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Rebecca J. H. Woods, *The Herds Shot Round the World: Native Breeds and the British Empire, 1800-1900*, Chapel Hill: University of North Carolina Press, 2017. ISBN: 978-1-4696-3466-1

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Introduction by Melanie A. Kiechle, Virginia Tech

Everyone agrees that *The Herds Shot Round the World: Native Breeds and the British Empire, 1800-1900* is a great title. But it's so much more; this book is a carefully researched and argued study of how the interplay between agriculture and environment has played a central role in the political and social projects of imperialism. Through her exploration of the creation and re-creation of "native breeds" in the British Empire's distant outposts, **Rebecca J. H. Woods** argues that the relationship between domesticated livestock and the places where they graze is an ongoing political, (agri)cultural, and social project. While pastoral images of sheep in a paddock or cows on the range may invoke ideas of simplicity and innocence, the tremendous physical, emotional, and mental work that put livestock in those spaces was never simple or innocent.

Gabriel Rosenberg situates *Herds Shot Round the World* in the history of capitalism. While there have been many studies of the commodification of livestock during slaughter, Rosenberg is compelled by the consideration of the commodification of life at the point of reproduction. As Rosenberg thinks with Woods's account of breeders, breeding associations, and breeds, he concludes that there is more to biocapitalism than monetary value.

Emily Pawley is entirely convinced by the global significance of Woods's approach to the history of breeds and breeding. And yet Pawley wonders, given the necessity of a global ice trade to facilitate the dispersal of these herds, what other aspects of the natural world were transferred around the globe and how did they shift and mutate in the process? Pawley poses this question less to understand biocapitalism, and more to interrogate how we think about the environment in relation to empire. Are the far-flung regions and diverse ecosystems once claimed by Great Britain best understood as neo-Europes, in the words of Alfred Crosby, or might Russell Menard's concept of Mestizo Agriculture be a better framework for these and other stories?

Of the several new ways of thinking about breeds introduced by this book, **Abraham Gibson** is particularly compelled by the argument that domestic animals are extremophiles. Gibson also applauds Woods for her contributions to our understanding of the relationship between agriculture, empire, and migrations of both humans and nonhumans. While others have written at length about the subjective designation of species as "invasive," Woods redirects attention to the fraught definition of "native" biota. Given the constant motion and change of the nonhuman environment, Gibson wonders if we should apply the STS frames of maintenance and innovation to nineteenth-century breeding and agricultural improvement.

In her response, Rebecca Woods takes us to the beginning of her project, with an incongruous visit to Plimoth Plantation, where a flock of Arapawa Island goats, a feral breed, grazed in the place of the extinct "native" population of Old English Milking

Goats. These goats don't appear in the pages of the book, but they inspired the questions that Woods has been asking and continues to ponder in animal history. Woods generously explains her research methods, including how she decided upon the project's limits, as she engages the issues and questions raised by the respondents. Fittingly, in a period in which nativism continues to rise, Woods ends her comments with some thoughts about what environmental historians can contribute to ongoing political and cultural debates.

Before turning to the first set of comments, I would like to pause here and thank all the roundtable participants for taking part. In addition, I would like to remind readers that as an open-access forum, *H-Environment Roundtable Reviews* is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

Editor's Mea Culpa: This roundtable was in its final stages in March 2020, but I lost track of my editorial tasks when our world and working conditions shifted due to Covid-19. I'm grateful to Rebecca Woods, Gabriel Rosenberg, Emily Pawley, and Abraham Gibson for their willingness to publish the roundtable at this late date. I apologize to H-Net readers that you have waited so long to read this exchange.

–Melanie A. Kiechle

Comments by Gabriel N. Rosenberg, Duke University

Many theorists and some historians writing about the relationship between capital and life offer a periodization that I'll term the "discipline story." It goes something like this: from the eighteenth through early twentieth century, capital endeavored to discipline life through temporal and spatial regimentation, protocols of standardization and abstraction in production, and through a general process of mass commodification. Life entered the circuits of production as a heterogeneous factor of production (human labor, animals' bodies, grain, timber, etc.); it left as homogenous flows of fungible commodities (meat, flour, chairs, etc.). Capital, then, endeavored to minimize the variation of its living inputs, to achieve ever greater economies of scale, and generally strategized capital accumulation consistent with a labor theory of value, a logic that became known as Fordism.¹

In and around 1968, Fordism begat post-Fordism. Along with other signal characteristics—the migration of capital from manufacturing sectors to finance and retail sectors; dependence on economies of scope rather than economies of scale; the rise of immaterial and precarious labor—post-Fordism inaugurated a new relationship between capital and life in which capital no longer restrained and disciplined life, but, instead, multiplied and fragmented it. The combination of genetic engineering and developments in intellectual property law meant that capital now had the technical means to generate (and the legal means to monopolize) new forms of life. As critically, these emergent forms of life functioned as capital such that the multiplying variation among forms of life presented an extraordinary opportunity for speculative investment. Historically, opportunities for arbitrage had emerged from the spatial, temporal, and political isolation of markets—buy low in Milan, sell high in London. Post-Fordist biocapitalism, by contrast, generated new arbitrage opportunities by both fragmenting and expanding the domain of life itself. Scientific and legal borders among species displaced territorial borders, and biocapitalists dreamed that these new speculative possibilities provided a final spatial fix to the crisis of capital accumulation.²

Such tidy periodization may be the meat and potatoes of sweeping social theory, but it's red meat to historians. Recent work traveling under the heading of the history of capitalism has done admirable work to complicate the discipline story, and Rebecca Woods's magnificent *The Herds Shot Round the World: Native Breeds and the British Empire, 1800-1900* should be essential reading alongside those volumes. Indeed, although the book will already be widely read by historians of science and the

¹ As I detail below, I see William Cronon's *Nature's Metropolis* as the most powerful articulation of the discipline story as it relates to nineteenth century capitalism. See William Cronon *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton, 1991).

