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Serve the People: Bovine Experiences in China's Civil War and Revolution, 1935-1961

A dissertation submitted in partial satisfaction of the requirements for the degree
Doctor of Philosophy

in

History

by

Peter Watson Braden

Committee in Charge:

Professor Karl Gerth, Chair
Professor Paul Pickowicz, Co-Chair
Professor Catherina Gere
Professor Richard Madsen
Professor Sarah Schneewind

2020

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Co-chair

Chair

University of California San Diego

2020

DEDICATION

With love and gratitude, I dedicate this dissertation to my mother and brother,
Elaine Wallace and Sam Braden.

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ABSTRACT OF THE DISSERTATION

Serve the People: Bovine Experiences in China's Civil War and Revolution, 1935-1961

by

Peter Watson Braden

Doctor of Philosophy in History

University of California, San Diego 2020

Professor Karl Gerth, Chair

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Sentient animals, both human and nonhuman, experienced increasing demands from the Nationalist and Communist governments of China during the mid-twentieth century. A multispecies environmental history of this period demonstrates the intermingled agency of humans, bovines, and microbes. Cattle, water buffalo, and yaks were not merely passive property or inert observers, but active, sensitive, participants in war and revolution. Reading documents written by people who interacted with bovines in conjunction with current veterinary literature on bovine physiology and behavior, I

demonstrate how these animals experienced war, economic transformation, and technological innovation. Moreover, I show how human and bovine subjectivity varied with the animals' sex, breed, location, and ownership status.

Each chapter explores changes in bovine experience by focusing on a bodily fluid that represents some aspect of the animal's life. The chapter on milk explores how the growth of a nationwide dairy industry strained relations between calves and cows, while the chapter on blood shows how cattle experienced the transition to urbanized, industrial slaughter. By showing how bovines experienced tightening state control over their social bonds, diets, medical care, workload, sexuality, and death, I challenge conventional human-centered histories of science, gender, labor, and imperialism in modern China.

Introduction: A People's Republic?

The Argument

Rallying his compatriots during the turbulent year of 1943, Generalissimo Chiang Kai-shek declared that without his Nationalist Party [KMT, or Kuomintang] there could be no War of Resistance against Japan (1937-1945).¹ Not to be outdone, Chiang's rivals soon retorted, "Without the Communist Party, there would be no China."² And in 1950, shortly after the founding of the People's Republic, a triumphant Chairman Mao Zedong changed the line to "Without the Communist Party, there would be no New China."³ All three statements are valid if we replace either Party with "cattle." This dissertation is a multispecies history of modern China. It addresses not only the contributions and experiences of humans, but also of cattle, water buffalo, and yaks, known collectively as bovines.

Bovines "served the people" in two distinct and related ways. During the middle of the twentieth century, the Nationalist and Communist governments imposed increasing demands on sentient animals, both human and nonhuman. Bovines and their human

¹ Chiang Kai-shek, *China's Destiny & Chinese Economic Theory*, with notes and commentary by Philip Jaffe, New York: Roy Publishers, 1947 [First publication Chongqing, May 1943], p. 140. [Accessed May 28, 2019 at <https://archive.org/details/chinasdestinyand009043mbp/page/n143>].

² No author. 毛澤東改詞，這首歌傳唱七十多年經久不衰 ["Mao Zedong changed the lyrics, and this timeless song has been passed down for seventy years" in 上觀新聞 Shanghai Observer, [Accessed September 29, 2019 at <https://www.jfdaily.com/news/detail?id=179290>] Contains image of editorial 沒有共產黨就沒有中國["Without the Communist Party, There Would Be No China"] 解放日報 *Liberation Daily*, August 25, 1943.

³ Ibid.

counterparts were made to serve the idealized national community called “China” by contributing to total war and economic revolution. In a broader sense, the animals also found themselves in a hierarchy of species that subordinated the labor, bodies, and interests of nonhuman life forms to the needs of humanity, or *Homo sapiens*. The relationships among humans, bovines, and the microbes inside them were flexible and complex. One species sometimes benefitted at the expense of another, yet cooperation and co-existence also existed. Whether their bonds were exploitative or supportive, the welfare of humans and bovines were always interdependent.

This study is the first attempt to show how intelligent nonhumans experienced their service to the Chinese nation, and to *Homo sapiens* more generally, during this tumultuous period. Bovines, of course, worked without understanding that their bodies and labor were strengthening the country and its leaders by providing resources to build industrial capacity and bolster the national defense. Yet they made undeniable contributions of physical and mental effort. These animals were not merely passive property or inert observers, but active, sensitive, participants in war and revolution. Changing conditions of work, rest, medical treatment, reproduction, and slaughter affected the inner lives of tens of millions of intelligent, social bovines.

In *Animal Farm*, George Orwell’s “fairy story” about a barnyard revolution gone wrong, a venerable boar named Old Major succinctly portrays the hierarchical relationship between subservient animals and selfish humans, proclaiming “Man serves the interests of no creature except himself.”⁴ Chinese cattle of the mid-twentieth century

⁴ George Orwell, *Animal Farm: A Fairy Story*, New York: Penguin (Plume), First Plume Printing, 2003 [1946], p. 8.

might have found much merit in this claim. Government officials, livestock specialists, and farmers imposed increasing demands on the bodies and labor of bovines. To defend and then rebuild their battle-damaged nation, both the Nationalist and Communist states needed strong, obedient, high-yielding bovines, and plenty of them. Cattle, water buffalo, and yaks experienced this intensifying pressure in the form of longer working hours, novel diets, and reproductive manipulation. While these changes often had detrimental consequences for bovine welfare, the same process of intensifying state control also yielded much-needed vaccination, hygienic pens and stables, and well-intended if ineffective bans on slaughtering draft animals. In all cases, the physical and mental welfare of the bovines took second place to the goal of producing animals who could better serve human needs.

“Whatever goes upon two legs is an enemy. Whatever goes upon four legs, or has wings, is a friend.”⁵ Inciting his fellow creatures to rebel against their human overlords, Old Major depicts a clear binary between *Homo sapiens* and all other animals. He dissolves categories such as class and gender, calling for solidarity among oppressed beasts “of every land and clime.” For all its rhetorical power, however, Old Major’s synopsis of human-animal relations overlooks a great deal of context and contingency. A bovine’s sex, location, breed, and relationships to specific humans determined his or her experiences. Female dairy cows, for instance, had to endure separation from their calves, who were often destroyed. A draft ox’s workload depended largely on his economic and emotional value to his human counterparts, who might be merciless taskmasters or doting

⁵ George Orwell, *Animal Farm: A Fairy Story*, New York: Penguin (Plume), First Plume Printing, 2003 [1946], p. 8.

caretakers. In areas with livestock insurance, some farmers maimed or overworked their cattle to get a quick payout, while others used the program to obtain affordable veterinary care. Most significantly, the many hundreds of thousands of bovine deaths during the Great Leap famine (1959-1961) did not evenly befall every location or breed. Dairy cattle populations, for example, increased in some regions even as draft animals starved and froze to death. Human-bovine relations in China cannot be reduced to a tale of exploitation and opposition. Old Major's summation of interspecies relationships is seductive, but simplistic.

A history of human-bovine relations must not shy from depicting animals as sentient beings who could suffer inhumane treatment, but neither can it ignore humans' real and sustained exertions on behalf of the animals. The historian Erica Fudge has noted that farm animals in seventeenth-century England "were not only weighed, appraised, counted; they were cared for, stroked, killed, spoken to, and some were even named. They were treated well and treated badly."⁶ In short, relations between humans and farm animals were nuanced, complex, and particular. This held true for the long-suffering creatures in Orwell's parable, as well as for the bovines of early modern England and twentieth-century China.

Why Write Multispecies History?

⁶ Erica Fudge, *Quick Cattle and Dying Wishes: People and Their Animals in Early Modern England*, Cornell University Press, 2018 p. xiii [<https://www.jstor.org/stable/10.7591/j.ctt21h4x22>]

What insights can we gain from a multispecies history? This unorthodox approach yields four important benefits. Three of these are historiographical, relating to the art of constructing historical narratives, while the fourth benefit pertains to the underlying events that historians study. First, a multispecies history gives us a new viewpoint on human events such as war and revolution. As “the subaltern’s subaltern,” animals give unfamiliar and sometimes startling perspectives on the regimes of work, economic value, sexuality, and medical care that enmesh both humans and nonhumans.⁷ Understanding how these systems affected intelligent animals can help historians see human experiences in a new light. Secondly, nonhumans challenge historians to re-examine commonplace assumptions about subjectivity and agency, and the related questions of “who matters?” and “who acts?” Thirdly, multispecies histories encourage scholars to re-examine the familiar and apparently natural boundaries within which we construct narratives. They remind us of the priorities and power structures inherent in long-cherished, apparently absolute and objective units for measuring and studying our world. Finally, multispecies accounts of the past show how uncritically we use the misleading term “human history.” Trying to understand twentieth-century China without accounting for bovines or bacteria is like studying the Iditarod Trail Sled Dog Race while ignoring huskies. Trailing behind each racer are the intermingled imprints of dog paws and sled rails. The labor, intelligence, and determination of both humans and sled dogs should be as evident in historical accounts as they are in the snowy path of the race. Let us now consider in depth each of the four benefits of multispecies history.

⁷ David Gary Shaw, “The Torturer’s Horse: Agency and Animals in History,” *History and Theory*, Theme Issue 52 (December 2013), p.147.

First, **multispecies history, like the histories of social groups rendered silent or invisible in established narratives, encourages us to re-examine narratives based on comfortable assumptions.** Scholars of gender, ethnicity, and disability have shifted our understanding of historical trends and events by challenging us to adopt the viewpoints of marginalized, despised, or under-examined groups of humans. Seeing the wagon trains of the late nineteenth century from the perspective of displaced Native Americans rather than Euro-American settlers transforms “Manifest Destiny” from a tale of glorious conquest into a record of vibrant societies laid to waste. The historian Prasenjit Duara has called for “bifurcated histories” to address heterodox ideas and groups of people who do not often appear in triumphantly essentialist national sagas.⁸ Multispecies historians can provide a “trifurcated history” that is attentive to orthodox narratives and dissenting voices, and to the nonhuman beings who live and die in between. The anthropocentric perspective on cattle husbandry after 1949 emphasizes that expanding rail networks, refrigeration capacity, and industrial slaughterhouses allowed more domestic consumers to enjoy nutritious beef, while exports earned precious foreign currency for the nation. Yet these technological developments also exposed hundreds of thousands of intelligent animals to harrowing journeys from grassland or village to urban abattoir. Omitting bovine experiences from this history yields a biased account that obscures how human violence affected other kinds of animals.

Even when humans direct their violence at other people, nonhumans are also affected. The historian William M. Tsutsui has noted that the Pacific War [1941-1945]

⁸ Prasenjit Duara, *Rescuing History from the Nation: Questioning Narratives of Modern China*, Chicago: University of Chicago Press, 1995.

was “tremendously and tragically destructive for one species, *Homo sapiens*.” Yet he notes that warfare had “far more ambiguous” effects for other species.⁹ For much aquatic life, the Pacific War was a respite from human exploitation. Because combatants pressed most fishing and whaling vessels and their crews into military service, the declining fish populations of the western Pacific recovered during the war.¹⁰ To be sure, desperate Japanese citizens hunted songbirds virtually to extinction, devastated forests in pursuit of fuel and construction material, and slaughtered the animals of the Tokyo Zoo during the same period.¹¹ But Tsutsui concludes that the war had a “beneficial environmental impact, at least in the short term, when it came to fisheries resources.”¹² The author’s insightful argument is constrained by his instrumental approach to nonhuman life, apparent in the term “fisheries resources.” Although there is scientific evidence that fish have “numerical competency...social cognition...[and] emotional respons[es] to pain,” their welfare and experiences are absent from his account.¹³

Treating bovines not simply as “resources” but as sentient beings reveals how warfare affects not just the size of animal populations, but also their quality of life. Before 1949, for instance, civil war and the Japanese occupation of China impeded the efforts of government-backed veterinarians to eradicate the deadly rinderpest virus, also

⁹ William M. Tsutsui, “Landscapes in the Dark Valley: Toward an Environmental History of Wartime Japan,” in Richard P. Tucker and Edmund Russell, eds. *Natural Enemy, Natural Ally: Toward an Environmental History of Warfare*, Corvallis, Oregon: Oregon University Press, 2004, p.200.

¹⁰ Tsutsui, “Landscapes,” p.206.

¹¹ Ian Jared Miller, *The Nature of the Beasts: Empire and Exhibition at the Tokyo Imperial Zoo*, University of California Press, 2013.

¹² Tsutsui, “Landscapes,” p. 207.

¹³ Catarina Vila Pouca and Culum Brown, “Contemporary topics in fish cognition and behavior,” *Current Opinion in Behavioral Sciences*, 16: 46-52 (2017) [Accessed May 29, 2019 at <https://sci-hub.se/10.1016/j.cobeha.2017.03.002#>] Sci-Hub is a free, peer-to-peer network based on scholars’ desire for an open exchange of knowledge, in sharp contrast to the shameless gouging of subscription services like Elsevier.

called cattle plague. An instrumental account would emphasize that many unvaccinated draft animals pointlessly died, to the detriment of human welfare. While acknowledging the instrumental value of bovines, this dissertation uses veterinary literature and contemporary accounts of cattle mortality to show how these animals experienced the cattle plague, complete with necrotic lesions, emaciation, and explosive diarrhea. By interpreting observational data about sick cattle, I emphasize that by obstructing vaccination, warfare caused cattle to die -- but first, to suffer. Moreover, when sustained domestic peace, international cooperation, and social mobilization helped eradicate rinderpest nationwide in the 1950s, this was not simply a boon for farmers, or for a state keen to develop its “bovine resources.” It was also a public health success for millions of sentient animals.

The second major benefit of multispecies history is that it suggests new ways to think about subjectivity and agency. In his case study of the Duke of Wellington and his horse, Copenhagen, at the Battle of Waterloo, the historian David Gary Shaw finds the standard understanding of agency inadequate. Defining an agent or actor as “minimally someone without whom things, especially a particular doing, might have been significantly different,” he notes that “robust, ‘classic’ agency requires intentional... rational action.” But this narrow understanding of agency excludes much meaningful activity by humans acting from habit, or by animals such as Copenhagen, who acted under human direction and yet shaped the outcome of the battle more than many two-legged warriors. Shaw instead calls for “abandon[ing] notions of agency that start with or

assume the specialness of reason, of the individual, of the human.”¹⁴ He proposes instead that “agency is a continuum, not limited to the complex and intentional acts of a rational man.”¹⁵ Similarly, in the actor-network-theory of the philosopher Bruno Latour, “*any thing* that does modify a state of affairs by making a difference is an actor.”¹⁶ Most importantly for this study, Shaw suggests that historians treat Wellington and Copenhagen as a “unity...a temporary but socially significant fusion of sensible things.”¹⁷ This capacious interpretation of agency encourages historians to recognize the contributions of nonhuman animals to events as major as battles, and as minor as the plowing of a field.

This dissertation builds upon Shaw’s reasoning by arguing not only that animals act, but that their discernible behaviors reflect their responses to their experiences. Bovines tremble with exhaustion, bellow in distress, and chuff in contentment. Furthermore, I suggest that viruses and bacteria also exhibit a form of agency by advancing their own interests and compelling humans to respond accordingly. While microbes are not “sensible things,” they do exist in a “temporary but socially significant fusion” with humans and animals. Microbes can cause disease or grant immunity, spoil food or facilitate digestion. Contemplating microbial agency not only yields a more accurate understanding of human activity, but also helps to make nonhuman agency seem more plausible. After confronting and recognizing the agency of these ubiquitous,

¹⁴ David Gary Shaw, “The Torturer’s Horse: Agency and Animals in History,” *History and Theory*, Theme Issue 52 (December 2013), p. 148-151.

¹⁵ Shaw, “The Torturer’s Horse,” p. 146.

¹⁶ Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory*, New York: Oxford University Press, 2005, p.71. [Accessed at <https://www.fulcrum.org/concern/monographs/rv042t698>].

¹⁷ Shaw “The Torturer’s Horse,” 161.

influential, yet mindless organisms, historians may be more willing to accept the agency of more obviously intelligent and social beings such as bovines.

Thirdly, animals show that the tidy geographic, social, and temporal boundaries within which we write and understand history are ultimately human constructions, rather than absolute or natural divisions. For a yak, the much-contested political distinctions between China and Tibet had less relevance than the transition from snowy mountain to verdant valley. Herds and flocks, like epidemics, forests, and clouds, are scarcely constrained by the lines on maps. Animals also help historians to dissolve temporal demarcations. From a yak's point of view, the day in the springtime of 1953 when it received the rinderpest vaccination was more life-changing than the founding of the People's Republic of China (PRC) in 1949 or the "peaceful liberation" of Tibet in 1959. I do not suggest that animals mark time in the human fashion, or that our political struggles do not affect them. On the contrary, the affairs of human and non-human subjects are inextricably linked. But animal experiences offer a useful corrective to our casual, anthropocentric sense that "everything changed" with some watershed historical event. When it comes to making a substantial difference in the lives of intelligent beings, the real action often happens far from the conventional foci, such as the fall of dynasties, the founding of nations, or the signing of laws. National borders, social classes, and political dynasties offer convenient and often illuminating units for structuring complex arguments about the past. But they are by no means universally decisive, or even relevant. Each species of animal, for instance, might divide territory by the availability of its preferred food, or mild weather, or the number of predators. Likewise, animal understandings of time might be based not on imperial reigns

but on cycles of reproduction or migration. Such demarcations are reasonable and significant, yet they overlap at best uneasily with manmade boundaries.

