



Metabolic Labor

Broiler Chickens and the Exploitation of Vitality

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Abstract Amid mounting concerns over viral and bacterial outbreaks in industrial farm settings, scholars of modern industrial agriculture have increasingly focused their attention on the dangers posed by an “excess of life.” While important, this focus tends to produce a narrative in which life is associated with disruption, pathology, and chaos, while that part of the animal that remains productive comes to be viewed as determined, machinelike, and anthropogenic. In this essay, I focus on the way that life is counted upon to *exceed*. Industrial animal husbandry depends upon nonhuman vitalities to predictably exceed human inputs to production, but this fact has been overlooked amid an emphasis on containment and control. I propose we think about nonhuman contributions to production, including those taking place at the microbiological level, as *labor*. This approach confers two advantages over Cary Wolfe’s influential biopolitical analysis of the factory farm. First, it provides a register for talking about how life can be both potentially disruptive and indispensable to certain forms of capitalist production, even as multiple forces work to erase nonhuman contributions from the way we think about production. Second, it allows for the possibility of agency on the part of farmed animals that includes more than just resistance, disruption, or death. This essay concludes with an ethnographic description of the lives of broiler chickens on a hobby farm in rural Michigan, asking what it is like to do metabolic labor.

Keywords animals, agency, biopolitics, vitalism, labor

A virulent strain of avian flu ripped through the Midwest in the spring of 2015, prompting farmers in several states to destroy so many chickens at the behest of the US Department of Agriculture (USDA) that disposal of them became an environmental hazard.¹ The outbreak added to long-standing fears over the containment of viral and bacterial infections in crowded animal facilities that have accompanied the broiler chicken industry since its beginnings in the early twentieth century.² Scholars have amplified these concerns in recent years, noting that attempts to wring more

1. Lowe, “Midwest Farmers Rush to Dispose of Chickens Killed to Contain Avian Flu.”

2. Boyd, “Making Meat.”

productivity out of intensively farmed animals almost invariably result in greater vulnerability and risk for the animal populations, with “biosecurity” innovations barely outpacing emerging disease threats.³

Industry responses to the threat of disease have tended to double down on efforts to exert complete control over livestock biology, calling for strict confinement practices and liberal use of vaccines and antibiotics along with maximum separation between the different components of the farm operation.⁴ This “closed systems” approach to animal husbandry mirrors another economic ideal of the factory farm: the “vertical integration” of the animal, in which single firms take control over greater and greater proportions of animal life cycles for financial as well as biosecurity reasons.⁵

Scholars of modern industrial agriculture have devoted considerable attention to this same set of concerns in recent years, as questions of pathology, containment, and biosecurity have come to occupy a substantial portion of the literature. While some scholars have pointed out that efforts to create pathogen-free environments often fail—and that the ideal narrative of biosecurity endures even as it has come to entail, in practice, the management of inevitable outbreaks rather than the complete elimination of pathogens⁶—these accounts nonetheless share with industrial narratives an intense focus on the disruptive capacity of “excess life.” The notion of the vertical integration of living beings, meanwhile, plays upon a venerable industry trope of the animal-as-machine that scholars (aside from animal rightists like Peter Singer and Ruth Harrison) have left largely unexamined.⁷

An important consequence of both the biosecurity narrative and the scholarship surrounding it is an emerging separation whereby life, or “biology,” comes to be associated with disruption, pathology, and chaos, while that part of the animal that remains productive comes to be viewed as determined, machinelike, and anthropogenic. Life, when it appears in this narrative, does so as an invader and as a threat to the safety, efficiency, and hygiene of the farm operation. A widely cited historical account of the

3. *Ibid.*, 633–34, 663. See also Allen and Lavau, “‘Just-in-Time’ Disease”; and Lakoff and Collier, “Problem of Securing Health.”

4. Hinchliffe and Ward, “Geographies of Folded Life.” This separation has become especially extreme in the case of industrial hog farming, with ever-finer distinctions introduced between the different phases of the animal life cycle; see Blanchette, “Herding Species.”

5. Striffler, *Chicken*, 45–47; Blanchette, “Herding Species.” For the economic rationale behind vertical integration in the broiler chicken industry, see Boyd and Watts, “Agro-Industrial Just-in-Time,” 145–46.

6. Hinchliffe and Ward, “Geographies of Folded Life.” Hinchliffe and Ward were the first to point out the depth of this divergence between biosecurity-in-theory and biosecurity-in-practice. Blanchette, “Herding Species,” 662, refers to this as the “fantasy of separation.” On the normalization and incorporation of expected disease loss into the business model of broiler chickens, see Boyd, “Making Meat,” 643. Allen and Lavau, “Just-in-Time Disease,” 8, have shown that biosecurity measures paradoxically create conditions for the emergence of new pathogens by densely packing genetically similar, immunosuppressed animals into close confinement and sealing off the environment, the latter causing viruses to “turn in on themselves” and mutate.

7. See, e.g., Keck, “Liberating Sick Birds.” For an exception that engages directly with the maximization of “vitality,” see Blanchette, “Herding Species.”

broiler chicken industry, for instance, details the industry's efforts to turn the chicken into a "highly efficient machine" for converting grain into protein while battling the emergence of new pathogens.⁸ The image we are given is one of a biotech firm bending the biological processes of the broiler chicken to the will of capital, all while struggling against the antagonistic movements of a nature that "fights back." The same antagonistic arrangement of biological and productive forces characterizes leading biopolitical analyses of the factory farm. Cary Wolfe worries over the ever-present chance "for life to burst through power's systematic operation in ways that are more and more difficult to anticipate," threatening the existence and productivity of life forms in what is otherwise portrayed as a relationship of total domination.⁹ The result is a situation wherein resistance, disruption, and death become the only forms of agency available to animals on the factory farm.