² On biocapitalism see Kaushik Sunder Rajan, *Biocapital: The Constitution of Postgenomic Life* (Durham: Duke University Press, 2006) and Melina Cooper, *Life as Surplus: Biotechnology and Capitalism in the Neoliberal Era* (Seattle: University of Washington Press, 2008).

environment, its pages offer a wealth of insights that extend (and in some cases eclipse) the most important contributions of histories of capitalism. Like *Herds*, scholars investigating the history of capitalism now emphasize the centrality of finance and speculation to nineteenth century Atlantic world capitalism.³ *Herds* explores both finance and speculation by examining a category of capital that could be biologically reproduced: livestock. By doing so, *Herds* foregrounds both the role of reproductive control in producing surplus value and, more broadly, the ways in which value could not be disentangled from identification and affect. In this sense, *Herds* also sits alongside other volumes exploring the intersections between political economy and living things in the nineteenth century. For students of American history, this includes more recent entries such as Alan Olmstead and Paul Rhode's *Creating Abundance* (2008) and Courtney Fullilove's *The Profit of the Earth* (2017), as well as classics such as Jack Kloppenburg's *First the Seed* (1988) and William Cronon's *Nature's Metropolis* (1992).⁴

Indeed, the comparison to Cronon's account of meat production in *Nature's Metropolis* is the most helpful and clarifying one. *Nature's Metropolis* famously argues that the capitalist transformation of the American West proceeded through the commodification of the non-human world with, at each stage, the non-human world becoming more estranged from the particularity of its emergence and living variation. In the chapter, "Annihilating Space: Meat," Cronon recounts the harrowing relationship between, on the one hand, the tremendous growth of meat production in the late nineteenth century and, on the other hand, the intensifying commodification of both vegetal and animal life through that very infrastructure. The latter, in the stirring account of the history of Chicago's Union Stockyards, comes largely through the technical optimization of slaughter. In dingier Marxist prose, this "annihilation of space" provided a radical reduction in the socially necessary labour time needed to produce meat and provided a critical template for Fordist production (recalling that Henry Ford took the inspiration for the assembly line from his tour of the Union Stockyards). Put differently, Cronon's account tells us that improvement in the infrastructure of production—improvement that shrank the space between animals at pasture and urban consumers—made it substantially cheaper for the likes of Swift and Armour to process a heterogenous population of swine into the uniform commodity of pork.⁵

³ For examples, see Jonathan Levy, *Freaks of Fortune: The Emerging World of Capitalism and Risk in America* (Cambridge: Harvard University Press, 2012); Sven Beckert, *Empire of Cotton: A Global History* (New York: Knopf, 2014); and Caitlin Rosenthal, *Accounting for Slavery: Masters and Management* (Cambridge: Harvard University Press, 2018).

⁴ Jack Kloppenburg, *First the Seed: The Political Economy of Plant Biotechnology, 1492-2000* (New York: Cambridge University Press, 1988); Cronon, *Ibid.*; Alan Olmstead and Paul Rhode, *Creating Abundance: Biological Innovation and American Agricultural Development* (New York: Cambridge University Press, 2008); Courtney Fullilove, *The Profit of the Earth: The Global Seeds of American Agriculture* (Chicago: University of Chicago Press, 2017).

⁵ Cronon, 207-262.

Herds productively shifts the focus from slaughter to breeding. For the most part, *Herds* confirms the importance of the technical revolutions in meat production and transportation, though it focuses, understandably, more on the ways that refrigerated water freight reshaped imperial meat circuits than on changes wrought by refrigerated rail cars. Regardless, *Herds* turns the attention to reproduction, a choice that has profound implications for the vital categories organizing the life horizons of different animals. For Cronon, capital devised slaughter and processing infrastructures that treated most animals within species as indistinguishable. All pigs died the same—Tamworth and Poland-Chinas alike—and the same could be said for cows and sheep. And, yet, this approach tends to confirm the logic of capital that it would critique. By contrast, *Herds* asks readers to consider “what happens if we look beyond species to the level of the *breed* In the nineteenth century, to colonial producers as much as to British consumers, a sheep was not merely a sheep, nor was a cow or a bull merely that that. Different types, crafted over time in response to particular ecological contexts and economic circumstances, evoked different responses on the market, and produced different effects in various colonial places” (10-11). Rather than presuming that “the making of meat as a commodity begins at the slaughterhouse gates,” Woods argues that the “the process of commodification . . . begins with reproductive control” (14).