Finally, animals not only allow scholars a new perspective on the narratives we call “history.” They also play an indispensable role in the actual events that we analyze. One scholar has observed, “All history is animal history, in a sense--that is, history written by, for, and about animals. The only question is which.”¹⁸ But historians need not focus on one species to the exclusion of others. In fact, the interwoven stories of humans and bovines in mid-century China offer insights onto each other. These species lived in symbiosis, or “any intimate association of two or more different organisms.”¹⁹ They interacted in an energy economy based on sunlight stored in plant matter. Often, their relationship benefitted both parties: veterinarians protected bovines from the ravages of cattle plague, while agroecologists improved the availability and nutritional content of pasture grasses. Each holding up their end of the plow, united in toil, human and bovine farmers could plant more crops and collect more solar energy than either species could in isolation. Nineteenth-century America, according to one historian, was “more than a society that used horses; it became a society of horses and humans living and working together.”²⁰ Just as it is “impossible to understand the industrial transformation of

¹⁸ Etienne Benson, “Animal Writes: Historiography, Disciplinarity, and the Animal Trace,” in *Making Animal Meaning*, Linda Kalof and Georgina M. Montgomery, eds. East Lansing: Michigan State University Press, 2011.

¹⁹ “Symbiosis,” Oxford English Dictionary [Accessed May 26, 2019 at <https://www.oed.com/view/Entry/196194?redirectedFrom=symbiote#eid19327200>].

²⁰ Ann Norton Greene, *Horses at Work: Harnessing Power in Industrial America*, Cambridge, Mass.: Harvard University Press, 2008, p.7.

American society” without taking account of horses, it is equally necessary to incorporate bovines into China’s agricultural, technological, and social histories.²¹

Bovines and humans were not the only historically significant symbiotes. Potent yet invisible microbes, both bacteria and viruses, drove many developments during this period. Bacterial spoilage due to a dearth of refrigeration capacity in prewar China, for example, hindered the development of a national dairy industry, and frustrated the efforts of veterinarians to bring perishable rinderpest vaccines from urban laboratories into remote villages. Livestock insurance therefore arose as a financial solution to the problem of ubiquitous and incurable bovine pathogens. Additionally, both the Nationalist and Communist Parties profoundly modified the ecology of the country’s peripheral grasslands, replacing less-nutritious native grasses with forage crops from around the world. As bovines are ruminants who digest plant matter with assistance from billions of bacteria, fungi, and protists, the introduction of new and improved fodders was intended to nourish cattle by way of their gut biota. Finally, establishment of industrial slaughterhouses, with their regimented killing floors and government inspectors, attempted to guarantee a disease-free supply of beef for domestic consumers and overseas buyers. These technological, financial, and medical innovations responded to the metabolism and reproduction of countless submicroscopic life forms. While some microbes such as the cattle plague and *E. coli* could be devastating to cattle and humans, the single-celled life forms in bovine digestive tracts allowed the ruminants (and in turn,

²¹ Greene, *Horses at Work*, p. 8.

their humans) to obtain energy from otherwise marginal plant tissues such as rice stalks and prairie grasses.

The wellbeing of humans, animals, and microbes are inextricably linked. Moreover, all parties constantly negotiate their relationships to each other as they strive to survive, grow, and reproduce. The Chinese civil war and revolution were pivotal moments in the shared history of bovines, microbes, and humans. This dissertation integrates multiple species of historical subjects whose lives can usefully be studied in combination. Some have roots, and others have flagellae; some walk on two legs, and others, on four.

Three Lenses for Writing Multispecies History

I employ three lenses for writing multispecies history. We can call the first and most straightforward the “instrumental lens.” This method treats animals as passive units, interesting only insofar as they contribute to human economic or cultural endeavors. Exemplars include the work of historians such as Jonathan Schlesinger on Qing fur trading and Micah Muscolino on the “fishing wars” on China’s coast.²² While it ignores their inner lives, this way of writing does put animals on the page. It is possible, after all, to read excellent works of village and agricultural history in which the nonhuman actors

²² Jonathan Schlesinger, *A World Trimmed with Fur: Wild Things, Pristine Places, and the Natural Fringes of Qing Rule*, Stanford University Press, 2017 and Micah S. Muscolino, *Fishing Wars and Environmental Change in Late Imperial and Modern China*, Cambridge: Harvard University Press, 2009. Chinese scholars also tend to discuss animals instrumentally, as in Chen Gang’s recent article “The Nationalist Government’s Control of the Hog Bristle Trade During the Anti-Japanese War,” in *Research on the Construction of Southwestern China and Development of the Frontiers during the Anti-Japanese War*, He Yimin, Ling Xingzhen, et al., eds., Chengdu: Sichuan University Press, 2016, pp. 220-237.

are practically invisible. To pick just a few examples, outstanding works on Chinese villages by Ralph Thaxton, Jr. and Huaiyin Li make virtually no mention of livestock.²³ An indispensable component of multispecies history, the instrumental lens is still fundamentally anthropocentric and therefore incomplete.

A second way to write multispecies history can be called the “observational lens.” This perspective takes into account the animals’ behaviors: their gaits, vocalizations, physical health, and social interactions. The historian Peter Sahlins has demonstrated the observational lens in his account of seventeenth-century French scholars’ detailed and thoughtful depictions of the movement, diet, and color-shifting of chameleons.²⁴ This lens is particularly amenable to studying domesticated animals, whose lives intersect constantly with literate human observers such as breeders, trainers, veterinarians, military officers, and itinerant merchants. The observational approach entails reading these humans’ notes and reflections on the behaviors of their animal partners. Analysis of such sources can reveal a great deal about animals’ responses to their working and living environments. A concern with animals’ behaviors and social interactions brings us closer to a history that treats them as agents and subjects.

The third method of writing multispecies history is the most radical. We can call it the “interpretive lens.” This perspective combines the observational lens with the veterinary science of cognitive ethology, or an informed estimation of the animal’s

²³ Ralph S. Thaxton, *Catastrophe and Contention in Rural China: Mao’s Great Leap Forward and the Origins of Righteous Resistance in Da Fo Village*, Cambridge University Press, 2008; Huaiyin Li, *Village China Under Socialism and Reform: A Micro-History 1948-2008*, Stanford University Press, 2010.

²⁴ Peter Sahlins, “A Tale of Three Chameleons: The Animal between Science and Literature in the Age of Louis XIV,” in Louisa Mackenzie, Stephanie Posthumus, eds. *French Thinking about Animals*, Michigan State University Press, 2015, pp. 15-30. [Accessed at <https://www.jstor.org/stable/10.14321/j.ctt13x0p3s.6>].

mental state based on physiological and behavioral data. The interpretive lens allows historians to make reasonable assertions about the inner lives of animals, and to try to empathize with these voiceless actors. Occasionally, the authors of our primary sources also speculate on the inner states of the animals. Some of Sahlins' *philosophes*, for instance, argued that chameleons had "spirit and judgement," and were capable of love.²⁵ Aware of the possibility of bias or misjudgment, historians should treat these interpretations as carefully and critically as we would any other source. We can supplement (or challenge) the direct observers' claims by drawing on the ever-growing literature of veterinary science and livestock management to make cautious inferences about the animals' mental experiences and emotions. Understanding the effects of human action on animals means becoming comfortable with parsimonious and cautious, albeit non-textual, accounts of their inner lives.

A single example can illustrate the respective possibilities and limits of these historical approaches. Imagine a cow being led to slaughter in Shanghai in 1955. The instrumental approach shows that the animal will yield two hundred kilograms of beef, at a unit price of five *yuan*. The observational approach focuses on the slaughterhouse veterinarian's report that the animal hobbled and groaned. The interpretive approach suggests, based on this evidence, that as the moment of its death drew near, the animal experienced pain and fear. This is not mere sentimental anthropomorphosis: rigorous studies show that cattle in these conditions, displaying these behaviors, show elevated

²⁵ Sahlins, "Tale," p.23.

levels of hormones associated with stress and anxiety.²⁶ Nor is this finding self-evident: not all methods of husbandry and slaughter entail fear and pain. A society's choice of methods therefore reveals something about its values, as well the experiences of its animals.

Humans grant moral or emotional standing only to a relative few of the animals upon whom we act. The workers at the Shanghai slaughterhouse did not intend to make the cow suffer. They focused on doing their jobs, while the facility's leaders wished to satisfy production quotas, and the national leadership strove for contented, well-fed cities. Nevertheless, the cow's pain was real, and deserves recognition. On the other hand, the veterinarians and cattle plague vaccination teams we will encounter in this dissertation saved the lives of millions of bovines, sparing them a painful death from a disease whose symptoms are well understood. To prevent the spread of epidemics, humans also made cow sheds cleaner and better ventilated, thus improving the daily comfort and well-being of herds. While farmers may not have aimed to make their animals happier and more comfortable *per se*, the cattle benefitted from humans' desire to protect their property and to create a healthy animal labor force for national reconstruction.

Narratives of technological change that address only one species are almost always inadequate. In his account of animals in Ottoman Egypt, the historian Alan Mikhail observes, "The history of modernity is usually told as a story of the state from

²⁶ The veterinary literature on this topic is extensive. To begin, see CB Johnson, DJ Mellor, et al., "A scientific comment on the welfare of domesticated ruminants slaughtered without stunning," *New Zealand Veterinary Journal*, 2015 Jan; 63(1):58-65. doi: 10.1080/00480169.2014.964345. Epub 2014 Dec 11; and Jan Hultgren, Sofia Wiberg, et al., "Cattle behaviours and stockperson actions related to impaired animal welfare at Swedish slaughter plants," *Applied Animal Behaviour Science*, March 2014, Volume 152, pp. 23-37, [Accessed at <http://www.sciencedirect.com/science/journal/01681591>].

inside of the state.”²⁷ This top-down perspective, circumscribed by the state’s perceived self-interest, inevitably omits many significant narratives for making sense of the past. Mikhail suggests that by shifting to a “human-animal” perspective, historians can call attention to less appealing aspects of modernity, such as “violence, species separation, cages, structural inequality, exclusion, and ecological degradation.”²⁸ In the archival record of the 1948 slaughterhouse commemoration ceremony discussed in Chapter 6, government officials made their case for the facility’s contributions to a modern Chinese state. Although this narrative is vital, it is incomplete. By focusing on human interests, these public servants and veterinarians effaced the suffering of many thousands of sentient animals. To understand the intersecting histories of animals and technology, scholars must attempt empathy not only with the human subjects who generate archives, but also with voiceless nonhuman populations whose wellbeing is inseparable from our own.

My aim is not to condemn or praise people for their roles in the agony or ecstasy of animals. The multispecies historian’s task is to illuminate the cultural preferences, state institutions, and commercial practices that link human and animal subjects, and to ask how they affect each party. What seems to humans a rational, innovative system for producing meat may seem to cattle a frightening and foul-smelling regime of butchery. Bringing animal interests into the story will thus help challenge our acceptance of shopworn terms such as “progress,” “modernity,” and “revolution.”

²⁷ Alan Mikhail, *The Animal in Ottoman Egypt*, New York: Oxford University Press, 2014, p. 178.

²⁸ *Ibid.*

Methodology

This project integrates two main kinds of primary sources: written observations of bovines in the 1930s-1950s, and the findings of modern veterinary science and cognitive ethology. To interpret the experiences of cattle, I take a cue from the historian Paul Cohen's use of recent anthropological data to make claims about the experiences of the Boxer rebels, who left almost no documentary record.²⁹ The historian Erica Fudge has similarly employed findings from animal welfare and veterinary science to interpret the experiences of bovines in seventeenth-century England.³⁰ While I am mindful of the risks of mapping the veterinary findings of today onto animals in different contexts, I believe that the rewards justify the risks. Without this analytical leap, scholars of multispecies history are restricted to the aforementioned instrumental and observational approaches. Integrating nonhuman experiences into history means accepting cautious interpretations of animals' inner states, based on a combination of firsthand records of their behavior with the findings of veterinary science.

A voluminous scientific literature discusses the mental states of cattle during events such as slaughter, birth, and feeding. Veterinarians and other scientists use empirically verifiable indices such as hormone levels, vocalizations, ear postures, nasal temperatures, and social interactions to make arguments about how bovines respond to a

²⁹ Paul A. Cohen, *History in Three Keys: The Boxers as Event, Experience, and Myth*, New York: Columbia, 1997.

³⁰ Erica Fudge, *Quick Cattle and Dying Wishes: People and Their Animals in Early Modern England*, Cornell University Press, 2018 [<https://www.jstor.org/stable/10.7591/j.ctt21h4x22>].

broad range of external stimuli.³¹ One psychologist argues that behavior is an “empirical anchor,” and the fields of ethology, comparative psychology and animal studies “revolve around the identification and analysis of independently verifiable acts of organisms.”³² For instance, a common metric is “percentage of visible eye-white as a dynamic indicator of frustration and satisfaction,” with more eye-white being visible when cows are distressed.³³ Using this metric, a recent study found that separation from their calves is a “frustrating stimulus” for cows, while reunion is “a rewarding stimulus.”³⁴ Scholars can interpret the experiences of animals in the past by reading this literature alongside historical depictions of animal behavior.

As animals do not produce written records, historians rely on documents created by the people who work, cure, feed, monitor, or otherwise interact with them: farmers and veterinarians, milkers and feeders, village cadres, and slaughterhouse inspectors. This second-hand reconstruction entails some risks, but historians of marginalized humans have not been deterred by the scarcity of texts in their sources’ hands. Studies of working-class people have been written with “registers and logbooks...[and] rough examination books” from the institutions with which they interacted, despite the fact that

³¹ Helen S. Proctor, Gemma Carder, *Applied Animal Behaviour Science* (2014) 161: 20-27, “Can ear postures reliably measure the positive emotional state of cows?”; Helen S. Proctor, Gemma Carder, “Nasal temperatures in dairy cows are influenced by positive emotional state,” *Physiology & Behavior*, (2015) 138: p. 340-344.

³² Alexandra Horowitz, “Behavior,” in Lori Gruen, ed. *Critical Terms for Animal Studies*, Chicago: University of Chicago Press, 2018, p. 64.

³³ Agnethe-Irén Sandem, Bjarne O. Braastad, “Effects of cow-calf separation on visible eye white and behaviour in dairy cows - A brief report,” *Applied Animal Behavior Science* (2005) 95: 233-239. See also A. Sandem, B. Braastad, K. Bøe, “Eye white may indicate emotional state on a frustration–contentedness axis in dairy cows,” *Applied Animal Behavior Science* (2002) 79 :1–10.

³⁴ Sandem, Braastad, “Effects of cow-calf separation...” , 233-239.

they are “mere traces, circumscribed stories.”³⁵ Likewise, the *gazetins* or “little newspapers” written by secret police observers reveal the “murmurs and noises” of Paris in the eighteenth century.³⁶ These archival materials open a window onto popular beliefs of the time, although most citizens did not commit their attitudes or conversations to paper. Tenuous though our grasp on such lives may be, our histories would be poorer without them.

Scholars may be skeptical about the possibility of inferring animals’ inner states from documentary materials. But this kind of interpretation is the norm when historians study human sources. Writing “*human-centered histories*,” notes one philosopher, involves “imagining [and] thinking about what it was like to be alive in another time and place, in order to bring it into the present in some way.”³⁷ When examining a source document, we carefully infer the agenda, intended audience, and biases of the author to better understand his or her reasons for committing words to paper.³⁸ Because this process is so common and well established, historians may overlook just what an interpretive leap it involves. While interpreting sources written *about* animals rather than *by* them adds a level of complexity, my approach is not much more radical or risky than the standard historical practice.

³⁵ Hilda Kean, “Challenges for Historians Writing Animal–Human History: What Is Really Enough?,” *Anthrozoös*, (2012) 25:sup1, s57-s72, [DOI: 10.2752/175303712X13353430377011].

³⁶ Arlette Farge, *The Allure of the Archives*, trans. Thomas Scott-Railton, New Haven: Yale University Press, 2013, p. 103-108.

³⁷ Kean, “Challenges,” p.63.

³⁸ I am grateful to Professor Sarah Schneewind of UCSD for helping me to make this connection [conversation, May 4, 2017].