In this essay, in contrast, I focus on the ways in which life is counted upon to *exceed*. Industrial animal husbandry, like other forms of agriculture, depends upon non-human vitalities to predictably exceed human inputs to production as part of its core business model.¹⁰ This fact has been overlooked amid scholarship focused on the disruption caused by excess life or on the vast amounts of human labor that factor into the production of animal flesh.¹¹ A great deal of human labor is congealed in the genome and the body of a broiler chicken, for instance, but neither the broiler chicken nor its genetic code is composed entirely of human labor; nor is human labor enough to make the chicken grow. While the focus of this essay is hog and chicken farming, this same fact—the necessity of life-in-excess—holds for a tremendous array of human technologies that would not function at all if specific forms of nonhuman life did not predictably exceed the power of human industrial arts.

I point out this neglected but commonsensical fact with two goals in mind. The first is to propose a register for talking about how life can be potentially disruptive and indispensable to certain forms of capitalist production, even—or especially—as multiple agencies work to erase nonhuman contributions from the way we think about the production of animal biocapital. The second is to allow for agency on the part of farmed animals or engineered life forms that includes more than resistance, disruption, or death. I argue that animal agency is to be found even when farms function normally and efficiently and when animals "comply" with the wishes of industry. Finally, I

8. Boyd, "Making Meat," 634. For a similar narrative on the chicken industry, see Allen and Lavau, "Just-in-Time Disease"; and, on the hog industry, Finlay, "Hogs, Antibiotics, and the Industrial Environments of Post-war Agriculture."

9. Wolfe, *Before the Law*, 32–33

10. Note that by "exceed" I do not mean "escape," the entire point of animal husbandry being to recapture the excess as surplus value. See Helmreich, "Species of Biocapital," for a recent overview of how scholars have attempted to map this relationship in the context of emerging forms of biotechnology.

11. On the (cheap, invisible, often immigrant) human labor that factors into livestock production, see Striffler, *Chicken*; and Blanchette, "Herding Species."

suggest it is helpful to think about these nonhuman contributions to production under the rubric of labor.

I use the concepts of life and vitality advisedly in this essay. Both categories have been under threat from various directions in the social sciences and humanities, most obviously from a biomechanical reductionist view of biology¹² but also from a theory of nonhuman agency that would make no clear distinction between the agency of living beings and the agency of nonliving or immaterial objects. In Bruno Latour's expansive sense of the term, a river can be agentic; so too can an especially dense stone or a volatile chemical reaction (it is worth noting that the examples Latour usually gives are of those nonhuman actions that disrupt or impede human plans).¹³ While there is value in this promiscuous view of nonhuman agency—particularly in Jane Bennett's attempt to expand human ethical concerns by recognizing the self-organization and “inherent creativity” of certain forms of inorganic matter¹⁴—we should be careful not to go too far too quickly and ignore the meaningful differences between living and nonliving matter, particularly when it comes to the way human beings exploit each of these things.¹⁵ There remains a fundamental difference between the agency of a rock and the generative, self-organizing, and self-replicating capacity of living cells and the tissues, organs, and organisms they comprise.¹⁶ These differences are critical for thinking about the way that surplus value is captured by (or as) capital, as I hope to show in this essay. Hog and chicken farming, in other words, differ meaningfully from the mining of minerals or the burning of hydrocarbons.¹⁷ Living beings, moreover, exist not just as objects in our world (like rocks or rivers) but also at the center of their own *umwelten*;¹⁸ thus the exploitation of living matter is, invariably, the intrusion of human artifice into a world that is wholly other—which is not true, as far as we know, of, say, a stick of wood (though once living) or the gunpowder residue left from a gun blast (two of Bennett's examples of “vibrant matter”).

12. “Biology 2.0” has, according to Wolfe, freed us of the moral dangers of an attraction toward the category of life. Wolfe, *Before the Law*, 57–62.

13. Latour, “Agency at the Time of the Anthropocene.”

14. Bennett, *Vibrant Matter*.

15. Bennett's “vital materialism” depends on what I would argue is an analogy rather than a continuity between living and nonliving things, generalizing some but not all of life's characteristic properties to inorganic matter; to wit, self-organization, but not *purposive* self-organization and arguably not self-sustenance, both of which are essential to the “production” of animal biocapital.

16. This remains true even if we run into epistemological problems when we try to find the limit cases of such a complicated category as “life.” See Helmreich, “What Was Life.”

17. I am in agreement with John Dupre and Maureen O'Malley here that life is a continuum of variably structured collaborative systems, and as such there are meaningful differences between, say, chickens and scallop larvae but also fundamental similarities (mostly having to do with metabolism as a self-sustaining process) that differentiate both, in turn, from inanimate objects. Dupre and O'Malley, “Varieties of Living Things.”

18. The term *umwelten* belongs to Jakob von Uexküll, who was the first to use the German *umwelt* in this sense, in von Uexküll, “Stroll through the Worlds of Animals and Men.”

In contrast to trends toward a “flattened” ontology of living and nonliving beings, there is a productive vitalism that runs through recent works in the emergent field of multispecies ethnography, from which this essay draws inspiration. Scholarship in this field—especially works by Donna Haraway, Anna Tsing, Matei Candea, and others—has brought attention to the extensive interspecies interdependence and “vital entanglements” that characterize everyday life on Earth.¹⁹ Those entanglements occur not between “things” or “matter” but between living beings who act without necessarily being acted upon but who nonetheless depend on myriad others to survive. This essay represents, in part, my attempt to draw out, name, and discuss this implicit vitalism in the context of relations of production. I hope to reinforce the point that vitalism is not, in itself, anachronistic or antiscientific.²⁰ To appreciate the distinctiveness of vital processes is to resist a parsimonious biomechanical or biochemical reductionism. It is to resist the confusion of genetics—what we might call the dynamic informational template of a living organism—with concrete biological processes and a single organism’s actual existence through time.