The book does privilege the intellectual heuristics that contributed to reproductive control over a more materialist account of changing breeding regimes. The book explains in vivid and persuasive detail *why* breeders paired animals as they did, but it gives less attention to the material logistics of breeding—the sticky, visceral *how*. When it does touch on that topic the results are fascinating and provocative. Take, for example, the book’s treatment of the “badge” of the Hereford, “its signature white face and red coat,” and the relative popularity of the breed among North American cattlemen (154). Throughout North America, most cattle ranges remained unfenced until the late nineteenth century. Under those conditions, *Herds* argues, the Hereford’s “white face” acted as a guarantor of paternity, and, thus, of reproductive control, that competing breeds did not offer. This strikes me as a persuasive and fascinating claim, but it underscores a broader point that might easily get lost: the regimentation and “shrinking” of space associated with the more efficient slaughter and transportation of meat animals also created possibilities for reproductive control. Confined animals were not just easier to fatten, finish, and slaughter; they were also easier to select and breed.

Regardless, *Herds*’ focus on reproduction disturbs the centrality of a labor theory of value to the nineteenth century meat economy and, instead, requires its readers to grapple with the aesthetic, affective, and speculative valences of breeding. Animals in the bio-economy *Herds* describes retained value, in part, because they reproduced affective relations and structures of identification that organized differences of species, within species, and across species. On the one hand, animals were objects whose unique and idiosyncratic aesthetic characteristics enhanced value. In mature systems of intensive livestock breeding, farmers tended to breed only the physiologically outstanding exemplars of their animal populations, while the

overwhelming majority of “normal” (in the descriptive sense) animals would never reproduce. Breeding animals tended to impress their unique desirability upon breeders—consider, for example, Arthur Young being seduced by the “extreme beauty” of the merino (52). Breeders, in turn, framed their parings as a kind of “elevated art” (60). Part of what made it an art was surely its speculative character: the ways in which breeders saw themselves as balancing, matching, and mixing the bodies, heredity, and environments of their stock to create animals capable of reproducing aesthetically refined and economically useful offspring. These artful parings, though grounded in experience and practice, always exceeded a purely technical account of improvement and, instead, hinged on intangible aesthetic judgements.

But we see here precisely where the aesthetic judgment of breeders capsized into *attachment to* and *identification with* animals. And so, on the other hand, breeding animals also reversed the arrow of judgment: in judging, the animal husband found himself potentially the forfeit. That is, breeders judged their animals to artfully appraise which should be bred, but they were also invariably ranked by their judgments. Judgments scaled. Artful breeders produced artful stock, and civilizations, colonies, and communities could be ranked by the quality of their stock and breeders. This is, ultimately, how we can understand the jousts around the problem of “native” breeds Woods uses as the primary thread of her narrative. British and settler identities mediated by livestock—identification more often intensified by settler colonialism than ameliorated by it—competed with the countervailing tendency to value objects against the universal rule of socially necessary labor-time. The point here is not that the former came to be eclipsed by capitalism, but, rather, that it emerged dialectically from within and as a critical component of it.

Another way of putting this is that capitalist production in imperial livestock breeding circuits (sometimes) *harnessed* and *multiplied* rather than merely *disciplined* and *confined* life’s “tendency to variability” (28). True, breeders pondered how to preserve the purity of their breeds and to produce livestock that “breed true.” But as Charles Darwin usefully maintained, “If organic beings had not possessed an inherent tendency to vary, man could have done nothing Although man does not cause variability, and cannot even prevent it, he can select, preserve, and accumulate the variations given to him by the hand of nature almost in any way which he chooses” (29). The logic of breeds was fundamentally grounded in commercially exploiting the inherent tendency of life to vary and to adapt to new environmental circumstances. Critically, this process of vital commodification long preceded the legal capacity to patent organisms. *Herds* usefully extends historian Daniel Kevles’s contention that the concept of breed “protected very well the collective intellectual property of the cartel of breeders represented by the breed association.”⁶ Indeed, one provocative

⁶ Daniel Kevles, “Innovation and Ownership in Living Products: Animals and Fruits in the United States, the 1870s to 1930” in *A Cultural History of Heredity IV: Heredity in the Century of the Gene*, eds. Staffan Müller-Wille, Hans-Jörg Rheinberger and John Dupré (Berlin: Max Planck Institute for the History of Science, 2008): 54.

comparison I extrapolate from the book is between nineteenth century British breeding cultures and post-Fordist, economy of scope “branding” (think of two pairs of shoes identical in all ways except that one features the Nike Swoop). *Herds* persuasively demonstrates that a breed’s value was defined by both how animal’s body might be used as a factor of production *and* by the maelstrom of identifications that traversed both breed and animal. Although breeders might have rejected the suggestion, some portion of the debates about the quality and use of the different breeds surely resolve to the nineteenth century equivalent of marketing and brand development. These and other insights mean that *Herds Shot Round the World* is a rich text for historians seeking new genealogies of the signature facets of contemporary biocapitalism. *Herds* sits at the vanguard of a fascinating emergent literature on the meat economy that correctly registers the importance of this vast, but relatively understudied form of biocapitalist enterprise.