Possibilities and Limits of the Methodology

A review of the literature on animal emotion reveals the diversity of expert views on the exact nature of animals' inner states. Much of the debate involves definitions: sometimes within the same paper authors have used vague or overlapping definitions of terms such as “emotion,” “affect,” “mood,” and “feeling.”³⁹ While empirically observable behaviors and physiological responses are highly suggestive, responsible scientists freely concede that, “With any study into the subjective mind of another being, it is always difficult to know exactly what another is thinking.”⁴⁰ The same, of course, is true when scholars study their fellow humans.

Several caveats are therefore necessary in any attempt to interpret the experiences of historical animals through the lens of today's veterinary science. **First, it is impossible to “read the minds” of historical animals.** Researchers have revealed general trends and patterns in bovine behavior, such as their affinity for familiar companions. But, as with humans, individual animals' responses to particular stimuli can vary considerably, sometimes without apparent reason. Thus, while their responses shared many commonalities, individual cattle had varying experiences of milking, pulling a plow, artificial insemination, and slaughter. This point is doubly important because the sources do not always describe the skill and care with which humans carried out such activities. Handbooks and directives show the ways that experts and officials *wanted*

³⁹ Amber J. de Vere and Stan A. Kuczaj II, “Where are we in the study of animal emotions?” *WIREs Cognitive Science* (2016) 7:354–362. [doi: 10.1002/wcs.1399].

⁴⁰ Helen S. Proctor, Gemma Carder, “Measuring positive emotions in cows: Do visible eye whites tell us anything?” *Physiology & Behavior* (2015) 147: p.1–6.

people to perform these tasks, and inspection reports sometimes expose mishaps and mistakes. Still, the actual events often remain obscure.

Second, like other disciplines, the study of animal behavior is constantly growing and evolving. The body of scientific knowledge that forms the basis of my analytical perspective is socially constructed, and subject to adjustment and contestation. Furthermore, the scientific literature is based on experiments in controlled settings. In most cases, these are pastures and stables that closely resemble the living environments of cattle. There is always, however, a chance that experimental protocols inadvertently affect the animals' responses to stimuli. This concern will be even greater for future historians who bravely attempt to discuss non-domesticated animals less accustomed to confinement and observation. In the interest of transparency, I will point out disputes or lacunae in the human understanding of bovine behavior. To assess for themselves how well the scientific reports match the experiences of historical cattle, readers may wish to explore the rich and occasionally contradictory literature of veterinary medicine and cognitive ethology, "the comparative study of animal minds."⁴¹

Finally, while veterinarians and farmers during the period of this study understood a great deal about the physiology and behavior of cattle, their ethical perspective on the meaning and value of animal welfare was frankly instrumental, anthropocentric, and utilitarian. As they saw it, their task was to produce food and

⁴¹ Marc Bekoff, "Cognitive Ethology: The Comparative Study of Animal Minds," in: *Blackwell Companion to Cognitive Science*, William Bechtel and George Graham (eds.), Oxford: Blackwell Publishers, 1995. Professor Bekoff further defines the term as "the comparative, evolutionary, and ecological study of nonhuman animal (hereafter animal) minds including thought processes, beliefs, rationality, information-processing, and consciousness" [ibid.]

economic benefits for their families and for society. The comfort or distress of the animals mattered only insofar as it affected this human agenda. This dissertation advances our understanding of how cattle experienced sweeping forces such as war, imperialism, and revolution, as well as events on the individual level such as branding, plowing, milking, and slaughter. But the experiences of cattle were largely beyond the concern of contemporary humans. Furthermore, Chinese farmers, veterinarians, and officials were by no means less compassionate than their Soviet or Anglophone peers. The point of this analysis is not to praise or condemn Chinese people for their treatment of bovines. Instead, I hope that this study will encourage readers to extend their curiosity and empathy to cattle: emotional, social, and individual actors who played an indispensable role in the drama of Chinese history during the middle of the twentieth century.

Source Selection

The sources for this dissertation include archival materials from the Second Historical Archives of China, the Jiangsu Province Archives, the Shanghai Municipal Archives, the Gansu Province Archives, the Shanghai Municipal Library, the Center for Modern Chinese Historical Research at East China Normal University in Shanghai, the Hong Kong Baptist University and the Chinese University of Hong Kong, the Academia Historica in Taiwan, the Hoover Institution in Palo Alto, and the United Nations Archives in Manhattan. I also received invaluable assistance from Chinese scholars who shared images from archives I was unable to access. Online repositories of historical documents,

including CNKI, Duxiu, Wanfang, and JSTOR, and scientific databases such as Sci-Hub were also helpful. The sources include memoirs, newspapers, government directives, the CCP's *Internal Reference* reports, popular and scientific animal husbandry handbooks, contemporary inspection and work reports, and official correspondence.

There are several reasons for the nationwide scope of this study. First, **no single location had enough materials to support a book-length project**. For some areas, such as D- County in Jiangsu Province, I had rich documentation for a period of years such as the late 1950s, but far less from the 1940s. For other areas, such as Shanghai, I was able to collect abundant materials on a particular feature of bovine life, such as slaughter, but relatively little on others. Neither body of texts would sustain a monograph-length study. Regrettably, in recent years, researchers have had steadily diminishing access to local archives and university collections in China. Obtaining the necessary letters of introduction was difficult and time-consuming, and I was rebuffed at several sites with tantalizing holdings. I hope that future scholars who can visit currently inaccessible local archives will enrich or, indeed, refute my findings.

Secondly, **the experiences of bovines varied considerably by breed and location**. Cattle in one county might live and die very differently from their closest neighbors, to say nothing of the vast gulf between the experiences of a water buffalo in Fujian Province and an ox in Shanxi. As the first work of its kind, this dissertation sacrifices the specificity and depth of a local study for the diversity that comes with a range of vivid but less detailed case studies. The regional comparisons that are possible in a nationwide study will help readers to see the astonishing variety of conditions in which bovines worked, ate, reproduced, and died.

Finally, and most significantly, I felt that **a singular focus on one community would obscure the interlinked experiences of bovines in far-flung regions.** Just as immediate local factors and national campaigns and agendas shaped the lives of Chinese people during this period, they also shaped the lives of bovines. The development of industrial slaughter in treaty port cities during the Republican period, for instance, laid a foundation for the rise of huge abattoirs on the northern prairies after 1949. Likewise, yaks in Tibet were a crucial reservoir of pathogens that might infect animals elsewhere in the country. Cattle plague anywhere was a threat to bovines everywhere. Technologies, attitudes, diseases, and energy overflowed the boundaries of counties, provinces, and even nations. A broad geographic focus on a variety of bovines heightens our awareness of the boundary-crossing nature of this history.

Structure of the Dissertation

By focusing on changes in living bodies, a historian can ask how these subjects experienced political and economic upheavals. One historian observes that “the body, no matter how we might like to imagine it as a safe haven from the messy contingency of history, is deeply implicated in it.”⁴² This principle applies to animals as well as people. In her biographies of “human animal[s]” in the Victorian period, Kathryn Hughes strives to “put mouths, bellies, and beards back into the nineteenth century.”⁴³ Attending to the

⁴² Kathryn Hughes, *Victorians Undone: Tales of the Flesh in the Age of Decorum*, London: 4th Estate, 2017, xv.

⁴³ Hughes, *Victorians Undone*, xiii.

sensory perceptions and experiences of historical subjects helps us to understand how familiar, abstract concepts such as war and revolution shaped the gritty realities of life. “Studying history through the senses,” contends one scholar, “humanizes the past.”⁴⁴ My dissertation builds upon this insight by not only “humanizing” the past but also, to coin a term, by “bovinizing” it. We conventionally discuss developments such as veterinary vaccination, dairy production, and industrial slaughter in terms of their effects on human economies, family relations, and public health. While not denying the value of this instrumental perspective, I also apply the interpretive perspective to show how intelligent nonhumans experienced sensations including the pain of rinderpest, the exhaustion of excessive plowing, and the fear and confusion of mechanized abattoirs.

Each chapter of this dissertation illustrates the argument embedded in the title: in mid-century China, bovines experienced increasing levels of monitoring and manipulation at the hands of humans determined to make the animals serve the people with their labor and bodily tissues. To reinforce the embodied nature of these processes, each chapter focuses on a fluid that represents some aspect of bovine life. Readers can empathize with historical humans by recognizing common sensations such as hunger, exhaustion, and loneliness. It is my hope that focusing on bovines’ bodily fluids, sensory perceptions, and experiences can build such historical empathy even across the artificial boundary of species.

Chapter One, on milk, shows how the rapid growth of the dairy industry after 1949 strained the emotional bonds between human and bovine mothers and their young.

⁴⁴ Evan A. Kutzler, *Living by Inches: The Smells, Sounds, Tastes, and Feeling of Captivity in Civil War Prisons*, Chapel Hill, North Carolina: University of North Carolina Press, 2019, p.4.

As the new government “liberated” women to take part in the paid economy, they increasingly entrusted their young children to state-sponsored nurseries. Here, the babies consumed dairy milk as a substitute for human breastmilk. Producing enough dairy required separating calves from their mothers, or “dams.” The state’s imperative for rapid economic growth thus meant that both human and bovine mothers had to endure stressful separation from their offspring. **Chapter 2, on lymph**, shows how the CCP continued the KMT campaign to eliminate the lethal cattle plague. Success resulted from a combination of imperialist scientific legacies, transnational aid and commerce, and domestic mass mobilization. Eliminating the disease was a public health accomplishment for tens of millions of bovines, and for the humans who relied on them. **Chapter 3, on sweat**, shows how the Land Reform, cooperativization, and hasty formation of People’s Communes affected bovine workloads and labor conditions. As workers in an energy economy, these animals had varying experiences of these changing relations of production, due to their specific environment and breed, and the social class of their owners. **Chapter 4, on ink**, is the only chapter whose fluid is not a bovine tissue but a human creation. It addresses the brief and fitful history of livestock insurance contracts from the 1930s-1950s. In the absence of effective nationwide vaccination against cattle plague, draft animal insurance helped farmers and the state to avoid crippling economic losses in case of an outbreak. Insurance coverage both helped and harmed bovines, depending on the human construction of an animal’s value. **Chapter 5, on saliva**, situates bovines as participants in an energy economy based on the sunlight stored in plant matter. While humans and cattle sometimes competed for access to this energy source, successive national governments and farmers also made extraordinary investments of capital, land, and

expertise to provide more and better fodder for the country's bovines. This chapter also introduces the concept of the "internal Anthropocene." Newly formulated diets altered the nutrient levels, temperature, and biodiversity of bovine rumens for the sake of human economic agendas. From the perspective of bovine gut bacteria, this process resembled the state-subsidized transformation of the global environment due to fossil fuel combustion since the start of the Industrial Revolution. Finally, **Chapter 6, on blood**, shows how bovines experienced the growth of a national meat processing industry. While concentrated, urban slaughter provided hygienic meat for domestic consumption and foreign trade, it also subjected sentient nonhumans to fear, discomfort, and death.

How This Project Interacts with Earlier Research

This dissertation joins several vibrant conversations within the discipline of history. The first is **environmental history**, which focuses on how societies shape, and are shaped by, the circulation of matter and energy through ecosystems.⁴⁵ The present study shows how advances in refrigeration and transportation brought solar energy, successively mediated through the metabolisms of grasses and bovines, from northern and central Asian hinterlands to coastal metropolises. I also argue that the introduction and cultivation of novel grasses and forage crops not only remade peripheral pasture

⁴⁵ Outstanding works in this field include Robert B. Marks, *Tigers, Rice, Silt, and Silk: Environment and Economy in Late Imperial South China*. New York: Cambridge University Press, 1998; Micah S. Muscolino, *The Ecology of War in China: Henan Province, the Yellow River, and Beyond, 1938-1950*, New York: Cambridge University Press, 2014; Kenneth Pomeranz, *The Making of a Hinterland: State, Society, and Economy in Inland North China, 1853-1937*, Berkeley, California: University of California Press, 1993.

lands, but also created an “internal Anthropocene” for the microbes inside the digestive organs of bovines. The roles and experiences of both humans and nonhumans are central to this multispecies environmental history.

Bovines also suggest new ways to think about **social history**. The social historian Charles Tilly posed the question, “How did Europeans live the big changes?”⁴⁶ Tilly encouraged scholars to ask how structural changes such as state formation and the rise of capitalism intersected with the lives of common people. As a social history of multiple species, this dissertation shows how humans and bovines in China jointly “lived the big changes,” including war, economic revolution, and technological innovation. The historian Hilda Kean has achieved a similar goal in her study of the preemptive euthanasia of some 400,000 cats and dogs by British citizens in the early weeks of the Second World War. She argues that the “holocaust of pets” inflicted by panicky humans on “the animal members of their families” in the year 1939 should encourage fresh thinking about a conflict that has entered national memory as a “Good War.”⁴⁷ This dissertation is an attempt at a **multispecies social history** in which animals are not simply property, victims, or statistics, but members of a multispecies society. Each chapter invites readers to view complex events and processes such as the Anti-Japanese War and the Great Leap Forward from the perspectives of bovines as well as humans.

⁴⁶ Charles Tilly, “Retrieving European Lives,” in Olivier Zunz, ed. *Reliving the Past: The Worlds of Social History*, University of North Carolina Press, 1985, p. 11. [Accessed October 5, 2019 at https://www.jstor.org/stable/10.5149/9781469611235_zunz.5]

⁴⁷ Hilda Kean, *The Great Cat and Dog Massacre: The Real Story of World War Two’s Unknown Tragedy*, Chicago: University of Chicago Press, 2017, pp. 4-5.

This study also advances a **multispecies analysis of imperialism**. The Japanese conquest and occupation of northeastern China during the 1930s-1940s was harsh and oppressive in many ways.⁴⁸ Yet scientists in the puppet state of Manchukuo also created the avianized rinderpest vaccine that later helped to eradicate the disease nationwide. To help exploit the rich farmland of northeast China, Japanese researchers sought to protect the local draft animal labor pool from this endemic illness. Serving their empire's expansionist agenda, these veterinarians produced a vaccine that not only curtailed widespread bovine suffering and death, but also stabilized the economies of countless Chinese households and villages in the 1950s and beyond. To acknowledge this ironic unintended consequence is not to excuse or endorse conquest and occupation. Rather, this is a call for historians to recognize that the actions of imperialist powers can have ramifications for intelligent beings in addition to the people of the occupied territory.

Nonhumans also offer new ways to think about the agency and subjectivity of historical beings. As we explore the many facets of bovine existence, from nursing and grazing, to working and dying, I hope that readers come to accept bovines as historical agents. Socially and emotionally connected to their fellow animals and human counterparts, cattle had verifiable and nonrandom responses to other intelligent beings. Bovines contributed many thousands of person-years of grueling labor in rice fields and grain mills, on dusty roads and in brick kilns, in terraced fields and dairy barns. Would China's recent history have been the same without bovines? These animals did not

⁴⁸ Rana Mitter, *The Manchurian Myth: Nationalism, Resistance, and Collaboration in Modern China*, Berkeley, CA: University of California Press, 2000; Louise Young, *Japan's Total Empire: Manchuria and the Culture of Wartime Imperialism*, Berkeley, California: University of California Press, 1998.

merely see or hear or endure violence and social changes; they helped make the Chinese revolution, and experienced it as paid-in-full participants.

Finally, this dissertation extends the historiographical trend of **dissolving artificial barriers among subjects of study** to reveal their interactions. Nearly four decades ago, the Marxist historian Eric R. Wolf vividly critiqued scholars who imagined “a global pool hall in which the entities [i.e. cultures] spin and bounce off each other like so many hard and round billiard balls.”⁴⁹ From a purely analytical point of view, treating cultures as “bounded systems” obscured the diffusion and exchange of ideas, material, and violence among peoples.⁵⁰ Studying societies in isolation thus yielded a distorted view of cultural transformation across time. This blinkered view of societal interaction was not only misleading, but also served to justify aggression and injustice. Wolf contended that essentialist understandings of a benighted East and an advanced West became “intellectual instruments in the prosecution of the Cold War.”⁵¹ A self-congratulatory, unidirectional vision of “historical progress” was the rationale for coercing the recalcitrant, backward peoples of the world into “modernization,” most notoriously during the American war in Indochina. Blind to the interconnectedness of world societies, and to the global class struggle of proletarians against the holders of capital, the intellectual and political elites of the Cold War insisted on viewing discrete nation-states as the most salient units for understanding history, and for wielding power.

⁴⁹ Eric R. Wolf, *Europe and the People Without History*, Berkeley, CA: University of California Press, 1982, p. 6.

⁵⁰ Wolf, *Europe and the People Without History*, Berkeley, CA: University of California Press, 1982, p. 19.

⁵¹ Wolf, *Europe and the People Without History*, p.7.

Even readers who do not share Wolf's Marxist worldview can find much to celebrate in the recent growth of the field of global history. Exploring transnational flows of silver, spices, gunpowder, religious beliefs, and medicine, scholars have discovered linkages that transcend the artificial category of nation-states.⁵² Their studies have yielded a more accurate understanding of the past, while also suggesting new possibilities for solidarity and collaboration among human societies.