Most importantly, I aim to show that the category of vitality helps us to better understand the interspecies and intraspecies relations in which we and our fellow beings are immersed. Metabolism, sexual reproduction, and photosynthesis play obvious, central roles in the last remaining mega-industries in North America. If metabolism, sexual reproduction, and photosynthesis are allowed to be conceived solely as biomechanical processes, then the interspecies relations of production at the center of those industries will remain hidden.

When vitalities are exploited in ways that are endemic to capitalist production, this is what I suggest we call “metabolic labor.” Metabolic labor is that which remains after human labor is subtracted from the equation of the “production” of animal flesh.

The Animal Machine—or the Benefits of Misrecognition

An oft-cited passage in the September 1976 issue of the trade journal *Hog Farm Management* advises farmers to “forget the pig is an animal” and “treat him just like a machine in a factory.”²¹ This and similar pieces of advice may have lived longer and higher-profile social lives as activist fodder than as anything else—it is unlikely that the September 1976 issue of *Hog Farm Management* would have achieved such enduring significance otherwise. Nevertheless, the idea that pigs and chickens are (or at least ought to be treated as if they were) machines has been present from the very beginning of the

19. See, e.g., Tsing, “Unruly Edges”; Haraway, *When Species Meet*; Candea, “I Fell in Love with Carlos the Meerkat”; and van Dooren, Kirksey, and Münster, “Multispecies Studies.” For a summary of research in multispecies ethnography, see Kirksey and Helmreich, “Emergence of Multispecies Ethnography.”

20. I should emphasize that I am not referring to a belief in a vital spark or immaterial essence but rather to the observation that living beings are self-sustaining entities whose actions and properties are not wholly reducible to the physical laws of the matter that makes them up. For a discussion of how the different legal traditions in the United States and Canada have dealt with this issue, see Jasanoff, “Taking Life.”

21. Byrnes, “Raising Pigs by the Calendar at Maplewood Farm,” 30.

factory farm era. As early as 1916, a farm textbook advocated that the farmer “think of himself as a ‘manufacturer,’ for he too converted raw materials into valuable finished goods.”²² Peter Singer quotes a number of like-minded constituents of the agricultural industry in his *Animal Liberation*, among them a contribution to a British farming magazine that pointedly describes the layer hen as “a very efficient converting machine.” A USDA fact sheet of comparable notoriety encourages farmers to consider the sow “a pig manufacturing unit.”²³ Historian Mark Finlay argues that “by 1960 [a] vision of ‘assembly-line’ hog production had become embedded into the infrastructure of America’s industrialized agriculture.”²⁴

The notion of the animal-machine has caught on outside the bounds of the factory farm as well, as anthropologist Jake Kosek observes in the aspirations of military scientists working with militarized honeybees. Based on research with scientists at the Los Alamos National Laboratory, Kosek writes: “For members of the Stealthy Insect Sensory Project [a DARPA-funded research project aimed at producing military working bees], the bee was simply a mechanical device, and the project viewed more as an engineering problem than an instance of intimate interspecies interaction.”²⁵

The figure of the animal-machine finds its logical extreme in the arguments of biotech firms seeking legal patents to genetically modified organisms. In a pioneering amicus brief submitted during a landmark case before the US Supreme Court in 1979, a biotech firm argued that genes and plasmids represented patentable “compositions of matter,” and so too did the living beings that contained them.²⁶ Affirmed by the court in its majority opinion, this “sleight of mind,” as science studies scholar Sheila Jasanoff calls it, meant that living organisms were legally viewed as the creation of biotech firms, “called into being solely by the hands of man” and thus subject to patent like any other invention.²⁷

An image of the animal as machine, then, arguably represents the general attitude of farmers and technoscientists toward the genetically pliable living beings under their gaze. More surprising, perhaps, is that the idea has found appeal within the academy as well. Wrestling with the ontological complexity of living beings bred solely for production, historian Edmund Russell suggests that modern farm animals are properly thought of as biotechnology, or “biological artifacts shaped by humans.”²⁸ Russell

22. Woll, *Productive Feeding of Farm Animals*, quoted in Finlay, “Hogs, Antibiotics, and the Industrial Environments of Postwar Agriculture,” 239.

23. Singer, *Animal Liberation*, 108. Jonathan Safran Foer uses these same two examples (without crediting Singer) in *Eating Animals*, 109, 127.

24. Finlay, “Hogs, Antibiotics, and the Industrial Environments of Postwar Agriculture,” 239. One could argue that the figure of the animal-machine is implied in the metaphor of production itself, which, while hardly noticeable any longer as a metaphor in this context, was deliberately introduced into the jargon of industrial farming in the 1950s to stress the parallels with manufacture.

25. Kosek, “Ecologies of Empire,” 661.

26. *Diamond v. Chakrabarty*, 447 U.S. 305 (1980).

27. Jasanoff, “Taking Life,” 174–77.

28. Russell, “Garden in the Machine,” 1.

recommends that we conceptualize pigs and chickens as “organismal factories.”²⁹ In a historical account of industrial chicken breeding mentioned previously, Boyd refers to the broiler chicken as a “highly efficient machine for converting feed-grains into cheap animal-flesh protein.”³⁰ More numerous are examples that, if they do not expressly reproduce the metaphor, refrain from critiquing it.

It is understandable that scholars would find the metaphor of animals-as-fixed-capital inviting. Modern farmers exert an unprecedented degree of control over the vital processes of the animals under their dominion. Farmers supervise feeding schedules, manipulate animal hormone levels, choreograph reproductive acts, and manage animals’ microbiota to an extreme degree. Some animals are supervised practically every waking moment from birth to slaughter. Others are held in pens so cramped they are hardly able to move. Industrially farmed animals are separated in nearly every sense from any meaningful connection to their environs.³¹

As an analytic concept, however, the animal-machine metaphor misses something fundamental about the relation of capital to living flesh. The omission is made clearer if we turn to Karl Marx for an understanding of machines in the context of capitalist production. Marx saw machines as both the apotheosis of capital and the harbinger of its demise. He writes in *Grundrisse*:

Once adopted into the production process of capital . . . labour passes through different metamorphoses, whose culmination is the *machine*, or rather, an *automatic system of machinery* (system of machinery: the *automatic* one is merely its most complete, adequate form) . . . it is the machine which possesses skill and strength in place of the worker, is itself the virtuoso, with a soul of its own in the mechanical laws acting through it.