Comments by Emily Pawley, Dickinson College

Following White Faces

This morning in Massachusetts, I met two animals descended from Woods's herds: Hereford calves, marked out by the white faces and red bodies that are echoed globally on millions of breathing animals. If you've eaten beef, you've ingested these calves' close relatives--they are among the most successful and broadly-distributed of the global beef breeds, an integral component of modern industrial agriculture and thus of global environmental change. Methane from their digestive tracts has changed our climate and will change it more; the pasture and corn fields earmarked for them occupy whole districts. These particular calves however, were not icons of modernity destined for the feedlot—they nibbled grass in a living history museum as “heritage breeds”—artifacts of the 1830s, like dash churns or horse-drawn plows. Higher on the hill, much rarer cattle, six Devons and a Shorthorn, rested in the sun. All these animals are vestiges of the great outward explosion of British breeds that Woods masterfully traces in *The Herds Shot Around the World*, which left permanent traces both on modern agriculture and on public memory of the agricultural past.

Woods's book is at once ambitious and complex, cleanly-argued and economical. In it she traces the emergence of the “native” breeds of Britain in the elaborate regional food system of eighteenth-century Britain. Woods then follows their spread, rise to dominance, and reconfiguration in the “Greater Britain” of the colonies and the United States, up until their decline in the early 20th. In telling this story, Woods's work makes crucial interventions in the histories of science, technology and the environment. As she demonstrates, following breeds rather than species allows us to rearticulate Alfred Crosby's “Neo Europes,” uncovering whole new layers of negotiation and intent, new flows, and new crucial actors and chronologies beneath the broad movement of cattle, sheep and pigs, revealing strategic lines of commerce and empire that continued to reshape animals and landscapes long after the first explosions of feral cattle and horse populations.⁷

Even as she champions breed-level history, Woods interrogates the meaning both of “breed” and “native.” Here she is deeply versed in the literature connecting improved breeds to the emergence of the idea of stable biological inheritance. To maintain the extraordinary price of breeding animals, authors such as Margaret Derry and Harriet Ritvo have shown, breeders had to champion the idea that a “template” came embedded in them, a commodity that could be passed to their offspring across widely varying climates and environments.⁸ This sense of breed stability clearly influenced

⁷ Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*, (Cambridge: Cambridge University Press, 2004 (Orig, 1986)).

⁸ Margaret E. Derry, *Bred for Perfection: Shorthorn Cattle, Collies, and Arabian Horses since 1800* (Baltimore, JHU Press, 2003); Harriet Ritvo “Possessing Mother Nature: Genetic Capital in the Eighteenth Century” in John Brewer and Susan Staves eds. *Early Modern Conceptions of Property* (New

changing ideas of embodied race. Following some of these same markets, Woods extends this argument and alters it, showing the continued interplay between theories of place-based and hereditary bodily change as new “creolized” breeds like the Corriedale appeared in places like New Zealand. She shows us how the definition of “breed,” far from stabilizing at the end of the eighteenth century, regularly shifted and split to match contesting imperial and commercial imperatives. She further demonstrates how changing meanings of the word “native” allowed British breeders and colonists to act out ideas about authenticity and creolization, to legitimize white settlement and to justify hierarchies between colonial and metropolitan whites. In doing so she shows how firmly cultural categories both shaped physical realities and became a symbolic resource for cultural work.

Following specific breeds is a valuable narrative technique, allowing Woods to stitch questions of breed definition to environmental, technological, and political developments. For example, the Herefords, the ancestors of my white-faced Massachusetts museum calves, never quite fit into the precise definition of breed framed around the first famous cattle breed, the Durham Shorthorn, to which they perpetually played catch up—they were never quite aristocratic enough, their roots were not recorded early enough. Their white faces, standardized in an effort to match the Durhams’ uniform red and white, helped make them saleable bloodstock, but this very public artificial shift threw their status as a true breed into question. It is these humble origins, however, this same irregularity and genetic looseness, Woods argues, that made it possible for the Herefords to thrive in the forms of extensive agriculture that characterized the sometimes arid, expansive grazing lands of the British and American empires. The breed’s popularity, leading to demand for bulls, blurred its standardization further. If the integrity of breeds requires the slaughter of scrub bulls, the undiscerning export of bulls threatens it. However, as the shakily-controlled Hereford expanded, the “lordly Durham,” more precisely defined, better engineered for the close stalls and high feeding of London butchers, declined—its Shorthorn descendant at the museum in Massachusetts is the only one I have ever seen. Woods’ choice of story valuably counters descriptions of capitalist science that confuse precision and stability of category with efficacy and value.

Woods’s final chapter takes us back to the Hereford as a constructed historical artifact, examining the invention of the “Traditional Hereford.” By the late nineteenth century, British breeders, having succeeded spectacularly at spreading Herefords across the globe, found that they had lost control of their template. Foreign herds were so large that British herds no longer had pride of place—indeed, Hereford blood was, like colonial whites, “returning” to Britain. Woods shows us how attempts to “preserve” the “Traditional Hereford” breed redefined it to exclude those animals and, implicitly, those people whose ancestors had left Britain not so long before. A

breed famous for its global spread rejected the offspring of that spread, turning to extreme localism for its legitimacy.

