspective draws also on animal geography and the exclusion and inclusion of animal bodies in urban spaces, focusing on the notion of the border. Animals, indeed, trespass borders: escaping, running, hiding, jumping over the fences that keep them locked up, or breaking through them. These violations call into question, "who has the power to create and dismantle borders – whether the dividing lines between nation-states or the walls of a slaughterhouse – and who has the power to cross them at will",[237] which reverberates within the power dynamics inherent to the surrounding environment.

In nineteenth-century cities, animals were everywhere. Pigs and hogs wandered the streets. Cattle, oxen and sheep were driven from the countryside, ports and rail yards to the city markets and urban slaughterhouses. Urban dairy cows crowded the sheds. Horses and dogs drew carriages and coaches. Each of these contexts was inscribed with violence toward and the constraint of animals who answered back by kicking, biting, running, escaping, bolting, refusing, pecking, and so on. Escape

231 See for an overview, Chiara Stefanoni, "Resistenza animale: un'introduzione", Enrico Giannetto (ed.) *Di stelle, atomi e poemi. Verso la physis*, Aracne, Roma, 2019, pp. 57–71.

232 Piazzesi, *Così perfetti e utili*.

233 While not belonging to the field of CAS and not being specific to animal resistance, Søren Mau's discourse about the "autonomy" of animals as a recalcitrant and oppositional factor to the capitalist transformation of agriculture can be considered an approach within this field. Mau speaks about a struggle of capital "for hundreds of years" against nature, in which he includes animals. Mau, *Mute Compulsion*, p. 294.

234 Sue Donaldson and Will Kymlicka, *Zoopolis: A Political Theory of Animal Rights*, Oxford University Press, Oxford, 2011.

235 Eva Meijer, *When Animals Speak: Toward an Interspecies Democracy*, NYU Press, New York, 2019.

236 Sarat Colling, *Animals without Borders: Farmed Animal Resistance in New York*, MA thesis, Brock University, 2013; Sarat Colling, *Animal Resistance in the Global Capitalist Era*, Michigan State University Press, East Lansing, 2021.

237 *Ibid.*, 109.

strategies provoked traffic hazards, congestion and accidents that came to be considered animal nuisance, provoking complaints and leading to administrative ordinances, such as Paris' ban on harnessing dogs due to a widespread fear of accidents. According to police regulations,

> Considering that, contrary to previous regulations, merchants, butchers, bakers, tripe butchers and others routinely use carriages pulled by dogs for the transportation of goods;
> That these small carriages, whose manoeuvrability is difficult because of the dogs' *unruliness*, rush daily to the covered markets and outdoor markets at the very hours that adjacent roads are the most congested by pedestrians and vehicles of all types; that these carts, despite their drivers, slip between other carriages and frequently cause inextricable traffic hold-ups and annoyances;
> That these animals are forcibly overworked sometimes *irritates* them to such a point that several drivers and even passers-by have already been seriously *injured*;
> Finally, considering that dog-driven vehicle traffic in the capital is a permanent cause of accidents, and that the large number of these animals increases, in frightening proportions, the danger of rabies and that this is a perpetual, and unfortunately well-founded, fear in the population, is one of the calamitous scourges that the municipal authority must prevent by all available means.[238]

Dogs' "unruliness", together with health concerns, manifested politically and within the urban environment. To be sure, there is no party of the animals with general political objectives, nor a movement in its traditional meaning, nevertheless in their everyday practices of "waywardness",[239] they display their will to determine the conditions of their own lives and liberation. Although non-deliberately, these practices have effects on social forces and their projects. What Papadopoulos, Stephenson and Tsianos say about human escape strategies can also be applied to animals. They write, "[Animal]'s escape, flight, subversion, refusal, desertion, sabotage or simply acts which take place beyond or independently of existing political structures of power force sovereignty to respond to the new situation which escaping [animals] create, and thus to reorganise itself".[240]

238 Quoted in Sabine Barles, "Undesirable Nature: Animals, Resources and Urban Nuisance in Nineteenth-Century Paris", in Atkins (ed.), *Animal Cities*, p. 183. [emphasis added]

239 Buckel et al., *The European Border Regime in Crisis*, p. 19.

240 Dimitris Papadoupoulos et al., *Escape Routes. Control and Subversion in the Twenty-First Century*, Pluto Press, London, 2008, p. 43.

4.6.5 Process Analysis

It was meat production's centralization as a hegemonic political project that defined the main policy that emerged out of the struggles between the hegemony projects outlined so far. The debate around the reforms has been everywhere quite intense, long and fought on many fronts: municipalities and councils, courts, press, academies. Despite the specific features of individual cases, the dynamic of the debate has had recurrent tropes. A first phase in which hygienists' call for governmental intervention in the problem of animal nuisance and meat unwholesomeness fails to achieve effective results. This practical failure was due to prevalent internal and national liberalization policies favoring the free market, the rights of private butchers and conservative organizations over public health concerns. Local inertia, lack of direction from central governments and the absence of universal consent from the medical and scientific communities regarding zoonoses also contribute to holding back reforms. Hygienists' prolific publications, however, have increased public awareness of bacteriology and of health problems associated with meat production, influencing consumers' choices and, eventually, progressively achieving legislative and institutional victories. The national-social project of slaughterhouse centralization is therefore hegemonic, constituting one of the pillars at the center of the welfare state and recasting the health vs. wealth conflict under the aegis of the nation-state.