And: “The accumulation of knowledge and of skill, of the general productive forces of the social brain, is thus absorbed into capital, as opposed to [living] labour.”³² Machines, then, to paraphrase Marx, are products of human labor and ingenuity. Machines are nodes of dead, objectified labor-power that confront living labor in the form of fixed capital, capital’s most adequate form. We can be swept away by Marx’s colorful metaphors of machines with organs, souls, and skills, machines that “feed” on fossil fuel and belch out black smoke; but the soul of the machine is, in the last analysis, an accumulation of human knowledge and human skill.

Animal products, on the other hand, are more than the sum of human labor and ingenuity that goes into them. The body of the pig or the chicken may contain both

29. *Ibid.*, 8. To be fair, Russell also suggests that we ought to view modern farm animals simultaneously as products and as workers. It is not clear which animals qualify for which statuses according to Russell or precisely how those roles coexist.

30. Boyd, “Making Meat,” 638.

31. Blanchette, “Herding Species.” See also Hansen, “Hokkaido’s Frontiers.” For an industry discussion of one aspect of this separation in piglet “nurseries,” see Brumm, “Nursery Designs for Peak Performance.”

32. Marx, *Grundrisse*, 278–81.

human labor and products of the social brain in large quantities; in the case of an animal whose genome has been altered to maximize productive potential, this is certainly so.³³ But—and this is the crucial point—human labor and expertise are always, inevitably, insufficient for the production of animal flesh. This remains a process that despite constant and dramatic intervention over the past decades (if not centuries) humans still cannot totally control. This same fact holds no matter the extent to which a particular animal genome has been manipulated by farmers or scientists. The multiplication of porcine muscle cells, the photosynthetic growth of cornstalks, or the synergistic qualities of soil bacteria present themselves as both irreducibly generative and utterly indispensable to certain modes of capitalist production. As Russell observes, “no one has yet figured out how to transform sunlight, carbon dioxide, and a few nutrients into grain—except by subcontracting the job to plants. The same goes for meat production and animals.”³⁴

The erasure of the labor implied in Russell’s subcontract is related to what political ecologist James O’Connor calls, in a slightly different context, the second (ecological) contradiction of capitalism. O’Connor points out that “neither human laborpower nor external nature nor infrastructures, including their space/time dimensions, are produced capitalistically, although capital treats these conditions of production as if they are commodities or commodity capital.”³⁵ When agricultural trade journals tell farmers to treat pigs as if they were machines, they make a similar erasure, removing the generative capacity of animal life (let us say vitality) from the ideal equation of production.

Hog and chicken farmers have good reason to embrace a mechanistic ontology of animal life, then. Machines *are* labor, but they do not labor. Animal bodies, on the other hand, create surplus value in ways that are distinct from anthropogenic machines. Bio-mechanical reductionism conceals the exploitation of those vital forces.

A Different Exploitation: What Is Missing in Wolfe’s Animal Biopolitics

Rather than illuminate capital’s second contradiction in the case of living capital, biopolitical ruminations on the factory farm have tended to reinscribe the contradiction

33. Blanchette, “Herding Species.” Blanchette documents just how extensive human labor is in the context of hog farms and how new biosecurity messages co-opt new and more extensive forms of human labor both inside and outside the hog barn. Surplus value in those cases is extracted from the human labor that fosters the animal’s growth. The crucial distinction here between animals and artificial fixed capital, however, is that with the pig, human labor is always *in addition* to the ongoing labor of the pig, whereas fixed capital contains only congealed, dead labor.

34. Russell, “Garden in the Machine,” 8. The language of “subcontracting” sounds more pleasant than what is really going on, since the subcontract is now in most cases a one-sided, unrelenting exploitation involving interminable labor in almost unthinkable conditions and is decidedly not protected by a contract, implicit or explicit. Nevertheless, Russell’s phrase, which I suspect he intends metaphorically, invokes the concept of work and labor.

35. O’Connor, “Second Contradiction of Capitalism,” 164 (emphasis added); see also Wadiwel, *War against Animals*, on how industrial animal husbandry exploits “the creativity of animals . . . right down to the metabolic and generative capacities of living organisms” (15).

by referring to agriculturalists' rigid control over nonhuman life in terms that are far too unyielding. These analyses also tend to miss the crucial difference between the exploitation of animals for animal products and the exploitation of human labor.³⁶ At least part of the problem stems from what I would contend is a widespread mistranslation of a key phrase from Michel Foucault's 1976 lectures at the Collège de France, specifically the part of the lecture that has come to serve as a programmatic statement of Foucault's theory of biopower. Describing the transformation of sovereign power to its modern form in the nineteenth century, Foucault states:

Et je crois que, justement, une des plus massives transformations du droit politique au XIXe siècle a consisté, je ne dis pas exactement à substituer, mais à compléter, ce vieux droit de souveraineté—faire mourir ou laisser vivre—par un autre droit nouveau, qui ne va pas effacer le premier, mais qui va le pénétrer, le traverser, le modifier, et qui va être un droit, ou plutôt un pouvoir exactement inverse: pouvoir de «faire» vivre et de «laisser» mourir. Le droit de souveraineté, c'est donc celui de faire mourir ou de laisser vivre. Et puis, c'est ce nouveau droit qui s'installe: le droit de faire vivre et de laisser mourir.³⁷

[And I think that one of the greatest transformations political right underwent in the nineteenth century was precisely that, I wouldn't say exactly that sovereignty's old right—to take life or let live—was replaced, but it came to be complemented by a new right which does not erase the old right but which does penetrate it, permeate it. This is the right, or rather precisely the opposite right. It is the power to “make” live and “let” die. The right of sovereignty was the right to take life or let live. And then this new right is established: the right to make live and to let die.]³⁸

It is the opposition and symmetry between the two sets of phrases, *faire mourir/laisser vivre* and *faire vivre/laisser mourir*, that I suspect leads some translators, as in the above translation, to render the third and most important term as *the power to make live*, which Wolfe, following Roberto Esposito, in turn takes to be the very definition of biopower.³⁹ Translated as such, the phrase elides the connotation of maintenance and support that is better captured by rendering the French idiom *faire vivre* as “to foster life.”⁴⁰ The latter evokes an image that is more consistent with what I am arguing in this essay to be the real character of animal husbandry, as it denotes support for a process that already exists independent of one's own labor.