Part of Woods's clarity and force derives from her resolution to focus on British imperial story and to center it on the empire's center. As is probably clear, I am wholly convinced of the global significance of this story, and agree that telling the story from this standpoint reveals fundamental structures of animal history that would otherwise remain invisible. However, in this discussion, I would love to hear Woods reflect on how her story might intersect with other, differently centered stories. A recent historiographical current has shown how profoundly European and settler colonial landscapes were shaped by appropriated animals and plants from the Americas, China, Central Asia, and West Africa, creating, not Neo-Europes but what Russell Menard has called a "Mestizo Agriculture."⁹ If the spread of Herefords depended, as Woods shows us, on the ice that let metropolitan desires stretch to imperial grassland, it would depend too on corn, ground into provender, and used in feedlots and stockyards to fatten scrawny range-fed cattle. Corn's global spread has been carefully traced in the English-language history literature. Soy, its East Asian companion crop, is catching up.¹⁰ How might placing cattle in colonial landscapes emerging from many origins give us a different sense of how different breeds, and different meat-eating geographies have spread? How has the movement of new colonial plants into Britain itself changed the realities of place for British breeds?

Woods's astonishingly clear and disciplined narrative arc will provide valuable insights for a great range of historians, from animal historians and historians of race and bodily change to economic historians looking to trace the rise of agricultural capitalism. For me, working in North America, and looking at my cattle artifacts, it strikes me that Woods's careful stories of cattle and sheep in Britain and New Zealand should help us think through the related (but far from identical) symbolic work that is being done by the preservation of British breeds in North America. The decline of many British breeds at the end of the nineteenth century, occurring in parallel with a long rise in American rural nostalgia, converted them into artifacts of an American past, a relationship that has been recently solidified by a slow food movement hunting for past, authentic, and, ironically, "local" foodways—Berkshire pigs became ubiquitous in Farm-to-Table restaurants for a while, and even in McDonald's, Angus cattle have become markers of American quality. Woods' careful work should encourage those of us who live on colonized land of "greater Britain" to think about

⁹ Russell R. Menard, "Colonial America's Mestizo Agriculture" *The Economy of Early America: Historical Perspectives and New Directions*, ed. Cathy Matson (University Park: Pennsylvania State University, 2006): 107-23; Judith Ann Carney, *Black Rice: The African Origins of Rice Cultivation in the Americas* (Cambridge, Mass.: Harvard University Press, 2009); Stephen B. Brush, "The demise of 'common heritage' and protection for traditional agricultural knowledge," *Biodiversity and the Law: Intellectual Property, Biotechnology and Traditional Knowledge*, ed. Charles R. McManis, (London: Earthscan, 2007).

¹⁰ Arturo Warman *Corn and Capitalism: How a Botanical Bastard Grew to Global Dominance* (Chapel Hill, N.C.: Univ of North Carolina Press, 2003); Christine M. DuBois, *The Story of Soy* (London: Reaktion Books, 2018).

what “heritage” we claim when we preserve so many creatures whose names end in -shire, -ford, and -cester.

Comments by Abraham Gibson, University of Texas at San Antonio

Breeding Nativism in the British Empire

Like any fair-minded reviewer, I must concede from the start that Rebecca J.H. Woods's first book, *The Herds Shot Round the World*, has one of the greatest titles of all time. In terms of sheer cleverness, it may even surpass Robert Kohler's classic history of *Drosophila* genetics, *Lords of the Fly*.¹¹ Prospective readers who venture beyond the front cover will be happy to learn that the rest of the book is also great. Woods offers an entertaining and enlightening history of livestock breeds in the British Empire during the nineteenth century, while also raising serious questions about culture, commerce, and ecology that apply equally well to contemporary society.

While most historians are content to discuss animals at the species level, Woods trains her focus at "the level of the breed" (p. 10). She is not the first scholar to examine the construction of varieties, types, and breeds (names like Harriet Ritvo, Margaret Derry, and Joshua Specht appear throughout her notes), yet few have written about the topic with such clarity. Woods notes that clashes between empire and culture were typically most acute among breeds, and that breeds were necessarily more refined than their non-cultivated cousins, which allows historians to paint a more nuanced picture. She also explains how breed standards imposed artificial boundaries on a phenomenon that is naturally unbounded. "A breed is an inherently unstable thing," the author writes, adding that a breed's genome is "never entirely containable by the methods of selective breeders" (p. 28). In other words, life's innate dynamism will eventually and invariably foil breeders' attempts to concentrate specific phenotypic qualities indefinitely. This view, that breeds are at once natural and artificial, that they are both biological and cultural, accords well with the recent "hybrid" turn in environmental history.¹²

The book offers several new ways of thinking about the complicated nature of breeds. For example, the decision to cast domestic animals as "extremophiles" is downright inspired. While the label is usually reserved for microbes that live in unforgiving settings like hydrothermal vents and nuclear waste, Woods convincingly argues that large mammals, like the merino sheep who thrive in extreme environments, likewise qualify. There is a key difference, however. After all, merino sheep are extreme *cultivars*. I invite the author to expand on this idea. What prompted her to employ this term? Would she advise others studying the history of animals to adopt the term, or is specific to this case study? Also, were the ancestors of Merino sheep extremophiles, or were the Merino driven into their extreme niche by humans? Does it matter?