The present dissertation takes this salutary trend a step further by seeing not only mutual influence among disparate groups of *Homo sapiens*, but also among humans and the other organisms with whom we share the Earth. Scholars have perceived a need for such studies, noting that “climate, soils, plants and animals, including billions of symbiotic micro-organisms within us, incessantly remould and in turn reflect human destiny.”⁵³ The human microbiome, consisting of “the ecological community of commensal, symbiotic, and pathogenic microorganisms that literally share our body space,” may include as many as ten thousand varieties of bacteria, fungi, and viruses.⁵⁴ These microbes are indispensable to our digestion, mental health, immunity to pathogens, and ability to maintain homeostasis. A rigidly reductive, anthropocentric focus on only those organisms with human DNA risks fundamentally misunderstanding what one

⁵² Tonio Andrade, *The Gunpowder Age: China, Military Innovation, and the Rise of the West in World History*, Princeton University Press, 2016; Peter Frankopan, *The Silk Roads: A New History of the World*, New York: Vintage, 2017; Joanna Waley-Cohen, *The Sextants of Beijing: Global Currents in Chinese History*, New York: W. W. Norton, 2000.

⁵³ David Lowenthal, *The Past is a Foreign Country, Revisited*. Cambridge, United Kingdom: Cambridge University Press, 2015, p.13

⁵⁴ David Quammen, *The Tangled Tree: A Radical New History of Life*, New York: Simon & Schuster, 2018, p. 315.

author has called “the composite nature of human identity.”⁵⁵ Moreover, interspecies reliance is not just for humans: in the guts of ruminants such as bovines, “microbes are bathed in nutrients and protected from the outside world while they digest the cellulose in plant cell walls which cattle are unable to do for themselves.”⁵⁶ Domesticated bovines, central to this dissertation, depend not only on the microbes in their rumens but on the humans who provide cellulose in the form of grazing lands or fodder. In short, bacteria, bovines, and humans need each other. The Linnean taxonomic schema of separating and classifying lifeforms by genus and species has served scientists well for centuries, but its limits are becoming apparent. As science accommodates new understandings of the interdependence of life, so, too, must history.

Why Now?

Works of history reflect the worldviews and priorities of their authors. Only sixty years ago, at the height of the Cold War, a Western writer could refer to citizens of the PRC as “blue ants.”⁵⁷ Reducing these humans to an undifferentiated swarm was both a common response to an apparent geopolitical threat, and a gross and unjust distortion of reality. Refusing to acknowledge difference and complexity among “the Other” can become a justification for exploitation and hostility. By revealing the rich variety of

⁵⁵ David Quammen, *The Tangled Tree: A Radical New History of Life*, New York: Simon & Schuster, 2018, p. 317.

⁵⁶ Dorothy H. Crawford, *Deadly Companions: How Microbes Shaped Our History*, New York: Oxford University Press, 2007, p.15.

⁵⁷ Robert Guillain, *The Blue Ants: 600 Million Chinese Under the Red Flag*, London: Secker and Warburg, 1956.

human experiences in modern China, scholars have demolished the myth of the “blue ants.”⁵⁸ This hard-won wisdom enables a more accurate understanding of the past, and more meaningful exchange between cultures today. An even more convincing history of modern China will also admit the intelligence and emotional sophistication of nonhumans such as bovines.

If animals could write their history, the past century would stand out as a time of unusual turmoil. One historian has correctly observed that “for plants, bacteria, insects, cattle, whales, fish and human beings, the twentieth century was murderous.”⁵⁹ Short of killing, we have also affected the lives of nonhumans in less obvious ways. In *The Cultural Lives of Whales and Dolphins*, two marine biologists describe how the pitch of baleen whales’ songs has changed in recent decades, perhaps in response to ambient noise from increased maritime shipping.⁶⁰ Although they do not yet fully understand whale songs, scientists agree that these melodies are rich in information and manifest a variety of dialects. Singing the songs is a cultural practice through which the animals share news, find mates, and, possibly, express themselves. When we consider the expansion of global commerce in recent decades, few of us think about undersea background noise from sonar and ship engines. Yet this accidental byproduct of transnational trade appears to have altered a fundamental cultural and social activity of another intelligent species. Such a profound change in their mode of communication

⁵⁸ A complete list would take many pages. A good starting point is Jeremy Brown and Matthew Johnson, eds. *Maoism at the Grassroots: Everyday Life in China’s Era of High Socialism*, Harvard University Press, 2013.

⁵⁹ David Edgerton, *The Shock of the Old: Technology and Global History Since 1900*, New York: Oxford University Press, 2007, p. 160.

⁶⁰ Hal Whitehead and Luke Rendell, *The Cultural Lives of Whales and Dolphins*, University of Chicago Press, 2014, especially Chapter 4, “Song of the Whale.”

would be a signal event in the history of any species. Because whales cannot tell their own histories, the responsibility falls to humans.

A second inspiration for this project came from a recent article on post-traumatic stress disorder (PTSD) and social unrest among African elephants.⁶¹ The expansion of global trade in recent decades has spurred demand for ivory in many developing regions.⁶² Poachers have increased their activity to satisfy these markets. Unfortunately for elephant societies, many of the animals killed for their tusks are herd leaders and sources of what we might call institutional memory. The loss of these individuals can be highly traumatic for survivors, making them violent and anti-social. The examples of elephants and whales show that human social and economic decisions and developments, while bringing gains and losses to billions of people, have also deeply affected the societies and cultures of animals. These case studies led me to consider the potentially momentous effects of war and revolution on the sentient nonhumans of China.

As I was finishing this dissertation, current events demonstrated the intermingled agency of humans, animals, and microbes. At the end of last year, the novel coronavirus Covid-19, which apparently originated among bats in central China, jumped to human hosts who carried it to virtually every country on Earth. Humans, animals, and microbes were all indispensable to this outbreak, which has already caused many thousands of

⁶¹ Bradshaw, G.A., Allan N. Schore et al. "Elephant Breakdown," *Nature*, vol. 433, February 24, 2005, p807.

⁶² For more on the Chinese market for endangered animals and their body parts, see Karl Gerth, *As China Goes, So Goes the World: How Chinese Consumers are Transforming Everything*, New York: Hill and Wang, 2010.

deaths, as well as economic losses, emotional trauma, and social disruption that will linger for years.

Contrary to popular belief, the pandemic was not inevitable. Rather, it was contingent upon certain ways of raising, confining, and consuming animals, and upon specific dysfunctional political relationships within and among human societies. China's rapid recent economic expansion has affected the lives and behavior not only of billions of humans, but also of other animals such as pigs, whales, and elephants. These intelligent nonhumans face grave peril as their flesh, fur, and bones have become desirable commodities for newly empowered consumers. Jet-propelled trade and tourism, combined with the myopia and ineptitude of many national governments, further accelerated the spread of the pathogen. It was from this socio-economic substrate that the pandemic erupted.

A balanced history of the past few decades must acknowledge the agency of multiple species. We will never identify the unwitting host animal who first conveyed the novel coronavirus to a human. But his or her significance in global history as an agent, without whom this outbreak would not have happened, must exceed that of Copenhagen, the Duke of Wellington's horse at Waterloo.

There is some hope in the possibility that this disaster (and perhaps this dissertation!) will encourage people to examine and adjust our relationships with our fellow humans and nonhumans, and with our shared planet. We can choose whether to trade the biodiversity of forests and prairies for cheap meat and milk. We can also ask whether we should hold intelligent animals in tiny cages in urban markets or industrial farms, where their microbial hangers-on can quickly become hardier and more virulent

by mutating and swapping genetic information. And we can ask whether our shared antipathy to an invisible pathogen might supersede the mistrust and recriminations that afflict our increasingly connected global civilization. A multispecies perspective on history, attentive to the experiences and agendas of both human and nonhuman subjects, can inform and inspire future generations of thinkers, to the benefit of the world as a whole.

Chapter 1 Milk: Tying Ecosystems Together, Breaking Families

Apart

This chapter addresses the social and political history of milk, the defining food of the mammalian diet. Within a few decades after the Second World War (hereafter called by its Chinese name, the Anti-Japanese War 抗日戰爭 [1937-1945]), China developed an enormous domestic dairy industry. As a medium for the transfer of food energy, dairy helped to integrate the country's diverse ecosystems and economies. The growth of dairy herds allowed babies in the industrial and commercial hub of Shanghai to consume calories that originated as sunlight on the remote pastures of the country's northern frontiers. While nursing mothers' bodies convert food into easily digestible calories for their babies, dairy cattle turn the grass of distant pastures into milk for human workers in cities.

Yet while it bound together the nation's biomes, milk also became a medium for dissolving family bonds between parents and children, both human and bovine. To satisfy the imperatives of rapid industrial and agricultural growth, humans prematurely weaned dairy calves and separated them from their mothers (known as "dams"). In this way, the cows' milk could nourish human children, whose mothers entrusted them to nurseries while taking on new roles in the paid economy. In both cases, the state justified its intervention on the grounds of improved economic efficiency and higher standards of hygiene and nutrition for the young. The resulting increases in productivity also entailed emotional and physical stresses for human and animal families.

Even as we call attention to this distress, fairness and accuracy demand that we not overlook several points. First, Chinese citizens obtained considerable physical and emotional benefits from dairy products. Especially during and immediately after the Anti-Japanese War, milk saved lives by providing calories and nutrients to poor and vulnerable populations. Milk became a popular, even beloved food: a delicious and wholesome symbol of health and prosperity.

It is also clear that while “improved” and “scientific” methods of animal husbandry inflicted harm on cattle, many dairy farmers understood the importance of treating their herds with kindness and patience. After all, agitated and ill-treated cows had shorter, less productive lives than healthy animals. Textual records suggest that Chinese dairy farmers were no more cruel or insensitive than their American and Soviet mentors. Around the world, the reconstruction of shattered postwar economies relied in large part on the toil and pain of millions of cows.

To analyze the relevance of these events to dairy cattle, this chapter uses the framework presented in the Introduction. The instrumental, observational, and interpretive lenses are intertwined. Statistical data from archival sources and secondary literature show the instrumental role of cattle in the economic and political developments of China at mid-century. Policy directives and eyewitness accounts in animal science handbooks show how contemporary observers noticed, modified, and responded to the behavior of dairy cattle. Finally, recent veterinary literature permits an interpretation of these data to make claims about the emotional responses of these historical cattle to their living environments.

The Science of Bovine Minds

Cattle have personalities and intelligence. They are not merely robotic, Cartesian *bêtes-machines*.⁶³ Today, veterinary scientists agree that “animals, such as dairy cows, [show] distinct individual behavioural consistencies that reflect personality traits.”⁶⁴

Furthermore, intelligence varies considerably among cows of the same breed.

Researchers found that when given “step-by-step learning opportunities with increasing difficulty,” twenty percent of Japanese Black cows learned to navigate a complex maze, and remembered the route for up to six weeks.⁶⁵ The authors of the study suggest that “all members of a group may not need to have the ability to learn and remember a complex spatial structure,” as less adept individuals can follow their clever peers to prime foraging locations.⁶⁶ Other researchers have found evidence that while learning to press a panel and receive a food reward, dairy cattle “may react emotionally to their own learning improvement” as evidenced by faster movements and increased heart rates.⁶⁷ The researchers are careful to note that the small scale of their study precludes sweeping

⁶³ The *Stanford Encyclopedia of Philosophy* notes, “Descartes regarded nonhuman animals as machines, devoid of mind and consciousness, and hence lacking in sentience.” The same source also explains that while his followers “understood him to have denied all feeling to animals,” there is now some controversy about the seventeenth-century philosopher’s exact position. *Stanford Encyclopedia of Philosophy*, “René Descartes,” <https://plato.stanford.edu/entries/descartes/>, accessed September 25, 2017. For the controversy, see John Cottingham, “‘A Brute to the Brutes?’ Descartes’ Treatment of Animals,” *Philosophy* 53:1978, p. 551-559.

⁶⁴ Roger Müller and Lars Schrader, “Behavioural Consistency during Social Separation and Personality in Dairy Cows,” *Behaviour*, Vol. 142, No. 9/10, Unravelling Animal Personalities: How and Why Individuals Consistently Differ (Sep. - Oct., 2005), p.1303.

⁶⁵ Masahiko Hirata, Chihiro Tomita, Karin Yamada, “Use of a maze to test spatial learning and memory in cattle: Can cattle traverse a complex maze?” *Applied Animal Behaviour Science* 180 (2016) pp. 18-25.

⁶⁶ Masahiko Hirata, Chihiro Tomita, Karin Yamada, “Use of a maze to test spatial learning and memory in cattle: Can cattle traverse a complex maze?” *Applied Animal Behaviour Science* 180 (2016) pp. 18-25.

⁶⁷ Kristen Hagen, Donald M. Broom, “Emotional reactions to learning in cattle,” *Applied Animal Behaviour Science* 85 (2004), p. 203-213.

conclusions. Still, the evidence suggests not only that these animals can learn, but that they are in some sense responding to their learning.

Cattle form social bonds. Forty years ago, scientists determined that a “strong, specific maternal bond” could form between a dairy cow and her calf within just five minutes of birth.⁶⁸ Such bonds can also arise among unrelated dairy cattle. Researchers have found evidence that “dairy cows actively maintain valuable dyadic relationships,” with the implication that “keeping acquainted cows together may contribute to a stable inner structure of a dairy herd and thus promote dairy cow welfare.”⁶⁹ Considerable evidence supports the “social buffering” hypothesis that gregarious animals such as humans, monkeys, and cattle are better able to resist and recover from physical and mental stresses when among familiar companions.⁷⁰ Conversely, isolation or the disruption of their social groups can be highly distressing for individual animals, as evidenced by “elevated heart rate, increased vocalization, and potentially injurious escape attempts.”⁷¹ As we shall see in this and future chapters, the vagaries of war, economics, and government policy often resulted in the shifting and separation of these sensitive, social animals, to the detriment of their well-being.

Cattle also experience emotions, which they express in observable ways. As noted in the Introduction, one common metric is “percentage of visible eye-white as a dynamic

⁶⁸ S.J. Hudson and M.M. Mullord, “Investigations of maternal bonding in dairy cattle,” *Applied Animal Ethology*, 1977:3, p. 271.

⁶⁹ Anke Kristina Gutmann, Marek Špinko, and Christoph Winkler, “Long-term familiarity creates preferred social partners in dairy cows,” *Applied Animal Behaviour Science*, 169 (2015), p. 1.

⁷⁰ Takefumi Kikusui, James T Winslow, and Yuji Mori, “Social buffering: relief from stress and anxiety,” *Philosophical Transactions of the Royal Society B*, 2006 December 29; 361(1476) p. 2215.

⁷¹ Ruth C. Newberry, Janice C. Swanson, “Implications of breaking mother-young bonds,” *Applied Animal Behaviour Science* 110 (2008), p. 12.

indicator of frustration and satisfaction,” with more eye-white being visible when cows are distressed.⁷² A recent study found that separation from their calves is a “frustrating stimulus” for cows, while reunion is “a rewarding stimulus.”⁷³ Scientists have also used other measures of cows’ emotional states, such as ear postures, nasal temperatures, and levels of stress hormones such as cortisol.⁷⁴

In sum, bovines were not merely a vital asset and colleague for millions of Chinese households. If they were merely inert tools or property, these animals would still have exerted considerable agency in modern Chinese history by dint of their indispensable draft labor and bodily products. Yet the science suggests that their historical significance extends beyond the rather mundane level of agency, which applies to any entity that somehow shapes its environment. Instead, bovines are historical subjects: intelligent, social, and emotional beings.

From Milk to Klim

During the first half of the twentieth century, most Chinese people consumed very little dairy. In 1949, the annual national consumption of cow’s milk was only 200,000

⁷² Agnethe-Irén Sandem, Bjarne O. Braastad, “Effects of cow-calf separation on visible eye white and behaviour in dairy cows - A brief report,” *Applied Animal Behavior Science* 95 (2005) 233-239. See also A. Sandem, B. Braastad, K. Bøe, “Eye white may indicate emotional state on a frustration–contentedness axis in dairy cows,” *Appl. Anim. Behav. Sci.* 79 (1) (2002) 1–10.

⁷³ Agnethe-Irén Sandem, Bjarne O. Braastad, “Effects of cow-calf separation on visible eye white and behaviour in dairy cows-A brief report,” *Applied Animal Behavior Science* 95 (2005) 233-239.