The problem with “the power to make live” is that it suggests total human control over nonhuman lives in a way that understates the importance of nonhuman vitalities. The resulting framework allows no space for the constructive quality of life. Wolfe

36. The exploitation of animals as macrobiological laborers—i.e., beasts of burden—fits into the second category along with the exploitation of human labor, for reasons that I hope will become clear in a moment.

37. Michel Foucault, *Il faut défendre la société*, 214.

38. Foucault, “*Society Must Be Defended*,” 241.

39. Wolfe, *Before the Law*; Esposito, *Bíos*.

40. “To foster life” is Robert Hurley's translation of *faire vivre* in Foucault, *History of Sexuality*, 138.

struggles with the implications of this throughout his analysis in *Before the Law*, wondering why, “if life is stronger than the power that besieges it . . . does biopolitics continually threaten to be reversed into thanatopolitics?”⁴¹ The question, borrowed from Esposito, is both a cause and a symptom of the idea that, as Wolfe asserts, “resistance comes first.”

The machinery of power races to maintain control over the forces it has brought into its orbit, forces that derive in no small part from animal bodies (both human and non-human) that are not always already abjected. . . . Quite the contrary, those bodies are enfolded via biopower in struggle and resistance, and because those forces of resistance are thereby produced in specifically articulated forms, through particular *dispositifs*, there is a chance . . . for life to burst through power’s systematic operation in ways that are more and more difficult to anticipate.⁴²

I would argue that this perpetual return to resistance as a way out of the problem stems from one original error. Set against “the power to make live,” only death and its opposite—life run amok—register as meaningful actions, and they can only ever register as a refusal. That is why when Wolfe admits that vital forces are not always already abjected, he casts their excesses entirely in the negative—as resistance.⁴³ The biopolitical frame thus constituted refuses nonhuman beings the ability to act in any other way. In fact, industrial farming never does turn into thanato-politics; it simply encourages one or several dimensions of living-ness to flourish at the expense of others.

Beyond the issues that follow from the mistranslation of *la pouvoir de faire vivre*, there is a more fundamental problem with attempts to understand human-animal relationships (and industrial agriculture, especially) through the lens of biopolitics. Despite the many obvious parallels between carceral regimes and industrial farming—including creeping managerial control over almost all phases of life, population-level manipulations, and so on—the biopolitical frame is still concerned first and foremost with power relations between human beings. The interspecies exploitation of nonhuman animals by humans often follows a very different set of rules. To wit: in late capitalism, human laborers are peripheral to mechanized production; and even in manufacture, skilled human labor consists of movements that might eventually be taken over by more dexterous machines. There is nothing essentially *human* about manufacture that cannot be displaced to machinery. Foucault affirms this idea in one short phrase: “the controlled insertion of [human] bodies into the machinery of production,” without which, he argues, the development of capitalism would not have been possible.⁴⁴ Here is a strong echo of Marx’s prediction that the “final form” of capitalist production is “invariably the same—a productive mechanism whose parts are human beings,” representing an

41. Wolfe, *Before the Law*, 37.

42. *Ibid.*, 32–33.

43. *Ibid.*, 32.

44. Foucault, *History of Sexuality*, 140–41.

inversion of worker and tool in which the workman is converted into “a living appendage of the machine.”⁴⁵ On the other hand, machines are peripheral to the cultivation (if not the slaughter and processing) of animal products, which relies instead on animal metabolism and other vital processes that human technology cannot yet replicate. This asymmetry has led scholars to make complex suggestions about the compound status of nonhuman organisms, including Russell’s aforementioned suggestion that nonhuman animals can serve as machines *and* workers *and* commodities.⁴⁶ What is really going on in the case of animal husbandry is more aptly described, as I am about to argue, as a fundamentally distinct kind of labor, occurring at different macrobiotechnological and microbiotechnological levels but always as a yoking of vitality in its many forms.

Metabolic Labor

In order to fully appreciate the exploitation at the center of human-animal relations of production, I suggest we recognize the ways in which vital forces can be made to labor.

Political economic definitions of labor tend to exclude animals from consideration. Sensitive as Marx was to the exploitation of human workers, the condition of nonhuman labor seems to have escaped his attention entirely, both in his early writings and in his later critique of political economy. It is ironic that Marx identifies the extraction of value from nature by humans as the perfect expression of human species-being, whereas he saw the appropriation of human labor by other humans as capital’s most fundamental and egregious sin. This is an irony only resolved by an unrelenting human exceptionalism. The contradiction repeats itself in Marx’s labor theory of value, in which only human labor counts toward the tally of socially necessary labor-power that accounts for the exchange value of a thing.

The omission of the importance of nonhuman vitalities in certain forms of capitalist production is repeated every time anyone talks about the total industrial control of an animal, or about attempts to eliminate excesses of life in those processes, or even about the hubris therein. For what we are talking about is not just hubris but a contradiction of capitalism: again, that biocapital *depends upon* nonhuman vitalities exceeding human inputs in order to create value, which dependence it then immediately acts to erase in the figure of the animal-machine.