The book's treatment of "native" breeds in Britain and beyond is also significant. While contemporary observers considered Herefords "the first breed of stock in the island" (p.78), these cattle were not the progenitors of British bovines, an honor usually ascribed to the legendary Chillingham cattle (p. 93). Even so, these animals were one of the earliest British breeds, and were thus imbued with patriotic fervor. As Woods explains, "Britishness became

¹¹ Robert Kohler, *Lords of the Fly: Drosophila Genetics and the Experimental Life* (Chicago: University of Chicago Press, 1994).

¹² Paul S. Sutter, "World with Us: The State of American Environmental History," *Journal of American History* 100 (June 2013): 94-119.

instantiated in the flesh and forms” of these native breeds (p. 47). And yet the Herefords’ phenotypic variation undermined the breed’s claims to phylogenetic insularity, at least in the eyes of breeders who prioritized visual cues. As a result, breeders not only sought to homogenize the Hereford’s physical characteristics, but also promoted alternate measures of “purity,” including “rhetorical association with great antiquity, claims to aboriginality, nativeness, (and) indigeneity” (p. 81). Little surprise that agricultural nativism helped reify social and cultural nativism. As the author explains, “being ‘native’ intersected with ideas about nationhood and citizenship in ways that influenced what labels like British, Welsh, English, and Scottish meant” (p. 13).

Woods shows that many breeders imbued their animals with an extreme form of patriotism that drew explicit links between agriculture and national glory. It is noteworthy that Tiago Saraiva drew similar connections between agriculture and nationalism in his recent award-winning book, *Fascist Pigs*, but he was looking at breeding campaigns in fascist regimes during the early twentieth century.¹³ Woods shows that these connections date back at least a hundred years earlier, and that they manifested as clearly among capitalists as they did among fascists. I invite the author to elaborate. How do the agricultural origins of nationalism in the nineteenth century help us understand the unsettling resurgence of nationalism today?

On a related note, Woods joins a growing number of scholars who seek to contextualize human and nonhuman migrations. To date, most of their works have highlighted the subjective, culture-laden criteria for “invasive” species. Within this tradition, Peter Coates has examined American perceptions of invasive species, while Fred Pearce and Emma Marris have developed rich metaphors like “the new wild” and “rambunctious gardens,” respectively, to describe Earth’s increasingly reshuffled biota.¹⁴ By comparison, Woods shows that the “native” label is every bit as problematic as the “invasive” label, and that it is no less politically charged. She notes that definitions of native are highly contingent, with grave implications for the “specter of indigeneity, the criteria by which certain kinds are (or are not) deemed ‘native’ to a place” (p. 2).

The book also provides new ways of thinking about agricultural “improvement” campaigns throughout the British Empire in the nineteenth century. Defined as the “overall goal of rationalizing, and thereby increasing the productivity of, the agricultural sector” (p. 29), these improvement campaigns dramatically transformed British breeds. In response to market demand, breeders developed animals who grew exceedingly fat at increasingly earlier ages of their lives. These efforts sought to increase productivity (which they did), but they also transformed ecologies and economies at home and abroad. In many cases, technological innovations enabled agricultural innovations. For example, the development of steam and refrigeration technologies meant that breeders in Australia and New Zealand could reorient their efforts away from the unstable wool market and toward the booming meat market. Nevertheless, breeders in these far-flung places struggled to walk a fine line between improvements to breeds in colonial outposts and fidelity to breed standards (and consumer expectations) in metropole Britain.

¹³ Tiago Saraiva, *Fascist Pigs: Technoscientific Organisms and the History of Fascism* (Cambridge: MIT Press, 2016).

¹⁴ Peter Coates, *American Perceptions of Immigrant and Invasive Species: Strangers on the Land* (Berkeley: University of California Press, 2006); Emma Marris, *The Rambunctious Garden: Saving Nature in a Post-Wild World* (New York: Bloomsbury, 2011); Fred Pearce, *The New Wild: Why Invasive Species Will Be Nature’s Salvation* (London: Icon Books, 2015).

While others have written about improvement in both American and European contexts, Woods advances the dialogue by describing the paradoxes latent in these initiatives. Take the aforementioned Hereford cattle as an example. In pursuit of short-term profits, breeders in Britain exported “blooded” stock to breeders in North America, and thus sowed the seeds of their own replacement. “In their enthusiasm to profit from the demand for high-quality animals,” Woods writes, “breeders in Britain enabled their (quasi-)colonial competitors to establish their own high-quality reservoirs of the breed’s genetic potential” (p. 21). Subsequent disputes over standardization meant that herds in North America and Europe were reproductively isolated from one another for decades thereafter. But not forever. Recent genetic analyses have shown that Hereford bulls bred in the Americas were later re-imported to their British homeland, further obfuscating already fuzzy notions of breed, nativism, and improvement (p. 168).

Woods notes that animals will invariably evolve beyond the parameters of their breed unless they are treated with “anxious care” (p. 4). This observation reminds me of another popular buzzword in environmental history and STS: “maintenance.”¹⁵ This, in turn, prompts several questions for the author. Does the maintainers-vs-innovators debate translate to the world of nineteenth-century breeding? Is it fair to describe animal domestication as one long engineering project, or does that somehow mischaracterize the relationship between humans and nonhuman animals?