⁷⁴ Helen S. Proctor, Gemma Carder, *Applied Animal Behaviour Science* 161 (2014) 20-27, “Can ear postures reliably measure the positive emotional state of cows?”; Helen S. Proctor, Gemma Carder, “Nasal temperatures in dairy cows are influenced by positive emotional state,” *Physiology & Behavior*, 138 (2015) 340-344.

tons, or less than one pound per person for a nation of nearly 600 million citizens.⁷⁵ Nomadic herders in pastoral regions such as Tibet and Inner Mongolia kept large herds, but did not trade much milk with Han Chinese in the rest of the country. The dairy industry was concentrated in the hinterlands of coastal cities, where European and American missionaries bred small herds of dairy cows. In Jiangsu Province, for example, foreign missionaries and doctors imported some Holsteins in 1883 and mated them with local oxen 黄牛.⁷⁶ Chinese entrepreneurs also got into the dairy business. In 1925, a merchant from Wenzhou named Wu Baiheng 吴百亨 started a small herd with six Holsteins imported from the Nantong Agricultural Institute in neighboring Jiangsu Province. The following year, Wu lent funds to help farmers set up a dairy collective on the outskirts of the bustling commercial city.⁷⁷ Still, milk consumption remained limited.

Seasonal fluctuations in supply and demand, coupled with a lack of processing technology, hindered the economic viability of the dairy industry. Dairy farmers must feed their herds year-round, although cows produce more in the spring and summer, when they are nursing their newborn calves. In late 1947, at the behest of “the dairymen of Nanking [Nanjing],” United Nations Food and Agriculture Office (FAO) Dairy Extension Specialist Elwood O. Johnson wrote a professor at Iowa State College to ask

⁷⁵ Wang Huaibao 王怀宝, *Naiye 50 Nian 奶业 50 年* [The Dairy Industry at Fifty Years], Haiyang Publishing, 海洋出版社, 2000, p. 505. The first census in the PRC, taken in 1953, listed the population as approximately 582 million. For more on the difficulty of interpreting this census, see Leo A. Orleans, “The 1953 Chinese Census in Perspective,” *The Journal of Asian Studies*, Vol. 16, No. 4 (August 1957), pp. 565-573.

⁷⁶ “黑白花奶牛 [Holsteins],” *Jiangsusheng Chumuzhi 江苏省畜牧志* [Animal Husbandry Gazetteer of Jiangsu Province], Nanjing: 2000, p. 20.

⁷⁷ Jin Wenping, ed. 金文平, *Wenzhoushi Lucheng quzhi shangce 温州市鹿城区志上册/卷十七 畜牧业-第一章 主要畜禽* [Gazetteer of Wenzhou City’s Lucheng District, Vol. 1, Section 17, Livestock Husbandry, Chapter 1, Main Livestock and Poultry] Zhonghua Publishing 中华书局, 2010, p. 408.

about the possibility of acquiring “a milk-drying unit to take care of their surplus milk.” As Johnson explained, “The dairies have a large surplus in summer, as the people do not use [milk] in any quantity in hot weather.” The Republican capital city of Nanjing had one of the country’s largest dairy herds, yet Johnson considered the farmers’ request impractical. Even their peak summertime yield of 3,000 pounds per day was not enough to justify the cost of the milk-drying machine. Other means of extending the life of milk were also unappealing, for “they will not eat cheese, and the butter market is limited.”⁷⁸ To the director of the Chinese Ministry of Agriculture’s Animal Industry Division, Johnson suggested, “Probably the best disposition of surplus milk would be through the development of the ice cream business.”⁷⁹ But this tactic would have required considerably more refrigeration capacity than the country possessed at mid-century. Ultimately, the dairy specialist proposed that milk consumption “might be materially increased by educational publicity,” and by selling dairy goods to schools at subsidized rates.⁸⁰ If he could not dispose of the supply, he might at least stimulate demand.

Johnson was probably correct that making powdered milk was uneconomical for Nanjing’s dairy farmers. Due to the country’s modest production, most Chinese consumers got their first taste of powdered milk from Australia and North America, of which one of the most popular brands was the cleverly-named “Klim.” Some consumers celebrated the new product in verse. In an “Ode to Klim,” one Shanghai poet proclaimed:

Klim milk powder: supplied at a low price,
Chinese children entrust their lives to it.

⁷⁸ Second Historical Archive of China [hereafter SHAC] 23-1-2762, Elwood O. Johnson to Professor A.C. Iverson, December 31, 1947.

⁷⁹ SHAC 23-1-2762, “Commercial Dairying in Nanking,” Johnson to T. New, December 30, 1947.

⁸⁰ *Ibid.*

Drinking foreign milk, accepting foreign kindness,
Children today are incredibly fortunate.
Mother has no milk, and the wet-nurse has run dry.
Why should Chinese cattle have to trouble themselves?⁸¹

Invoking children's reliance on powdered milk, the verse calls attention to many mothers' inability to lactate as a result of malnutrition amidst postwar food shortages. Indeed, during wartime, milk powder was a vital source of nutrients for displaced, orphaned, and impoverished children. In a "simple and solemn" ceremony in July 1948, representatives from the United Nations handed over 70,000 pounds of powdered milk to Nationalist officials in the capital city of Nanjing. This imported milk was distributed at "children's nutrition stations" to babies and severely ill people below the age of fourteen.⁸² In September, the United Nations International Children's Emergency Fund (UNICEF) distributed over 5,000 pounds of whole milk powder in Shanghai as part of a plan to feed "thousands of Shanghai's needy children."⁸³

Governmental and non-governmental organizations regulated the consumption of milk powder. International aid agencies required a doctor's certification that a poor, sick child below the age of fourteen suffered from gastrointestinal illness, chronic illnesses such as malaria, or serious malnourishment before releasing their daily 45 grams of milk

⁸¹ No author. Kening Naifen 克宁奶粉 ["Klim Milk Powder"], *Wenhui Zhoubao* 文汇报 [*Wenhui Weekly*] 1946, Volume 6, Issue 11.

⁸² No author. Jingqu jiuji naifen qiwan yu bang, jiang peiji pinku ying'er ji bingzhong (fu zhaopian) 京区救济奶粉七万余磅, 将配给贫苦婴儿及病重(附照片) ["Over 70,000 pounds of dairy powder relief in the capital region will be distributed to poor children and the seriously ill (with photos)"] *Shehui Jianshe* (Chongqing) 社会建设(重庆) [*Social Construction* (Chongqing)], 1948, reprint 1, issue 5, p. 91.

⁸³ *North-China Daily News*, Sept. 19, 1948.

powder.⁸⁴ Rural children could obtain milk by satisfying slightly looser conditions: in central China's Henan province, fresh and powdered milk were also available to malnourished orphans and poor children from the countryside, and to students.⁸⁵ As we shall see, the government's role in promoting and regulating milk consumption accelerated after the establishment of collective farming in the 1950s.

The Rise of the Herds

For a war-torn country with a small dairy industry, imports of canned milk were a useful source of portable, imperishable calories. But both domestic and Western observers agreed that in the long term, China would need to develop its own dairy herds. In the autumn of 1936, less than a year before the Japanese invasion, the veterinarian Wu Xinfu 吳信法 linked large-scale, scientific dairy production to national sovereignty. Explaining that “Survival of the fittest is the law of evolution,” Wu argued that “any race that does not adapt to science can only fall behind and be conquered.”⁸⁶ Because “food is

⁸⁴Guoji ertong jijiu jin gongzuo shishi gezhong banfa—ying'er weiyong naifen xuzhi 国际儿童急救金工作实施各种办法-婴儿喂用奶粉须知 [“International emergency relief for children employs various methods—important information about feeding children with dairy powder”] Ertong Fuli Tongxun 儿童福利通讯 [*Children's Welfare Bulletin*], 1948 issue 18, p. 7-8.

⁸⁵ Niunai, naifen: Pingbing ertong junke qingling 牛奶、奶粉：貧病兒童均可請領 [“Milk and Dairy Powder: Poor and Sick Children May Apply for These”], Shanhou jiuji zongshu Henan fenshu zhoubao 善后救济总署河南分署周报 [Weekly Report of the UNRRA Branch Office in Henan], 1946 Issue 13, p. 3.

⁸⁶Wu Xinfu 吳信法, ed. Niuru ji qi zhipin (yingyong kexue congshu) 牛乳及其製品(應用科學叢書) [*Dairy milk and dairy products (Applied Science Series)*], 正中書局印行, Sept. 1936, Nanjing, Preface. [Rare book collection of Nanjing Library].

of paramount importance to the people,” and humans had moved beyond the days of “eating fur and drinking blood,” food would have to “scientifize 科學化.” Dairy, a key part of Western diets, was an ideal scientific food: economical, hygienic, and nutritious. But Wu estimated that China had only about 10,000 dairy cows, which produced a paltry thirty million pounds of milk per year.⁸⁷ He looked forward to the day when each farm family would keep at least one milking cow, freeing the country from its reliance on imported dairy cattle and powdered milk.⁸⁸

The Anti-Japanese War stalled but did not quell Chinese reformers ambitions for dairy sovereignty. In a nearly five-thousand character essay published soon after the end of the war, author Shang Deshu 尚德樹 expressed his support for a rumored United Nations plan to import 10,500 dairy cattle from the United States, New Zealand, and other dairy centers. Shang lamented that China’s dairy industry had “come to a halt” because the country’s own cattle were largely unsuited for milking, and there had been no imports during the war years. He added, “We often sigh that Chinese people’s health is poor, so our country cannot complete national construction projects.” Shang compared his frail compatriots to the “sturdy” Europeans and Americans. While half of the Westerners’ superior strength was due to genetics, the remainder was due to their consumption of nutritious foods like milk. Shang called dairy cows “the most delicate

⁸⁷ Wu Xinfu 吳信法, ed. *Niuru ji qi zhipin (yingyong kexue congshu)* 牛乳及其製品(應用科學叢書) [*Dairy milk and dairy products (Applied Science Series)*], 正中書局印行 Zhengzhong Press, Sept. 1936, Nanjing, p.16. [Rare book collection of Nanjing Library]

⁸⁸ Wu Xinfu 吳信法, ed. *Niuru ji qi zhipin (yingyong kexue congshu)* 牛乳及其製品(應用科學叢書) [*Dairy milk and dairy products (Applied Science Series)*], 正中書局印行 Zhengzhong Press, Sept. 1936, Nanjing, p.16. [Rare book collection of Nanjing Library]

livestock” on account of their sensitivity to extreme temperatures, and vulnerability to disease. But he saw in these animals the key to attaining the vigor and good health of the victorious Western peoples.⁸⁹

Like Shang Deshu, postwar Western authorities saw the development of China’s dairy industry as a way to improve citizens’ nutrition and invigorate the national economy. Between the end of the war and the expiration of its mandate in 1948, the United Nations Relief and Rehabilitation Administration (UNRRA) donated 2,632 head of dairy cattle, collected and shipped from donor nations including Canada, New Zealand, and the USA, to farms and research institutions across China [Figure 1.1].⁹⁰ Chapter 2 of this dissertation, on UNRRA’s role in the eradication of rinderpest, a virus known as the “cattle plague,” explains the Cold War reasoning behind this largesse. For Western officials keen to turn back what they saw as a menacing Communist tide in Asia, there could be few better investments than improving and protecting the livestock of predominantly agricultural China.

Intended to shore up the faltering, pro-Western Nationalist government, both the rinderpest vaccine and the UNRRA dairy cattle unknowingly played an outsized role in the construction of the People’s Republic. After the Communist victory in 1949, the vaccine continued to protect millions of bovines, allowing the government to make use of their muscle power. The dairy cattle, meanwhile, were vital contributors to the growth of Chinese herds in the 1950s.

⁸⁹ Shang Deshu 尚德樹, *Zenyang chuzhi yiwanglingwubai tou runiu?* 怎樣處置一萬零五百頭乳牛? [“How to handle 10,500 head of dairy cattle?”] 上海大公報, *Shanghai Da Gong Bao*, July 27, 1946 [accessed at HKBU]

⁹⁰ SHAC 23-2762, “Summary of Cattle Received and Distributed up to August 3rd, 1947”

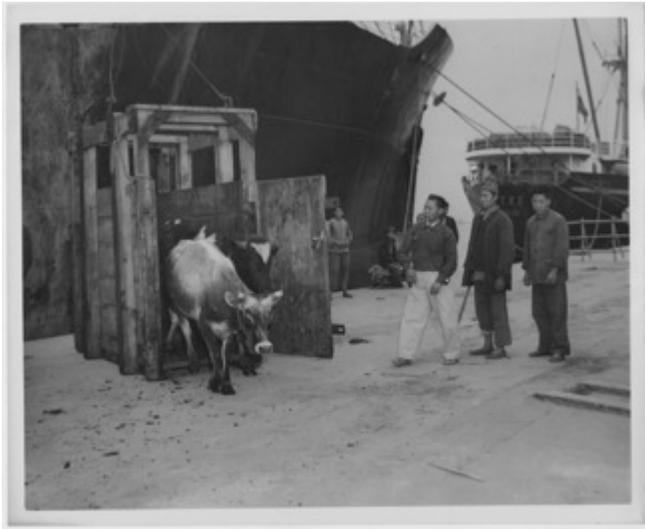


Figure 1.1: Cattle (Jerseys, heifers, Holsteins, Guernseys, short-horns) disembarking an UNRRA chartered cattle ship⁹¹

Mindful Milking

Chinese dairy experts were well aware of the close link between cows' mental states and their milk yields. Their attitudes on the treatment of these animals incorporated popular notions of gender roles and traits. In his 1937 treatise on dairy cattle, Pan Nianzhi 潘念之 suggested that if possible, women should take care of the cows. He asserted that women possessed a deep love of animals, and that their character was also “warm and gentle.” Not given to violent behavior, women were thoughtful, and could take

⁹¹ UNRRA photograph archive, S-0801-0007-0003-00020, <https://search.archives.un.org/unrra-imported-cattle-jerseys-heifers-holsteins-guernseys-short-horns-have-just-been-unloaded-from-one-of-unrras-charter-cattle-ships-which-bring-cattle-from-united-states-canada-and-new-zealand-to-china-9> [Accessed September 25, 2017].

painstaking care of their cows. This treatment would give the animals a warm, obedient temperament, making them better able to interact with humans. Pan further explained that cows were “slow and docile,” and tended to be “skittish.” To satisfy their needs, the caretaker “must completely understand each cow’s personality.” Caretakers must also prevent crowds of people from entering the stables, making a clamor, or bumping into the animals.⁹² Modern veterinary science confirms both that “calves can readily discriminate between different people based on their previous experience,” and that cattle who become fearful of humans due to aversive treatment are more accident-prone, and yield less milk.⁹³ Pan Nianzhi also observed that if a cow could not change position, or if its living space were unclean, it would pant and become “mentally and physically exhausted.”⁹⁴ In short, poor treatment and unwholesome conditions undermined a cow’s health and economic value.

In this passage, Pan employs all three of what I have termed the instrumental, observational, and interpretive perspectives to describe and analyze the behavior of dairy cows. As his readers were active and aspiring dairy farmers, he naturally frames his discussion of animal behavior around the practical goal of increasing milk yields. In this sense, the cow is a kind of machine or instrument with economic value to humans. Pan also observes many behaviors such as the cows’ need to periodically shift their position, and their panting in response to less-than-ideal environments. Even the most skeptical

⁹²Pan Nianzhi, ed. 潘念之, *Runiu siyangxue 乳牛飼養學 [Feeding Dairy Cattle]*, Sept. 1937, Shanghai: China Agriculture Press 中國農業書局, pp. 256-257.

⁹³ Anne Marie de Passillé et al., “Dairy Calves’ Discrimination of People Based on Previous Handling,” *J. Anim. Sci.* 1996: 74, pp. 969, 973.

⁹⁴Pan Nianzhi, ed. *Feeding Dairy Cattle*, pp. 256-257.

reader could connect these behaviors to external stimuli, and take corrective action. Finally, Pan does not hesitate to interpret the cows' inner states, ascribing personality characteristics and preferences to the animals based on his observation of their behavior. Dairy cows are docile yet skittish, and they appreciate kind and gentle treatment by humans. While his motives were pragmatic and instrumental, as opposed to sentimental or rights-based, Pan encouraged dairy farmers to make their cows calm and content.

In the first decade of the People's Republic, technical manuals translated from Russian reinforced the social norm that women should care for dairy cows, and milk them. These texts celebrated the accomplishments of female Socialist Labor Heroes who had achieved recognition by coaxing incredible amounts of milk from their cows.⁹⁵ Such texts by default used feminine pronouns [她/她们] to describe the personnel who milked cows and fed their calves. Almost without exception, their illustrations depicted women.⁹⁶ This female gendering of dairy work was not an exotic import: one Chinese text promoted a "Dance of the Milkmaids" in which women performed a graceful and stylized pantomime of milking [Figure 1.2]. A list of model workers at a Shanghai dairy in the late 1950s does include some men who paid close attention to the calves, and finely chopped their fodder to increase palatability.⁹⁷ But in this and subsequent chapters, we

⁹⁵ Te-luo-gu-xin-na 特羅古鑫娜 [Russian name], trans. Xu Guiting 許桂庭, *Jinaiyuan de laodong weisheng 擠奶員的勞動衛生* ["Labor Hygiene for Milkers"], Beijing: Caizheng Jingji Publishing 財政經濟出版社, 1957, p. 6.

⁹⁶ See for example Liu Shaobo 劉少伯 trans., *Duniu Peiyu 犢牛培育* [*Raising Calves*], Beijing: Caizheng Jingji Publishing, 1954 [original Russian edition published 1950], p. 82.