In the case of reproductive and metabolic labor, there is an additional obstacle to recognizing that intensively farmed animals like industrial sows or battery hens can perform metabolic labor even as they sit idly.⁴⁷ It is the notion that labor—even forced labor—must be deliberate and purposeful. This prejudice again dates back at least as

45. Marx, *Capital*, 371, 462.

46. Russell, “Garden in the Machine,” 6–13.

47. I say it is an additional obstacle because the macrobiotechnological labor of animals (e.g., draft animals) has been more readily recognized as labor; see, e.g., Haraway, *When Species Meet*, 45–62. See also Clark, “Labourers or Lab Tools,” which argues that the passivity of animal subjects in clinical drug trials should not exclude them from the category of laborer.

far as Marx and the idea that human architects, unlike bees or termites, raise the structure first in their own minds. There is no reason to suppose, however, that labor needs to be deliberate or consciously directed to count as labor. Metabolism is a process yoked by capital that creates surplus value. It should not matter if it is microbes or cellular structures that labor instead of subjects. Scholars have already begun to recognize this in the case of human microbiological labor, where life is “put to work at the microbiological or cellular level” in cases like human reproductive biotechnologies.⁴⁸ The exclusion of microbiological processes from the domain of things that can be exploited as labor rests on an arbitrary series of separations between micro- and macrobiology and between voluntary and involuntary processes that are no longer tenable. I do not mean to categorically deny the validity of those distinctions; in fact, I will rely on them in just a moment. What I mean to say is that analytically speaking, labor can take place at both the macrobiological and microbiological levels and can be voluntary as well as involuntary.

The distinctions between macro- and microbiology and between voluntary and involuntary processes become important when we turn to the question of the laboring animal *subject*. While it is my contention that plants and other nonsentient organisms still perform metabolic labor, the ethical character of the situation changes when conscious or semiconscious beings are attached to the metabolic labor in question. Pasture chickens, for instance, labor at both the macrobiological and microbiological levels—by eating, rooting, and laying eggs, on one hand, and by metabolizing feed into eggs or animal flesh protein on the other; but they have the additional burden of enduring their own metabolic labor, of constantly feeling the effects of the cellular processes within them that generate eggs at the rate demanded by capital. For a layer hen, this means producing and laying as much as one egg per day and experiencing its adverse effects.⁴⁹ The layer hen in a battery cage and the breeding sow in a gestation crate represent marked cases of this kind of drudgery: permanently subject to conditions so cramped and confined and so closely managed that there is practically nothing for them to do but eat and sleep, their labor takes place almost entirely at the microbiological level. There is still, of course, much for these animals to do from the perspective of capital, as they must transform one substance into another in a way that anthropogenic machines cannot yet duplicate. The unending monotony experienced by the pig or chicken in this setting adds to the physical stresses of the microbiological processes within it to form the entirety of its lived reality. We might say, then, that these animals are made hostage to their own reproductive or metabolic labor: they are held captive and their voluntary movements severely restricted while their bodies labor in spite of their suffering.⁵⁰

48. Cooper, *Life as Surplus*.

49. For a summary of the health problems experienced by layer hens, see Potts, *Chicken*, 161.

50. This picture runs against the grain of a rhetorical move long used in the service of the chicken industry, which states that if the chicken is alive and growing, it must be happy and healthy, and it is therefore at least

The category of metabolic labor helps solve the aforementioned problem of agency that is endemic to biopolitical analyses of the factory farm. Wolfe's biopolitics presents an either/or proposition whereby the farmed animal must either acquiesce to an all-encompassing human agency or violently resist. Instead, we can recognize the ways in which animal minds and animal bodies can work with and against the goals of industry simultaneously and at multiple scales: think of the sow that exhibits the stereotypy of banging its forehead against the inner wall of its gestation crate even as it continues to produce commercially valuable piglets, and we will recognize the need for this kind of nuance. Consider how the desire to maximize the vitality of the farmed animal leads to the reversal of the prioritization of human and animal lives, as Blanchette describes in the case of pig farming, where biosecurity practices "confine people into porcine worlds" by restructuring the social and familial lives of everyone from managers to line workers, even as the life cycle of the pig is molded to the constraints of the human laborer's working day.⁵¹

In short, the idea of vital labor's occurring at the microbiological level allows us to recognize the irreplaceable contribution living beings make in relations of production—contributions that serve the interests of capital but are never fully determined (or determinable) by them.

What Is It Like to Do Metabolic Labor?

Going by numbers alone, intensive metabolic and reproductive labor under conditions of close confinement represents by far the most common form of labor performed by sentient nonhuman beings in North America. Each day, hundreds of millions of animals in the United States are confined to the point of immobility while their bodies labor at the cellular level. In this section, I focus on the consequences of being, as I put it above, hostage to one's own metabolic labor. For an empirical study, I will turn to the cradle-to-grave trajectory of a group of Cornish-Rock "broiler" chickens that I observed for several months in the summer of 2015 on a hobby farm in rural Michigan.

The Cornish-Rock or white broiler chicken has dominated the poultry meat market in the United States since the 1950s, due in large part to their uncommonly rapid growth rate. Full-size Cornish-Rock chickens reach slaughter weight as early as five weeks of age, while so-called red broiler chickens (also a fast-growing species) take twice as long to mature, and "heritage breeds"—or those not bred specifically for modern meat or egg production—need nearly four months to reach adulthood. In industrial settings, Cornish-Rock chickens are grown in large "grow-out" operations run by

somewhat complicit in its own exploitation. See Harrison, *Animal Machines*, 181–83. The conflation of growth with welfare implies a kind of monism: if an animal is a body, and the body is thriving, then the animal must be content or at least not suffering. This is why we ought to insist on maintaining the critical distinction between chicken subjectivity and chicken microbiology.