The Herds Shot Round the World more than earns its clever title. The narrative is well structured, the analysis is sophisticated, and the writing is often exquisite. Woods shows that ideas about breeding, nativism, and improvement were intricately interwoven, with attendant consequences for ecology, economy, and culture. She also sheds light on the development of the Rare Breeds Survival Trust in late-twentieth-century Britain (p. 166), though her temporal focus limits the amount of ink she can devote to the topic. In sum, Woods has written an excellent book that should prove of interest to historians of the environment, the British Empire, and the long nineteenth century.

¹⁵ Andrew Russell and Lee Vinsel. “Let’s Get Excited About Maintenance!” *New York Times*, July 22, 2017.

Response by Rebecca J. H. Woods, University of Toronto

On a crisp fall day more than ten years ago, I stood beside a fence at Plimoth Plantation near the coast of Massachusetts, surveying a flock of Arapawa Island goats that milled about a small enclosure. Signage indicated that these goats were genetic and phenotypic stand-ins for the long-extinct “Old English Milking Goat”—a “native” breed that went extinct in the early nineteenth century. This feral breed from Aoteroa/New Zealand, supposed to be the descendants of a breeding pair (or pairs) dropped there by Captain James Cook in the late eighteenth century, matched the description of goats carried to the coast of what is now New England by the first boatloads of religious dissenters from England some 350 years earlier.¹⁶ Circa 2008, they performed (probably unbeknownst to them) this lost type at a “living history” museum dedicated to foundational myths about the American republic amidst a set of temporal, national, and geographical dissonances—though, importantly, not imperial ones—that I found fascinating and perplexing. And so I set out to try to understand how it was that a feral breed from modern-day New Zealand could be made to belong to a paddock intended to represent the “original” American colonists centuries earlier. Though Plymouth Plantation’s Arapawa Island goats never made their way into *The Herds Shot Round the World*, the answers I devised—or rather, the methods I pursued in response to this original question—ultimately led me to the argument of the book: that the changing fortunes of British breeds since the eighteenth century hinged on the changing notion of what it meant for a type of sheep or cattle to belong to, or be native to, a particular place; and the British Empire during the nineteenth century was fertile ground for such reimaginings.

I tell this story here in part because since the publication of *Herds* I have been ruminating on methodologies in animal history, and in part because the issue of methodology cuts into the critiques raised by my extremely generous and extraordinarily patient readers, who have, in various ways and with various emphases, rearticulated and extended a range of arguments from within this book: on the relationship of reproduction to capital; breed to colony; native to newcomer; nature to artifice. In researching and writing the *Herds Shot Round the World*, my method, to put it bluntly, was to follow the sheep (and cattle) out in space and back in time from other early twenty-first-century sites of rare breeds preservation—settings perhaps not unlike the one Pawley describes in her review—to their point(s) of origin. I drew inspiration from Sarah Franklin’s 2007 *Dolly Mixtures*, and more generally from science studies methods emphasizing the circulation of things, people, and knowledge, as I sought to understand how the national identities forged in British breeds transformed under novel colonial cultural, environmental, and economic conditions.¹⁷ I found that the breeds of empire migrated far and wide, very occasionally of their own accord, but more often under the sign of imperial industrial-capitalistic expansion. Indeed, so far and wide did these animals migrate that the self-

¹⁶ William Bradford, *Of Plimoth Plantation, 1620-1647* (New York: Knopf, 1963).

¹⁷ Sarah Franklin, *Dolly Mixtures: The Remaking of Genealogy* (Durham, N.C.: Duke University Press, 2007).

congratulatory rhetoric of nineteenth-century breeders and observers proclaiming a near-global reach for British breeds of sheep and cattle quickly came to seem less exaggerated than I had initially supposed, and I soon found myself deciding where *not* to pursue their hoofprints through imperial-colonial places and archives—a set of decisions, as much as any others, that shaped the contours of the book and its arguments, in ways particularly relevant to Rosenberg, Pawley, and Gibson’s reviews.

Rosenberg has generously and compellingly drawn out an implicit discourse on biocapital from within the pages of *Herds*. I am grateful, in particular, for his insight into how technologies for and discourses surrounding space-time “annihilating” technologies (like refrigeration) were not only an opportunity for expedited slaughter, but facilitated techniques of reproductive control, tightening anthropogenic oversight of breeds and their constituent individuals even as notions of environment continued to influence understandings of type. Rosenberg notes that I privileged the “why” (which aims breeders pursued, and what justifications they offered for them, for example) over the “how” of nineteenth-century livestock breeding, and I concede that he is absolutely right about this. The bulk of records left about sheep and cattle in the nineteenth century speak more to the scope of an industry—numbers of “heads” of animals exported; monthly and yearly totals of sheep and cattle carcasses climbing to the thousands and millions of hundredweights imported, processed, and consumed—than they did to cultural considerations of breed and identity formation. The British and colonial agricultural press, however, were an exception to this. Here, elite contributors who were well-educated and, it is safe to assume even in the absence of known biographical information, economically comfortable if not downright wealthy, debated and discussed the finer points of livestock breeding: which types were most suited to particular places; the extent to which cross-breeding introduced varieties might mitigate the challenges of acclimatization without threatening already established types, and so forth. By tracing the discourse of breeds and breeding, especially as it concerned the question and status of “native” breeds, or native belonging, through these texts, the vision of nineteenth-century sheep and cattle breeds that I was able to reconstruct therefore refracted the practices of breeding through this lens of privilege. The kinds of tacit, embodied knowledge that enabled and constituted the labor itself tended to resist transposition into print, and so questions of how, precisely, animals were handled and fed (by whom, for example, or with what?) go largely unanswered in my book, and the work on the ground, in the paddock and pasture, largely unaddressed.