⁹⁷ Shanghai Municipal Archive [hereafter SMA], B45-2-5-36 Guangrongbang 光榮榜 ["Honor Roll"], p. 37-39.

will see that while men played dominant roles in tasks such as plowing and slaughter, women workers were central to the milking and breeding of cattle.



Figure 1.2: Female workers in poses from the “Dance of the Milkmaids.”⁹⁸

Although they tried to make the cattle comfortable, Western and Chinese dairy practices were ultimately designed to boost milk yields and cut costs, even at the expense of the health of the cows. UNRRA veterinarian Keith Kesteven’s detailed list of guidelines for Chinese dairy farmers provides a clear example. Due to his central role in the UNRRA livestock program when the small domestic Chinese dairy industry was recovering from decades of war, and his frequent travels around the country to observe and critique local dairy farmers, Kesteven’s advice carried considerable weight. Chapter 2 shows that this young Australian doctor played an essential role in the eradication of

⁹⁸Zhongyang Qunzhong Yishuguan中央群众艺术馆编, ed. Jinaiyuan wu 奶员舞[*The Dance of the Milkmaids*], Shanghai Wenhua Publishing 上海文化出版社, December, 1956, p.4, 7.

rinderpest and was highly esteemed for his service to the veterinary profession.⁹⁹ His contributions to the welfare of millions of cattle are unimpeachable. Yet some of his techniques for raising cows and calves brought these animals discomfort and distress.

Kesteven began his instructions by noting that “a badly-reared calf will not develop into a high-productive cow.”¹⁰⁰ Newborn mammals gain nutrition and antibodies by consuming their mother’s colostrum, a yellowish compound produced shortly after birth. For this reason, Kesteven recommended keeping the calf and mother together for at least 48 hours when possible. As we saw above, this is more than enough time for a calf and its dam to form a deep emotional connection, which can persist long after separation. Indeed, among beef cattle, researchers have noted that compared to groups of unrelated cows, “mothers and daughters” display “half as much agonistic [combative] behavior at the feed trough,” even after a year’s separation.¹⁰¹

Economically efficient measures affected not only the calves’ social relations, but also their nutrition and health. Kesteven suggested that, when cost was no object and “the best possible conditions are required to raise a calf,” the animal should receive whole milk for at least six months. “Under natural conditions,” write modern scientists, calves and their dams “remain together until the calf is gradually weaned at approximately six to

⁹⁹ In 1971, Kesteven was awarded an honorary Doctorate of Veterinary Science by the University of Sydney. <http://sydney.edu.au/arms/archives/history/HonKestevan.shtml>, [Accessed September 27, 2017]. The misspelling of his surname as in the URL was a problem throughout his life. Additionally, the Australian Veterinary Association’s Kesteven Medal “is awarded to members for distinguished contributions to international veterinary science by providing technical and scientific assistance to developing countries.” Australian Veterinary Association, <http://www.ava.com.au/about-us-3>, [Accessed Dec. 13, 2016].

¹⁰⁰ SHAC 23-1-2762, K.V.L. Kesteven, “CARE AND FEEDING OF DAIRY CALVES,” August 18, 1947.

¹⁰¹ Ruth C. Newberry, Janice C. Swanson, “Implications of breaking mother-young social bonds,” *Applied Animal Behavior Science* 110 (2008), p. 9.

eight months,” and sometimes for as long as a year.¹⁰² But Kesteven wrote that this healthy but economically inefficient feeding method could be used “only when very high prices are to be obtained for special calves,” by which he likely meant veal. He therefore urged dairy farmers to “wean the calf from whole milk” and switch to a “less costly feed as early as possible without interfering with the normal growth of the calf.” By incrementally moving from whole milk, to skim milk, to a fodder concentrate mixture of corn meal, wheat bran, soybean cakes, salt, and bone meal, the calf could be fully weaned in about nine weeks, some four to six months ahead of the natural schedule.¹⁰³ Farmers needed to take extreme caution to during this process to avoid causing “scours,” (diarrhea) which was due to “the contamination of any food given to the calves.”¹⁰⁴ By substituting human foods and feeding techniques for the cows’ own time-tested method of suckling, farmers increased the animals’ risk of malnutrition and illness. Preventing calves from nursing allowed the animals’ owners to put the cows’ milk and butterfat to their own uses.

Like Kesteven, contemporary Soviet experts suggested that calves be separated from their dams and moved to “calf barns” 犛牛舍 within a month, with the exact timing depending on their health. Caretakers could feed them skim milk with vessels similar to baby bottles [Figure 1.3].¹⁰⁵ A Chinese manual added that these calf barns should be

¹⁰² Frances C. Flower and Daniel M. Weary, “Effects of early separation on the dairy cow and calf: Separation at 1 day and 2 weeks after birth,” *Applied Animal Behaviour Science* 70 (2001), pp. 276. See also Marina A.G. von Keyserlingk and Daniel Weary, “Maternal behavior in cattle,” *Hormones and Behavior* 52 (2007), p. 110; and Berit Lupoli, Birgitta Johansson, et al., “Effect of suckling on the release of oxytocin, prolactin, cortisol, gastrin, cholecystokinin, somatostatin and insulin in dairy cows and their calves,” *Journal of Dairy Research*, Vol. 68 Issue 2, May 2001, pp. 175-187.

¹⁰³ SHAC 23-1-2762, K.V.L. Kesteven, “Care and Feeding of Dairy Calves,” August 18, 1947.

¹⁰⁴ SHAC 23-1-2762, K.V.L. Kesteven, “CARE OF CALVES,” August 8, 1947.

¹⁰⁵ Liu Shaobo, trans., Duniu Peiyu, p.76.

quiet, and the calves should not be able to hear their mothers.¹⁰⁶ This was sound advice, for veterinary science provides evidence that “cow vocalizations elicit cardiac and subtle behavioural responses in calves. Responses [are] greater to a calf’s own dam than to calls from another cow.”¹⁰⁷ The guidelines amount to a tacit acknowledgement of the animals’ distress at the breaking of the parental bond.



Figure 1.3: Feeding calves with bottles

These guidelines illustrate a central tension in veterinary ethics: the patient is also property.¹⁰⁸ A veterinarian’s efforts to improve the health of his or her animal patient are

¹⁰⁶ No author, *Shiyong Yangniu Fa 實用養牛法 [Practical Methods for Raising Oxen]*, Shanghai: Guangyi Publishing 上海廣益書局, 1951, p. 18.

¹⁰⁷ Jeremy N. Marchant-Forde, Ruth M. Marchant-Forde, and Daniel M. Weary, “Responses of dairy cows and calves to each other’s vocalizations after early separation,” in *Applied Animal Behavior Science* 78 (2002), p. 19-28.

¹⁰⁸ Patricia Morris, *Blue Juice: Euthanasia in Veterinary Medicine*, Philadelphia: Temple University Press, 2012; Bernard E. Rollin, “Veterinary Ethics,” in Andrew Linzey, ed., *The Global Guide to Animal Protection, Champaign, Illinois: University of Illinois Press, 2012, p. 261-262.*

ultimately aimed at the satisfaction and profit of the animal's owner. As his words show, Kesteven himself was aware that premature weaning would undermine the nutrition and health of a calf on behalf of its owner's economic well-being. Such compromises are not limited to dairy cattle. The final chapter of this book will address the indispensable role that veterinarians played in developing and regulating the livestock slaughter industry in China. One in particular, Cheng Shaojiong 程紹迥, for decades led successful national campaigns to eliminate rinderpest and other painful, lethal livestock illnesses. His enthusiasm for bigger, better slaughterhouses coexists uneasily with his simultaneous drive to eliminate a disease that killed at least one million Chinese cattle per year. This apparent contradiction fades away with the recognition that Cheng's goals were to conserve China's draft animal labor force, and to provide large amounts of hygienic meat for the country's consumers. While Cheng and Kesteven worked *on* animals, they worked *for* their fellow humans.

This observation does not diminish the substantial benefits that animals gain from veterinary care. Nor is it a condemnation of veterinarians for hypocrisy or greed. Rather, the point is to acknowledge the power disparities inherent in the relationships among veterinarians, animals, and their owners. Historians and philosophers have insightfully probed the awkward corners of human doctors' interactions with colonial subjects and slaves.¹⁰⁹ The extent of humans' domination of their animal workers is even greater than

¹⁰⁹ See for example Shula Marks, "What is Colonial about Colonial Medicine? And What has Happened to Imperialism and Health?" *Social History of Medicine*, volume 10, issue 2, August 1, 1997, pp. 205-219; and Saurabh Mishra's "Beasts, Murraings, and the British Raj: Reassessing Colonial Medicine in India from the Veterinary Perspective, 1860-1900," *Bulletin of the History of Medicine*, volume 85, number 4, Winter 2011, pp. 587-619. This article contains many illuminating insights on the intersection of imperialism and animal health, but does not address the suffering of animals themselves. Stephen C. Kenny's annotated

over any of these human subalterns. An animal's owner can not only restrain it, compel it to work, beat it, brand it, divide its family, and force it to reproduce or castrate it, but also kill it, eat its flesh, and make clothes of its skin. In this environment, veterinarians must constantly navigate dual responsibilities both to animal patients and their human owners. Acknowledging this uncomfortable reality, while recognizing the diversity and richness of animals' inner lives, will bring historians closer to an accurate understanding of the relationships between humans and their animals.

Production and Reproduction

As during the immediate postwar era, children were a vital impetus for the expansion of the Chinese dairy industry during the 1950s. But this growth occurred in a way that the pro-capitalist Western advisors did not foresee or endorse. In the first decade of the People's Republic, changing family and labor relations in the human realm were a key driver of parallel changes for dairy cows and their calves. In the name of "liberating" women from the drudgery of housework and childrearing, the Communist Party urged women to take jobs in both factories and fields. As a direct result, this decade saw the rapid spread of nurseries and daycares, which allowed millions of mothers to join the paid work force without worrying about their children. In these facilities, youngsters

bibliography of outstanding works on "Slavery, Health, and Medicine" is available at <http://www.oxfordbibliographies.com/view/document/obo-9780199730414/obo-9780199730414-0256.xml>, [Accessed September 27, 2017].

consumed substantial amounts of milk. Parental demands for reliable sources of cows' milk spurred the construction and expansion of specialized dairy farms and processing plants across China.

Both human and animal families underwent considerable stresses to suit the needs of intensive economic production. Human children's burgeoning demand for dairy products helped spur the growth of China's herds. As we have seen, contemporary Chinese observations and modern veterinary literature suggest that calves and their mothers, separated so that humans could collect milk from nursing cows, experienced emotional distress. Likewise, in exchange for additional household income and safe daycare, human parents surrendered a great deal of time with their families and autonomy in rearing their children. Satisfying the imperatives of rapid, efficient production thus strained or broke long-standing familial bonds among both humans and cows, with considerable emotional burdens for both species.

Historians typically use the term "reproductive labor" to refer to "cleaning, cooking, child care, and other 'women's work.'"¹¹⁰ For dairy cows, the term takes on a more literal meaning: these animals worked for humans by giving birth (often after artificial insemination), lactating, and losing the ability to oversee and feed their young. To claim their cows' "reproductive labor," humans subverted the animals' biological urges. Just as human women assumed a key role in the reproduction and raising of dairy cattle, so too were female cows indispensable in the new human mode of socialized labor

¹¹⁰ See Mignon Duffy, "Doing the Dirty Work: Gender, Race and Reproductive Labor in Historical Perspective," *Gender and Society*, volume 21, number 3 (June 2007), p. 313.

and child-rearing. Female workers, both human and bovine, bore emotional and physical burdens in the construction of New China.

Women's Liberation?

In joining the paid workforce, women were supposed to gain spiritual benefits both by doing extra work, and by attending classes and meetings in the time they no longer had to devote to child-care. The Jiangsu Province Women's Federation quoted Chairman Mao's injunction to "excavate" the labor of women, while observing that the Soviet leader V.I. Lenin had seen equality of the sexes as dependent on women's "liberation" from housework.¹¹¹ In the words of the Women's Federation, "smashing the capitalist ideology of societal discrimination and the remnants of feudal thinking" required women to shake off the burdens of tending to home and hearth.¹¹²

The Communist Party depicted women's entry into the paid work force as a triumph of equal rights and improved productivity. Yet separation was also emotionally stressful for both mothers and their children. Working mothers worried that their unattended children might drown, be bitten by dogs, or accidentally burn down the house.¹¹³ Some therefore tried to keep their children close at hand. In May 1956, only a few dozen of Shanghai's factories had nurseries. With nowhere to put the kids, many

¹¹¹ Jiangsusheng Funü Lianhehui Gongzuozu (JFLG) 江苏省妇女联合会工作组 [Working Group of the Jiangsu Province Women's Federation] *Dali fazhan minban you'eryuan, tuo'ersuo* 大力发展民办幼儿园、托儿所 [*Vigorously develop collective kindergartens and daycares*], Nanjing: Jiangsu Remin Chubanshe 江苏人民出版社 July 1958, p.2.

¹¹² *Ibid.*

¹¹³ Nursery books.

mothers brought their young children with them onto the factory floor. The Party's internal newsletter drily noted that this practice "affected production."¹¹⁴ Without nurseries to care for their children, mothers in a paper factory in northeastern Jilin province brought the youngsters to work. Chatting with each other and distracted by the children, these women allowed a great deal of flawed paper to pass muster, to the dismay of the factory's quality inspectors.¹¹⁵ What was more, "because of the burdens of childcare," women often arrived late to work, left early, and even missed entire days.¹¹⁶ Crying babies and kids scampering around the machines impeded the smooth running of a factory, to say nothing of the youngsters' own health and safety. The need for better daycare was clear.

To ease the economic and emotional burdens on women in the workforce, the Communist Party therefore encouraged the formation of nurseries across the country. Nurseries were widespread in both rural and urban areas, and participation levels in the 80% range were common.¹¹⁷ Women who entrusted their young children to these facilities could work long, hard hours without the "burden" and "distraction" of tending to their children. These nurseries permitted economies of scale in hiring caretakers and purchasing milk. In the summer of 1956, the central government approvingly circulated

¹¹⁴ Neibu Cankao 内部参考 [Internal Reference], Shanghai gongchang tuo'erszhan baoyuyuan gongzi taidi bu'anxin gongzuo 上海工廠托兒站保育員工資太低不安心工作 ["Salaries for caretakers at daycares in Shanghai factories are too low for them to work without anxiety"] May 23, 1956, p519 [Collection of Chinese University of Hong Kong, hereafter CUHK].

¹¹⁵ Yige Xianjin de Mama Xiaozu 一个先进的妈妈小组 "A Pioneering Group of Mothers," Jilin Ribao 吉林日報, March 7, 1957 [Collection of Hong Kong Baptist University, hereafter HKBU, reel B32].

¹¹⁶ JFLG, Dali Fazhan, p.8

¹¹⁷ C.f. Neibu Cankao 内部参考 [Internal Reference], Beijingshi tuo'ersuo zuzhizhong cunzai de wenti 北京市托儿所组织中存在的问题 ["Problems with the organization of daycares in Beijing"] February 4, 1959, p. 24 [CUHK collection]. Over four hundred thousand children, accounting for eighty-three percent of all pre-school aged children in the Beijing suburbs, were enrolled at one of the area's 26,000 nurseries.

an assessment by the Communist Party Group of the All-China Federation of Trade Unions describing the onerous costs of childcare and baby food for working mothers. Pointing out the nationwide lack of nurseries, the document suggested that children with the most urgent need for daycare were those less than two years old. In addition to constant tending, babies under one year of age required milk. The Federation of Trade Unions observed that hiring a housekeeper and providing milk for a single child consumed all of a typical working mother's wages.¹¹⁸ Without the cost-saving efficiencies provided by nurseries, such women's participation in the labor force would be untenable.

By keeping children out of the way of their working mothers, nurseries boosted women's incomes and workforce participation. A glowing profile of "the lucky women of Daye" in central Henan province noted that 82 percent of a particular commune's children between the ages of one and three were in nurseries. One mother explained that her breastfeeding child had prevented her from taking part in production the previous year. But with the establishment of an affordable local nursery, she could earn five or six work points in a day.¹¹⁹ The Jiangsu Province Women's Federation claimed that female labor force participation 出勤率 increased by 25-35% with the widespread establishment of nurseries during the Great Leap Forward in 1958.¹²⁰

¹¹⁸ Zhonggong Zhongyang 中共中央[Party Central] ["Communist Party Group of the All-China Federation of Trade Unions,"] "Guanyu Zhigong Wuzhi Shenghuo de Jiben Qingkuang he Xiancun Wenti de Qingshi Baogao," de zhishi, 批转全国总工会党组 "关于职工物质生活的基本情况和现存问题的请示报告" 的指示, "pizhuan Quanguo Zonggonghui Dangzhu, June 30, 1956. [Source: <http://ccrd.usc.cuhk.edu.hk/> [Accessed August 22, 2017].