51. Blanchette, "Herding Species," 641–47.

independent farmers contracted by large firms. These “growers” bear the risks of bringing chickens to slaughter as quickly and efficiently as possible while receiving little of the reward.⁵²

The accelerated growth rate of the Cornish-Rock is the product of generations of artificial selection. The USDA in concert with poultry producers began exploring aggressive crossbreeding strategies for producing fast-growing broad-breasted meat chickens in the 1940s, aided by industry-sponsored “Chicken of Tomorrow” contests held across the nation.⁵³ Growth rates for the breed continued to increase in subsequent decades, reaching an average age-to-slaughter of just forty-seven days by 1995.⁵⁴

One of the advantages of the hobby farm as a setting for analysis is that it reveals how little the rapid growth of broiler chickens has to do with care and management and how much it is the result of embryogenesis following generations of epigenetic manipulation. Consumers inundated with advertisements for antibiotic-free and hormone-free organic meats may be surprised to learn that the rapid growth of broiler chickens has nothing to do with hormone injections, antibiotics, or fortified diet. Make standard scratch feed available to a group of broiler chickens—the same feed that is sold in bulk at any farm supply store—and by the time the chickens are eight weeks old they will have eaten themselves into heavy, panting masses of meat and patchy feathers.

To say that this makes them the “creation” of agricultural firms, however—like the seemingly innocuous implication of the term “chicken grower”—erases the five to seven grueling weeks of growth that must be endured by the chicken in a process that, as I have argued above, human labor alone cannot duplicate.

The health problems experienced by broilers—including lameness and leg deformities, broken bones, and chronic pain—have been well documented.⁵⁵ Nearly one-third of broiler chickens experience impaired locomotion, with between 3 and 4 percent fully unable to walk. These numbers exclude chickens previously culled from the flock due to lameness.⁵⁶ A 1999 study published in *Veterinary Record* found that an analgesic treatment improved the agility of broiler chickens, suggesting that birds suffering from lameness experience chronic pain.⁵⁷

For the group of nineteen chickens I observed, the first and clearest visible indication of the stress caused by their rapid growth was a sort of quick, labored breathing. This unusual breathing pattern began in the first few weeks of life and continued until death. I first noticed it when the flock was three weeks old. One of the chicks was lying

52. Scholars have documented the perpetual debt, precarity, and vulnerability caused by this arrangement for the independent owners of grow-out operations. See Striffler, *Chicken*, 79–90.

53. Stull and Broadway, *Slaughterhouse Blues*, 42–48; Shrader, “Chicken-of-Tomorrow Program.”

54. Boyd, “Making Meat,” 637. For a more detailed history of the modern broiler chicken, see Horowitz, “Making the Chicken of Tomorrow.”

55. Potts, *Chicken*, 155–58.

56. Knowles et al., “Leg Disorders in Broiler Chickens.”

57. McGeown et al., “Effect of Carprofen on Lameness in Broiler Chickens.”



Figure 1. Cornish-Rock chickens at approximately three weeks. Photo by author

on its belly in the grass, its large feet splayed out before it, with its eyes closed, its head high, and its beak firmly shut. Each breath was like a violent convulsion that rocked the bird to and fro as if it had just completed some strenuous exercise. This soon became the norm for each chick, and for the rest of their lives, whenever the group bunched together to sleep, they would become a silent, undulating mass of rosy pink skin and matted white feathers.

When they are just a few days old, broiler chickens do not differ greatly in size or behavior from other breeds, except perhaps for their slightly larger-than-normal feet and supercharged appetite; and as fuzzy little yellow chicks, much of their genetic manipulation is concealed from the untrained eye. By the time they were two weeks of age, however, the group I observed spent much of their time either huddled together or eating, and by three weeks of age they had begun to outgrow their emerging feather patterns (fig. 1), a fact that startled the farm's owners (this was only the second summer they had raised broiler chickens).

As the chickens grew larger, they spent less and less time standing. This contrasted with the almost constant motion of the layer hens in the adjacent outdoor pen, who spent most of their waking hours scratching, pecking, bathing, and interacting with one another. By four weeks, whenever I noticed a particular broiler had been standing for more than fifteen to twenty seconds, it would invariably collapse onto its

belly with a loud thud. Their sitting postures became more awkward as they grew larger, with legs splayed out to the side and sometimes in full splits. By the fifth week, none of the chickens could stand long enough to feed; instead, they lay flat on their bellies and curved their necks over the short rim of the galvanized feeder while gobbling down feed.

The chickens' size and consequent lack of agility continually frustrated their ability to do gallinaceous things. Among the clutch I observed, one white leghorn chick had been mixed in accidentally by the distributor, and the farm owners had allowed it to remain with the broilers for the duration of their lives. The leghorn stayed smaller (about half the size of the broilers when the latter were taken to slaughter) and never outgrew her feather pattern. By three weeks of age she was preening gracefully, scratching and digging for insects, taking dust baths, and jumping on top of twenty-four-inch galvanized food canisters. The broilers could do none of these things. When they tried to scratch their heads with one foot—a common maneuver for a layer chicken—they could do so only while lying flat on their bellies. I once watched one of the broilers, then about six weeks old, try to scratch its head while standing on its other foot. It fell forward and planted its face into the mud.

At almost every stage of growth, a broiler chicken's feet are comically large relative to their bodies and contribute to their awkward, plodding gait. At seven weeks, the chickens I observed made heavy thuds on the grassy turf with each footfall, like some exaggerated sound effect. When grapes were dropped into the pen (a favored snack), the nearest broiler chickens would lurch toward the grapes and run a few paces until exhaustion overtook them or until they tumbled clumsily into one another.

By the time the broilers neared slaughter, their underbellies had been rubbed raw by excessive time spent lying down. Feces had been ground into their exposed skin such that even careful (posthumous) scrubbing could not remove it. The labored breathing of the broilers became less obvious as they neared slaughter weight, if only because their chests were heaving shorter distances in proportion to their massive bodies. Open-beaked panting became more frequent, however. On the hottest summer days, some of the chickens would sit awkwardly on their bellies with their mouths agape and their eyes shut, looking as if each breath could be their last.