The British Empire constitutes the geopolitical scaffold for my analysis in *Herds*, and it offered a capacious network from within which to trace the circulation of animals and to interrogate shifting conceptualizations of breeds, breeding, and the notion of native belonging. Yet, as Emily Pawley notes, the colonies were “creole” in more ways than one, and she rightfully pushes me to consider how a shift in perspective would put British breeds into a much more mestizo context. Again, I find myself wholly in agreement with her critique: plants, especially fodder crops, flowed laterally between colonial places (as well as from centre to periphery and back), upending Alfred Crosby’s framework of European biotic diaspora even more completely than I have

been able to do justice to.¹⁸ The doubly single-minded focus I maintained in this work—first on the British Empire, and second on animals—led me past an opportunity to explore how colonial places and the organisms they fostered were formed out of multiply creole interactions. I can only hope that my oversights will inspire other scholars who follow the sheep to look more carefully into the feedbag. Pawley's own work, as well as recent scholarship from Anya Zilberstein and Maura Capps, are excellent guides in this direction.¹⁹

One of the exceptions to the tight focus on British animals in my book is, of course, the merino sheep, and Gibson homes in on this type in his response to *Herd*s. A signal tension within a domesticated form is the push and pull between “nature” and “artifice,” and in nineteenth-century breeding, this manifested in the particular way in which breeds were, and were understood to be, in constant flux. At once the product of “nature,” honed in response to their climatic and environmental conditions, breeds were also subject to the impress of human hands, shaped as well in the image of anthropogenic desiderata. Gibson pushes me to engage more directly with a view of breeds as engineered artifacts. Few nineteenth-century observers would have considered “engineered” an apt metaphor to describe their livestock, but certainly they marvelled at their own apparent ability to reformulate domesticated types. Merinos represented an extreme example of this: a type of sheep selected for thousands of years to answer human demand for wool production. To answer Gibson's question of how I came to an interpretation of them as “extreme *cultivars*” (his improved version of the term I relied on: extremophile), I'm indebted here to Libby Robin, whose own work has explored the environmental and cultural co-constitution of merinos and colonial identity in Australia, for the suggestion that they represent a type of domesticated extremophile.²⁰ Centuries if not millennia of Iberian transhumance reshaped merinos into organisms incapable of inhabiting the mild middle of Earth's topographical and climatic ranges.

Adjudicating the question of whether this, or other histories of human and animal domestication and breeding, represent the long tail of (bio)engineering hinges on whether or when a difference of degree in human ability to reshape other organisms represents a difference in *kind*, and this, I think, remains open to interpretation. The stakes, though, as Gibson notes, feel high: with nativism on the rise in our own political moment, might understanding its reification (he asks) in nineteenth-century breeds help us better understand, and ideally combat, it in its contemporary manifestations? This strikes me as an extraordinarily generous interpretation of the

¹⁸ Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*, new ed. (Cambridge: Cambridge University Press, 2004).

¹⁹ Emily Pawley, “Feeding Desire: Generative Environments, Meat Markets, and the Management of Sheep Intercourse in Great Britain, 1700-1750,” *Osiris* 33: 1 (2018): 47-62; Anya Zilberstein, “Bastard Breadfruit and other Cheap Provisions: Early Food Science for the Welfare of the Lower Orders,” *Early Science and Medicine* 21: 5 (2016): 492-508; Maura Capps, “Fleets of Fodder: The Ecological Orchestration of Agrarian Improvement in New South Wales and the Cape of Good Hope, 1780-1830,” *Journal of British Studies*, 56: 3 (2017): 532-556.

²⁰ Libby Robin, *How a Continent Created a Nation* (Sydney: University of New South Wales Press, 2007).

contemporary relevance of the arguments I made in *Herds*, but I am nonetheless pleased to think that my work may transcend in some way its context. Nativist discourses tend to take shape around convenient proxies, and in the nineteenth century, “native” breeds operated as one such set of proxies. In a way, they were able to do so precisely because of their hybridity: more than mere artifice, the “natural” qualities of sheep and cattle enabled and emboldened observers in Britain and the colonies to stake claim over native belonging. Ultimately, I agree with Peter Coates in thinking that we, as environmental historians, can contribute much to ongoing political and cultural debates by unpacking the cultural assumptions behind claims to “native” species.²¹

This roundtable has provided a welcome opportunity to rethink and refine some of the arguments I made within the pages of *The Herds Shot Round the World*, and to revisit and reflect upon the places, ideas, and insights to which the sheep and cattle I followed throughout the British Empire led me. I am deeply grateful to Melanie Kiechle for providing the venue to do so and for producing this roundtable, and to Gabriel Rosenberg, Emily Pawley, and Abraham Gibson for their provocative and generous commentary on my work.

²¹ Peter Coates, *American Perceptions of Immigrant and Invasive Species: Strangers on the Land* (Berkeley, University of California Press, 2006).

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