¹¹⁹ Ya Ping 亚平, "The lucky women of Daye," Zhongguo Funü Yuekan 中国妇女月刊 ["Chinese Women's Monthly"], June 1, 1958.

¹²⁰ JFLG, Dali Fazhan, p1.

In the time that they were not raising children, liberated mothers could absorb new social values. The Cultural Education Office of Jiangsu Province's D-County observed that before the establishment of nurseries, "studying and attending meetings were totally out of the question" for women.¹²¹ For this reason, their thinking had been "conservative and backward, and their mindsets were narrow" 心情狭隘. But since the establishment of nurseries, over 236,000 women county-wide had taken part in "red-expert studies" 红专学习, nearly trebling the previous level. Such training would "vastly improve their ideological understanding and their awareness and acceptance of socialism and communism."¹²² The report does not address the possibility that mothers might have preferred to spend their limited free time with their children and spouses. The playwright and bon vivant Oscar Wilde is supposed to have complained that socialism took up too many evenings. The wives and mothers of D- County might well have agreed.

Just as it did with dairy cattle, the state sought to replace biological families' idiosyncratic, informal methods of childrearing with its own standardized approach. Kids in daycares learned to brush their hair, trim their nails, wash their faces and hands, sew buttons, and mend clothing.¹²³ One mother was supposedly delighted that the nursery taught her child to refer to "taking a crap" 屙屎 and "taking a piss" 撒尿 as "large and small conveniences" 大、小便.¹²⁴ Of more direct value to the state, the Women's

¹²¹ Zhonggong D--xian Shenzao Renmin Gongshe Weiyuanhui Wenjian (Xian Ge Ju) D-- Zian Wenjiao Ju 中共东台县沈灶人民公社委员会文件（县各局）东台县文教局 CCP D- County Shenzao People's Commune Committee Document, November 24, 1958, file page 000053. [Zhang Letian special collection at Fudan University].

¹²² Ibid.

¹²³ JFLG, Dali Fazhan, p.16.

¹²⁴ Ibid.

Federation of the city of Yibing in Sichuan province proclaimed that children in nurseries learned “obedience to the law, patriotism, love of the collective, love of labor, and hygiene.”¹²⁵ Nurseries not only helped mothers to become productive, model citizens. In ways large and small, collective childrearing also profoundly shaped the social and ethical development of young children.

The new child-care system even “liberated” women who were not caring for their own children. A fifty-something named Zhou Wenqin formerly helped her daughter and daughter-in-law by taking care of their six children. But with the advent of the nurseries, Zhou was able to take part in transplanting, harvesting wheat, and hoeing, for which she earned 219 work points.¹²⁶ Unmentioned, of course, was that Zhou had received no economic compensation for her original role as a caretaker. Nurseries also affected the rural-urban labor market. The Women’s Federation of the city of Nantong in Jiangsu Province reported that, thanks to the nurseries, housekeepers could return to the countryside and do farm work, rather than staying in the cities to look after urbanites’ children.¹²⁷

While most texts for public consumption portrayed women’s workforce participation as beneficial and liberating, there is evidence that many were dangerously overworked, while patriarchal social relations retained their power.¹²⁸ One internal Party

¹²⁵Sichuansheng Funü Lianhehui bian 四川省妇女联合会编 Sichuan Province Women’s Federation, ed., *Mama gao shengchan, wawa youren guan* 妈妈搞生产，娃娃有人管 [*Mama takes part in production, and someone takes care of Baby*], 2nd ed., Chengdu: Sichuan Renmin Chubanshe 四川人民出版社, 1959, p. 9.

¹²⁶ JFGL, Dali Fazhan, p.9

¹²⁷ Ibid. p.28

¹²⁸ Gail Hershatter, *The Gender of Memory: Rural Women and China’s Collective Past*, Berkeley, California: University of California Press, 2014.

report from Zhangye 张掖 county in northwestern Gansu province noted that five people had fallen seriously ill from overwork during spring plowing in 1956, while six had died.¹²⁹ One was a woman on her menstrual period. She “piled earth for two days, and broke up soil for one day. She then started bleeding and died in less than half an hour.” The woman had asked permission to rest, but her husband did not let her, saying, “If you work less, you get fewer work points.” In another county in the same province, eight pregnant women miscarried after doing heavy physical labor, while nine fell ill from overwork during menstruation.¹³⁰ The imperative of rapid, constant economic growth overruled the physical and reproductive health of many women around the country.

During the Great Leap Forward, fifty men from a production brigade in Sichuan’s Jianyang County were sent to make steel in “backyard furnaces.” With the men gone, in the words of the local women’s federation, “women became the main army fighting the battle of deep plowing.” Putting these women to work required setting up nurseries for their 102 young children.¹³¹ Such nurseries relied in large part on the reproductive labor of lactating dairy cows to feed children. Chapter 4 on draft oxen features a more detailed discussion of the indispensable role of animal muscle power in mid-century Chinese agriculture. For now, it is enough to note that when war and other political campaigns removed the labor of men and cattle from farms, women often stepped forward to fill the

¹²⁹ Neibu Cankao 內部參考 [Internal Reference], Gansu bushao nongmin, funü laodong guodu debing siwang 甘肅不少農民，婦女勞動過度得病死亡 [“In Gansu, many farmers and women are falling ill and dying due to excessive work”] April 27, 1956 p502. [CUHK collection]

¹³⁰Ibid.

¹³¹Sichuansheng Funü Lianhehuibian, Mama gao shengchan, p. 6.

gap. Less visible, but no less important, were the dairy cows who allowed these women to go to work.

Cattle Behind the Scenes

At the height of the Great Leap Forward, a county in northeastern China proudly proclaimed that six thousand of its infant residents were consuming dairy milk, allowing their mothers to focus on farm work.¹³² During the busy summer months, mothers in one commune entrusted their babies to nurseries and then “happily took part in production.” Yet constantly rushing back to the nurseries to breastfeed their children had distracted these industrious women. The local Women’s Federation and Communist Party committee therefore decided to establish a dairy to produce milk for the workers’ children. Delighted with their immediate success, the county soon expanded the program, incorporating 858 scattered cattle into 143 dairies to supply the nurseries.¹³³

Dairy milk was a vital substitute for breast milk, and the country’s herds grew accordingly. Writing in a national newspaper in August 1958, during the early Great Leap Forward, Li Xiaochu, Deputy Director of the Second Ministry of the Commercial Production Enterprise Bureau, observed that the demand for dairy products was constantly increasing, “especially because rural women were taking part in labor” 劳

¹³² “Kangping People's Commune 6000 babies get to consume dairy milk,” *Liaoning Ribao* 辽宁日报 Liaoning Daily, Nov. 19, 1958.

¹³³ *Ibid.*

动。¹³⁴ The authors of a guide to industrial food processing agreed that when women began working outside the home, the establishment of kindergartens, nurseries, and homes for the aged greatly increased the demand for milk products.¹³⁵

As an important part of the diet at nurseries, dairy products brought nutrition and contentment to both mothers and their children. Sun Shuzhen, a mother in Zhejiang Province's Baiquan County, explained, "These days, when I drop my child at the nursery, I let him enjoy some milk, and I can go off to work."¹³⁶ Said Zhao Yaqin, leader of a Women's Brigade, "I used to drop my child off at the nursery with some biscuits, but he would cry when he couldn't bite through them. Now that he has [dairy] milk, I can go take part in production."¹³⁷ Much as milk softened the hard edges of biscuits, it also reduced the emotional strain of separation between parents and children.

Still, we must not exaggerate the consumption of dairy milk in nurseries. After all, not all young children in such facilities drank this beverage. Some daycares in Sichuan Province provided (much less nutritious) sweetened rice milk.¹³⁸ Other children continued to drink human milk, as some daycare employees also served as wet-nurses.

¹³⁴ Hoover Institution Chinese Newspaper collection, Li Xiaochu 黎晓初, Fazhan naipin shengchan de xintujing 发展奶品生产的新途径 ["New ways for developing dairy production"] [confirm publication] August 3, 1958.

¹³⁵ Dongbei nongxueyuan bian 东北农学院编 Dongbei Agricultural Institute, ed. Gaodeng nongye yuanxiao shiyong jiaocai: chumupin jiagongxue 高等农业院校试用教材: 畜产品加工学 [Trial Teaching Materials for High-Level Agricultural Institutes: Livestock Goods Processing], Shenyang, June 1961, p.84.

¹³⁶ Gengniu Zonghe Liyong Jingyan Huibian 耕牛综合利用经验汇编 [Collected Experiences in Integrated Usage of Cattle], Beijing: Nongye Press 北京: 农业出版社, April 1959, p58.

¹³⁷ Ibid.

¹³⁸ Hunan sheng Fulian 湖南省妇联 Hunan Province Women's Federation, Xianhua kai zai leyuan zhong 鲜花开在乐园中 [New flowers bloom in paradise, 1st ed.], Changsha: Hunan Renmin Publishing 湖南人民出版社 Dec. 1958, p. 14.

Having weaned her own baby, caretaker Wu Jinxiu 吴金秀 breast-fed two other children, explaining that while her own child could eat other foods, “tender and fuzzy newborns” 嫩毛毛 needed milk.¹³⁹ Finally, some children who were allergic to cows’ milk consumed the milk of sheep.¹⁴⁰ For all these reasons, it would be a mistake to conclude that every child in every nursery was drinking the recommended amount of dairy. Nevertheless, cows’ milk was an indispensable element of the new labor regime.

Teaching Mothers How to Nurse

While the state modified the nursing practices of bovines, it also sought to “improve” the breastfeeding of human children. In the first decade of the People’s Republic, a substantial body of state-sponsored instructional literature guided mothers in raising healthy, productive children by applying scientific, “modern” principles even to the most personal and instinctive practices. Just as dairy experts recognized the superior health benefits of cows’ milk for calves, authors of parenting guides agreed that human breast milk was the ideal food for young children.¹⁴¹ Human milk was fresh and convenient, and its composition automatically changed to suit a growing youngster’s nutritional needs.¹⁴² Although “mother’s milk is a priceless treasure,” a mother suffering

¹³⁹ Ibid. p.15.

¹⁴⁰ Fang Wenyuan 方文渊, Li Delin 李德麟, Tuo’ersuo Shanshi 托兒所膳食 [*Nursery Cuisine*] Shanghai, Jia Publishing 家出版社, 1950, p.66.

¹⁴¹ Ibid.

¹⁴² Shen Qicui 沈其萃, Zenyang gei haizi weinai 怎样给孩子喂奶 [“How to breastfeed your baby”], Beijing Gongren Ribao 北京工人日报 Beijing Workers’ Daily, January 20, 1957.

from illnesses including tuberculosis, anemia, diabetes, or heart disease should not breast feed.¹⁴³ For the sake of the child's health, and "based on the principle of economy," all mothers (except those with certain diseases) should strive to breastfeed.¹⁴⁴

Despite the health benefits of breast milk, children's recipe books suggest that during the 1950s, as dairy became more widespread, nursing mothers weaned their children at a younger age. One popular text published in 1950 offered dietary guidelines not only by month, but even by the hour. According to the authors, babies should start drinking dairy milk at the age of nine months.¹⁴⁵ As this guidebook was part of a series used by prestigious hospitals and nursing schools in cities including Beijing, Tianjin, and Shanghai, its reach was considerable. By 1957, the Shanghai Hygiene Department suggested that by the age of 3-14 days, babies could consume 1-2 *liang* [50-100g] of both fresh dairy milk and milk powder each day.¹⁴⁶ Both texts repeated the standard advice that human breast milk was the best and cleanest choice for babies.¹⁴⁷ Yet they acknowledged that the milk of other animals could meet most of babies' needs.

Although Chinese planners believed the adage that "breast is best," there could be too much of a good thing. Authors discouraged the practice of prolonged breastfeeding, and of allowing children to suck at an empty breast 吃干奶 even after weaning. "Because

¹⁴³ Xin Mei 心梅, *Naxie muqin bukeyi weinai haizi* 那些母亲不可以奶孩子? ["Which mothers cannot breastfeed their children?"] Beijing Gongren Ribao 北京工人日报 *Beijing Workers' Daily*, Feb 4, 1957.

¹⁴⁴ Shen Qiucui, "Zenyang," *ibid.*

¹⁴⁵ Fang Wenyan 方文渊, Li Delin 李德麟, *Tuo'ersuo Shanshi* 托儿所膳食 [*Nursery Cuisine*] Shanghai, Jia Publishing 家出版社, 1950, p.77.

¹⁴⁶ *Shanghaishi Weishengju bian* 上海市卫生局编 Shanghai Municipal Hygiene Department, ed., *Tuo'ersuo shipu* 托儿所食谱 [*Daycare Recipes*], Shanghai: Shanghai Weisheng Publishing 上海卫生出版社, 1957, p. 1.

¹⁴⁷ *Ibid.* p. 65.

they love their children so much,” explained one writer, “some mothers let them drink breast milk until the age of two or three, and some let the child suck at the breast until the age of four or five, even after they have no milk.”¹⁴⁸ But this practice was misguided, for it could slow the child’s development, while wasting the mother’s time and energy.¹⁴⁹

Another writer attacked the practice on the basis of cleanliness and contagion: “Seeing baby make a fuss / To ease his worries, let him suck / Suck, suck, wipe, wipe: unhygienic / This custom must be changed.”¹⁵⁰ Paired with an illustration of a toddler at the breast of an elderly lady, the doggerel suggests that whatever solace a child might derive from this practice, such behavior could transmit disease and must be discouraged [Figure 1.4]. By providing guidelines for such an intimate, instinctual behavior as breast-feeding, the state asserted its role as a regulator of reproductive behavior and protector of its citizens’ health.

¹⁴⁸ Zhao Yulin 赵玉琳, *Zenyang gei haizi duannai 怎样给孩子断奶* [“How to Wean Your Baby”], Beijing Gongren Ribao 北京工人日报 *Beijing Workers’ Daily*, March 25, 1957.

¹⁴⁹ Ibid.

¹⁵⁰ Chen Zhengzhen, Xiao Qiong, 這些習慣要改掉 [“These customs must be changed”], *Zhongguo Funü Yuekan 中国妇女月刊 Chinese Women’s Monthly*, June 1, 1957 [HKBU archive]



Figure 1.4: “These customs must be changed.”

That Others May Live

While the growth of dairy herds in urban hinterlands accounted for some dairy consumption, the transformation of milk into a mass-market product resulted from the exploitation of previously under-used pastures on China’s northern and western frontiers. The high cost and relative economic inefficiency of dairy production had historically confined the nation’s dairy farming to urban peripheries where, as the American agronomist John Lossing Buck explained, “families in the higher income classes can afford to purchase dairy products.”¹⁵¹ Technological breakthroughs in the 1950s meant that the grass of China’s vast and sparsely populated northern and western prairies could

¹⁵¹ John Lossing Buck, *Land Utilization in China: A study of 16,786 farms in 168 localities, and 38,256 farm families in twenty-two provinces in China, 1929-1933*, New York: Paragon Reprint Corporation, 1964 (Second Printing), first edition: Nanking: University of Nanking, 1937, p. 257.

convert solar energy into calories for cattle, whose milk could then nourish the humans of the densely populated coasts and cities.

Some mid-century Chinese writers blamed the country's small dairy industry on foreign depredation. Western-trained experts, by contrast, tended to focus on ecological and demographic factors in arguing that specialized dairy production used land and resources too inefficiently to become widespread in China proper. Simply put, cattle eat too much. In 1937, the agricultural economist John Lossing Buck noted that “grains and tubers” yielded six or seven times as much food energy per unit area as dairy cattle.¹⁵² Almost a decade later, Shen Zonghan 潘宗瀚 an eminent agronomist who studied at Cornell University, calculated that raising a single ox for meat or dairy required 20-30 *mu* [approximately 1-2 hectares] of land. While a family of five could live on the crops from such a plot, a cow's yield of milk or flesh was “decidedly” inadequate to sustain so many people. He concluded, “This is the economic reason why development of the livestock enterprises in our densely populated areas has not been possible.”¹⁵³ Ten years after Shen's analysis, the geographer Glenn Trewartha agreed that Chinese farmers' “largely vegetarian diet” had allowed the nation's rural population to reach the unusually high density which in turn made the dairy and beef industries impractical.¹⁵⁴ While recent imperial incursions and market distortions had hindered the growth of the country's dairy

¹⁵² Ibid.

¹⁵³ UNRRA S-0528-0119 “Agricultural Resources of China” folder—contains report of same title, (First Draft) Chinese version by Tsung-han Shen [Shen Zonghan], Ph.D., Acting director, National Agricultural Research Bureau, MOAF, English translation by Shou-yu Feng, Technical assistant to US Agricultural Attaché, Shanghai, June 1946, p. 3.

¹⁵⁴ Glenn T. Trewartha, “New Maps of China's Population,” *Geographical Review*, Vol. 47, No. 2 (Apr., 1957), p. 239. [Accessed: May 10, 2016 at <http://www.jstor.org/stable/211594>].

industry, the unforgiving arithmetic of energy and resource consumption had been enough to forestall the development of a national milk industry.