The farm's owners were sometimes made uneasy by the behavior and appearance of the broilers, and they expressed incredulity over the chickens' rapid growth. But the benefit to farmers of this accelerated growth rate is easy to understand. A halved life-span means less feed, less loss due to disease, and for outdoor farms, less risk of predation. Online hobby farm message boards are filled with comments by farmers who at first express ambivalence over the appearance and behavior of their young broilers but who ultimately succumb to the temptation of a compressed feed-to-meat ratio and radically shortened time to slaughter.⁵⁸

58. A user on permies.com wrote: "The first time I raised cornish rock cross, I was not prepared for . . . how different it is to raise them. By harvest time I had a 30% mortality rate! I was sure I was somehow inadvertently [sic] torturing these birds! . . . This breed grows so fast many suffer from broken legs and many have heart

This narrative gives some indication, I hope, of the extent to which the course and quality of broiler chicken lives are determined by the genetic interventions of industry, even when they are raised outside the “factory farm” setting. And yet the lives of these broiler chickens also show us how misplaced are the exaggerated claims about biotech firms “creating” new forms of life. We should take a short detour in order to take full measure of the hubris in that rhetoric. To begin, even in cases of direct genetic modification—as opposed to epigenetic manipulation accomplished through selective breeding, as is the case with broiler chickens—genetic modifications of current genetically modified organisms usually involve only one or several genes. The famous Onco-Mouse™, subject of one of the first biotech patent cases in Europe, had precisely one of its roughly twenty-five thousand genes altered. But more to the point, even if we were to imagine an organism with a completely synthetic genome that had been created ex nihilo, it would not change the fact that that animal still has to live—has to carry on biological processes in order to metabolize, grow, and/or reproduce as the case may be in complex, contingent ways that are not fully determined by genetic information.⁵⁹ Tinkering with genes, in other words, is a far cry from ontogenetic determinism. One way to fully appreciate this is to watch a broiler chicken grow from a fuzzy, nondescript little yellow chick that fits in the palm of a hand to, within weeks, a creature crippled by its own growth process, a being that lives its entire life in unquenchable hunger, discomfort, and confusion; and then remind ourselves that this is happening *nine billion times* every year in the United States alone, in conditions far less pleasant than a northern Michigan hobby farm.

Given the dramatic and intractable effects of epigenetic manipulation on the lives of broiler chickens, and given that I have needed to stretch the concept of labor near to its breaking point in order to fit this arrangement of productive forces within it, one might reasonably ask why I should insist on retaining the category as a means of describing interspecies relations of production. After all, I have argued that human exploitation of nonhuman animals follows a different set of rules from human exploitation of other humans, and I have needed to argue that labor does not require the

attacks. . . . As they approached their harvest date I told myself I would never raise these again. They are just too freaky. And the way they die at the drop of a hat is just too depressing. . . . Harvest day came. And we ate one. It was the tastiest chicken of my life. . . . So here's the upsides: Other breeds are generally harvested at about five months (21 weeks). These are generally harvested at about 8 to 9 weeks and when you harvest them, they are bigger. *Half the time of having to care for them—that right there makes for half the hassle, half the predator problems, half the weather problems, half of . . . a lot of things.* The feed to meat ratio is excellent. And did I mention the flavor?” Wheaton, “Making the Best of Raising Cornish Rock Cross” (emphasis added).

59. It is this element, the necessary (for production) existence of actual living beings through time, that distinguishes what I call metabolic labor from what Waldby calls *biovalue*. If “biovalue refers to the yield of vitality produced by the biotechnical reformulation of living processes,” then metabolic labor refers to the yield of vitality produced by living processes, reformulated or otherwise. See Waldby, “Stem Cells, Tissue Cultures, and the Production of Biocapital,” 310.

consent or even the complicity of a laboring subject in order to count as such. Why not just use a different word?

Within the existing vocabulary of capitalist production, *labor* is the term that best approximates the contributions of broiler chickens to the process of chicken farming. The term maximally distinguishes those contributions from the competing and prevailing images that would erase them—concepts like chicken “grower” or chicken “producer,” which implicitly portray chicken bodies as wholly the result of human ingenuity and toil. The image of the laboring broiler chicken at least inoculates against the temptation to view these immature and passive birds as wholly determined by external forces and instead recognizes their originary role in production, the adverse effects of which they would seem to experience every moment of their lives.

Conclusion

The American biotech industry’s successful attempts to patent life-forms, the industrial farmer’s trope of the animal-as-machine, and a biopolitics defined as “the power to make live”: each of these, in its own way, erases the generative capacity of nonhuman vitality from the equation of production. In this article, I have attempted to lay out one suggestion for how to undo this erasure or at the very least avoid reaffirming it. In my view, the process requires two steps. The first is to resist prevailing trends toward both a parsimonious biomechanical reductionism and a theory of agency that posits a radical equivalency between human and nonhuman actors and to hold in their place a kind of vitalism that recognizes the distinctness of living organisms. The second is to recognize that vital forces can be made to labor—where, for instance, metabolism becomes metabolic labor, reproduction becomes reproductive labor, photosynthesis becomes photosynthetic labor, and so on.

My intention is not to treat “labor” as a prediscursive fact but rather to suggest it as a useful analytic concept for thinking about the human-animal relationship in settings like the factory farm. The concept draws much of its utility from the fact that labor is a native category within the industrial environments and commodity flows in which industrially farmed animals are situated. The term comes freighted with notions of power and exploitation that are appropriate in thinking about the situation of animals in these settings. What is happening in the flesh of the broiler chicken is a profoundly unequal encounter between animal and industry, the likes of which constitutes the statistical bulk of human-animal encounters in North America today. To refer to the continual exploitation of vital processes following from that encounter as *labor* is, I hope, the beginning of a conversation and not its end.

I should add, finally, that labor gives us a register to eventually talk not just about exploitation and dispossession but also compensation. It is not my express purpose here to call for an end to the institutionalized boredom, fear, and loneliness that is industrial farming; but if the exploitation of metabolic labor is to continue, perhaps it ought not be so utterly thankless.

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