Another Western-trained writer, the sociologist Fei Xiaotong 費孝通, explained how industrial improvements could link the under-used grasslands of Inner Mongolia to the consumers of China proper. In a lengthy report based on a visit to the northern prairies around the city of Haila'er 海拉爾, Fei explained that because every family on the grasslands raised cattle, the supply of milk far exceeded demand.¹⁵⁵ A family of eight with a herd of just four or five cows could live comfortably on the two to three *jin* of milk per day that each animal produced. In fact, locals in the Ulan Bataar region did not want to breed for higher yields, because they had a surplus even with just ten pounds of milk per cow each day.

To feed the babies of China while raising the incomes of the Inner Mongolians, Fei called for sedentary dairy farming in conjunction with improved dairy processing capacity and transportation networks. He noted that in the past, the many Russian emigrés in the Haila'er region had run dairy farms, purchasing grass to feed their cows and collecting 40-50 *jin* every day from each cow. Sighed Fei, "If everyone on the grasslands raised their cattle in this way, they'd be able to sell off their milk. Wouldn't the herdsmen be able to improve their living standards?" Instead, the herders moved their animals across the pastures, living in portable yurts and subsisting on meat and milk.

¹⁵⁵ Fei Xiaotong 費孝通, Niunai he yangrou: huashuo Hu'lunbei'er caoyuan zhi er 牛奶和羊肉: 話說呼倫貝爾草原之二 [Milk and Lamb: Talking about two aspects of the Hulunbei'er Grasslands], Xinguancha Banyuekan 新觀察半月刊 *New Observer Biweekly*, October 1, 1955, pp. 27-29 [HKBU collection, reel D106].

Powdered milk offered state planners a way to use vast, sparsely populated territories far from the country's heartland to serve the needs of major cities in China proper. In 1955, a grassland survey team found that five large prairies in Gansu province offered "lush pasturage, with a high nutritional value," adding that "the masses make little use of them."¹⁵⁶ In January 1957, the official Xinhua news service reported on the construction of four large milk powder factories in the key dairy regions of Heilongjiang, Gansu, and Inner Mongolia. The paper reported that when complete, these facilities would be able to provide enough milk powder to feed over five hundred thousand children per year.¹⁵⁷ Later that year, a high-level two-week conference with representatives from fourteen provinces and autonomous regions called for the grasslands and mountainous areas to develop their livestock industries so as to provide both live animals as well as meat and other animal products to other parts of the country.¹⁵⁸

Condensing and powdering liquid milk for ease of travel and storage were the best way to bridge both the spatial gap between the grasslands and the consumers, and the temporal gap between seasonal fluctuations in dairy production and human drinkers' constantly growing demand for milk. Easy to store and ship, powdered milk was essential for satisfying urban consumers far from the pastures and dairy herds of Inner Mongolia,

¹⁵⁶ Gansu wancheng wuge caoyuan kancha gongzuo 甘肃完成五个草原勘查工作 ["Survey of five grasslands in Gansu is Complete"], Renmin Ribao 人民日报 *People's Daily*, November 13, 1955.

¹⁵⁷ Si da rufenchang jinnian wangong 四大乳粉厂今年完工 ["Four large dairy powder processing plants to be completed this year"], *Xinhua*, January 7, 1957.

¹⁵⁸ Chumuye shengchan zuotanhui tichu fangzhen he renwu: rang zuguo de shanye biandi shi niuyang, 畜牧业生产座谈会提出方针和任务：让祖国的山野遍地是牛羊 ["Livestock Production Discussion Meeting Sets Forth Direction and Responsibilities: Let Cattle and Sheep Cover the Mountainous and Wild Areas of the Motherland"] Renmin Ribao 人民日报 *People's Daily*, December 20, 1957 [HKBU collection, reel D230].

Heilongjiang, and Qinghai. Furthermore, as milk yields were highest during the summer months, turning the liquid into a non-perishable powder could moderate the winter shortfall.¹⁵⁹ This process, however, relied on technology to stave off the bacteria that flourish in fresh, raw milk during transit. Chapter 3 on cattle plague shows that the country's refrigeration capacity during the 1950s was extremely limited. Almost no one had a refrigerator to store cold milk, but almost everyone could boil some water to reconstitute milk powder. While imports accounted for most of China's powdered milk before the 1950s, the growth of a domestic dairy processing industry in that decade brought energy from faraway pastures within the reach of hundreds of millions of people.

Statistics from Shanghai show the increase in China's milk powder processing capacity, and the resultant tightening of ecological bonds between the country's largest metropolis and its grassy frontiers. Between 1957 and 1960, Shanghai's total milk powder imports from other provinces increased by approximately 64%.¹⁶⁰ Furthermore, improvements in processing capacity permitted the share of milk that Shanghai imported from far-off provinces such as Heilongjiang and Qinghai to rise from 58% to well over 80%. Thanks to sterilization and powdering technology, solar energy striking blades of grass on China's Central Asian and northeastern frontiers could nourish a baby whose mother was working in a factory in a coastal city [Table 1.1].

¹⁵⁹Dongbei nongxueyuan bian 东北农学院编 Dongbei Agricultural Institute, ed. Gaodeng nongye yuanxiao shiyong jiaocai: chumupin jiagongxue 高等农业院校试用教材：畜产品加工学 [*Trial Teaching Materials for High-Level Agricultural Institutes: Livestock Goods Processing*], Shenyang, June 1961, p. 141-142.

¹⁶⁰ SMA B98-1-782-44, Naifen linianfensheng diaoru qingkuangbiao 奶粉历年分省调入情况表 ["Table showing historic imports of dairy powder by province"].

Table 1.1: Annual Milk Powder Transfers From Other Provinces to Shanghai (kg)

Data source: Shanghai Municipal Archives¹⁶¹

Year	1957	1958	1959	1960
Total milk powder imports	323,046	249,439	453,079	531,584
a. Inner Mongolia	60,561	107,267	334,592	293,381
b. Heilongjiang	125,762	66,681	35,990	45,026
c. Xinjiang	--	--	28,092	95,625
d. Qinghai	--	42,125	15,000	5,000
Percentage from a. – d.	58%	87%	91%	83%

We can estimate the number of cattle involved in this feat of bovine reproductive labor. First, note that milk powder was reconstituted in water at a ratio of 8:1, returning it to its original volume. This implies that the total wet weight of Shanghai's milk imports in 1960 was $531,584 \text{ kg} * 8 = 4,252,672 \text{ kg}$. The average annual yield of Chinese dairy

¹⁶¹ Ibid. For clarity, I have omitted information about the sources of milk powder from provinces other than those listed in items a. through d. This does not affect the calculations shown in the table.

cattle varied considerably during this period, owing to factors ranging from quality of care and fodder to genetics and climate. Reported estimates range from a thousand kilograms to a whopping ten thousand kilograms.¹⁶² Due to the incentive for breeders to score political points by exaggerating yields, such numbers must be treated with caution. A conservative estimate in line with global standards would be two thousand kilograms. Dividing total import consumption by this number suggests that in 1960, over 2,100 dairy cattle in remote provinces were working year-round to help satisfy one large city's requirement for milk powder. This figure does not include the city's own herds.

Although the above estimate is necessarily imprecise, it gives a way to start considering the scope of what was effectively the cows' bereavement. Each cow had been prematurely separated from its offspring, at the cost of visible emotional pain. This cycle of pregnancy, birth, and loss typically repeated at least five times during the cow's life. For any individual dairy calf and its mother, it scarcely mattered whether 30,000 or 300,000 cattle around the country shared their predicament. While the scale and distribution of experiences are important, they should not obscure the realities of breathing, drinking, and mourning for any individual human or cow.

The Dangers of Running Out of Milk

¹⁶² For example, see yields of Binzhou dairy cows 賓州奶牛 ranging from 2,140-3,667 kg per year in 中华人民共和国农业部畜牧兽医总局编, 全国农业展览会出优良畜禽图册, 农业出版社,1957 p. 86.

While milk powder linked remote pastures to rural and urban nurseries, it was not easy to increase the national production capacity, and cattle sometimes suffered. In June 1956, an internal Party report noted that twelve of the thirteen dairy processing plants in Heilongjiang province yielded products of very low quality. They could sell only 20% of what they produced, while the rest piled up in warehouses. Near the northern city of Harbin, dairy farmers were reduced to pouring their milk onto the ground, for the local canning and processing plants had ceased to buy. In the end, the municipal agricultural department agreed to let the frustrated farmers sell nearly 200 cattle to “the area between the passes,” i.e. China south of the Great Wall.¹⁶³ After they were sold off, the fate of these cattle is unclear. Nevertheless, they almost certainly endured lengthy travel, separation from familiar peers, and possibly slaughter. Cattle respond to isolation and unfamiliar environments with behaviors that indicate distress and fear. Such indicators include elevated levels of the stress hormone cortisol, increased heart rate, high-frequency vocalization, and stress-induced analgesia [reduced pain sensitivity].¹⁶⁴ To call attention to this suffering is not to condemn the original or new owners of the cattle. Rather, it is to emphasize that animals are not inert assets like other forms of property. They have physical and emotional needs that do not necessarily overlap with the agendas of their human owners.

¹⁶³ Neibu Cankao 内部参考 [Internal Reference] Heilongjiangsheng niunai zhixiao, nongmumin yijian henduo 黑龍江省牛奶滯銷，農牧民意見很多 [“Dairy sales cease in Heilongjiang, farmers and herders are dissatisfied”] June 6, 1956, page 136 [CUHK collection].

¹⁶⁴ J. Rushen et al., “Opioid Peptides and Behavioral and Physiological Responses of Dairy Cows to Social Isolation in Unfamiliar Surroundings,” *Journal of Animal Science* (1999), 77: 2918-2924.

The inability of milk processors to produce quality goods, combined with the burgeoning demand for powdered milk from working mothers, yielded a distorted market in which some dairy farmers destroyed milk while urban parents fretted over shortages. In October 1956, a Beijing newspaper published letters from readers concerned about the lack of dairy products even at major department stores. Zhou Guoying, an office worker and mother of three in the northern city of Tianjin, lamented that no local stores carried domestically produced powdered milk. In search of affordable milk, the desperate mother had even sent a friend to the finest department stores in Beijing, to no avail. Only imported brands such as Klim (克宁) and Golden State (金山) were for sale, at the impossible price of nine yuan per pound. Zhou had stopped breastfeeding her four-month-old son several months earlier, and now resorted to feeding the baby rice broth 米汤. Watching as her formerly calm and pudgy baby lost weight and cried day and night was “extremely painful.”¹⁶⁵

At stake were not only the sorrows of individual families, but also the socialist project itself. For worried father Fan Baoxing in the southern city of Hangzhou, securing milk powder for his emaciated child was “harder than ascending to heaven.” In addition to the emotional turmoil resulting from the uncertain food supply, Fan pointed out that “children are our successors, and guaranteeing their health means guaranteeing our own cause 事业.”¹⁶⁶ The researchers Zhang Su and Lü Shanyan have pointed out that

¹⁶⁵ Xuduo difang maibudao guochan naifen 许多地方买不到国产奶粉 [“Domestically-produced milk unavailable for purchase in many places”] Beijing Da Gong Bao 北京大公报 October 29, 1956 [Hoover Institution Chinese Agriculture collection].

¹⁶⁶ Ibid.

children's demand for dairy was "inelastic...whereas even the highest-ranked official could go a few days without milk, a baby without its mother's milk could not miss a single meal."¹⁶⁷ By endangering families' most vulnerable members, milk shortages could lead to social unrest.¹⁶⁸ Both the wellbeing of China's babies and the future success of the socialist revolution demanded a rapid response to the dire lack of dairy products.

Contemporary journalists remarked on the political causes of the situation. In the *People's Daily*, Zhu Youren 朱友仁 noted that in the third quarter of 1956, the city government of Shenyang had received over 150 letters from female workers unable to buy dairy, blaming the Ministry of Commerce as they "held their wailing babies."¹⁶⁹ In Zhu's estimation, the formation of public-private partnerships 公私合营 earlier in the year meant that many "capitalist" families joined the paid work force. They entrusted their children to caretakers or nurseries, where the youngsters consumed milk powder. As rural women in advanced agricultural cooperatives 高级社 began leaving their children in nurseries during the day, the demand for powdered milk rose even further. When domestic processing capacity proved unable to meet this demand, shortages were the inevitable result.¹⁷⁰

Some parents also connected the suffering of their malnourished children to the mistreatment of collectively-managed dairy cattle. In an open letter to the *People's Daily*,

¹⁶⁷ Zhang Su 张苏, Lü Shanyan 吕珊珊, "General Descriptions of Policies and Measures for Development of Dairy Industry in Early Years after 1949," *Chinese Agricultural Science Bulletin*, 2014, 30(8):1-6, p. 3.

¹⁶⁸ Ibid.

¹⁶⁹ Zhu Youren 朱友仁, Naifen weishenme tuoxiao 奶粉为什么脱销 ["Why are there powdered milk shortages?"], *Renmin Ribao* 人民日报 *People's Daily*, Nov. 1, 1956.

¹⁷⁰ Ibid.

anxious father Wang Jianqiu decried his once-lively baby's watery diarrhea. With Wang unable to buy milk, and his wife unable to nurse the five-month old child, the scrawny baby subsisted on rice broth.¹⁷¹ While acknowledging that cows' milk yields tended to decline in the winter, Wang suggested that his inability to purchase fresh milk in Beijing was due in part to a sharp decline in husbandry standards following the cooperativization of the city's Xishan dairy. The feeding staff were mixing the dairy cows' fodder and drinking water, and "no one cares if the cows eat or not." Pointing out that the neglected cows were covered in mud, Wang asked, "With this kind of feeding and management, how can [the cows] not produce less milk?"¹⁷²

Policy directives and hortatory newspaper columns make clear that many officials and dairy specialists shared these concerns about the cooperatives' poor care of their herds. As we have seen, dairy farmers in the West, in the Soviet Union, and in China agreed that the animals required a great deal of personal attention and scrupulous care. The effect on milk yields of grooming, nutrition, and emotional support for the animals were a constant refrain of dairy farming guides. By publishing Wang's letter, the *People's Daily* was giving collective farm managers a not-so-subtle push toward improving their livestock management practices.

Sometimes the farms' counter-productive attempts to cut costs were at fault. The *Nanjing Daily* reported on two high-yielding cows that died of sun stroke in the city's 98°F [37°C] summer weather when the dairy farm's managers felt that installing cooling

¹⁷¹ Duzhe laixin: Rang ying'er you xianniunai chi 讀者來信：讓嬰兒有鮮牛奶吃 ["Letters from readers: let children have fresh milk to drink"], Renmin Ribao 人民日報 *People's Daily*, December 17, 1956. [Hoover Institution collection].

¹⁷² Ibid.

equipment would be a waste of funds.¹⁷³ The newspaper did not discuss the dying animals' fear and agony, but estimated that their loss cost the government 10,000 yuan.¹⁷⁴ While many farmers surely did their best with limited resources, the government's frequent calls for better husbandry suggest that ignorance, incompetence, and indifference continued to plague both the dairy herds and the human families who relied on them. Chapter 4 on draft labor shows that the cooperatives' mismanagement of plowing cattle was even more alarming to officials, and even more disruptive to the national economy.

To address the milk shortages, the PRC government used a range of techniques: a massive breeding campaign to create cows with higher yields; boosting the country's milk powder processing capacity to make dairy from remote pasturelands accessible to consumers in the rest of the country; and promoting the milking of cattle bred to be draft laborers. Due to cows' innate biological limits, breeding took several years to yield results. Chapter 5 addresses the intensive breeding campaigns of the mid- to late-1950s. In this effort, artificial insemination was a novel means of transferring genetic information across great distances, thus advancing the ecological unification of the country and multiplying the nation's ability to extract energy from its far-flung grasslands. The remainder of this chapter will address yet another of the state's attempts

¹⁷³ Nanjing muchang pianmian kaolü jieyue: Liangtou gaochan runiu zhongshu siwang 南京牧场片面考虑节约：两头高产乳牛中暑死亡 [“Nanjing livestock farm excessively seeks to cut costs: Two high-yield dairy cows die of heat stroke”] Nanjing Ribao 南京日报 *Nanjing Daily*, July 21, 1957 [HKBU collection, reel 230].

¹⁷⁴ Ibid.

to make the most of limited resources, this time by milking draft animals bred not for their dairy yields but for their physical strength.

Making Do with Draft Oxen

Expanding dairy production in the grasslands was a key method of extracting food energy from an under-used source. Milking draft animals was another. As early as 1941, the Nationalist Ministry of Agriculture and Forestry (MOAF) had called for national and provincial livestock breeding stations to improve the milk yields of draft oxen so as to “provide food and improve the people’s health.”¹⁷⁵ But due to the considerable distraction of the Anti-Japanese War, progress was slow. In June 1946, in his capacity as acting head of the MOAF, Shen Zonghan noted that because it was “hardly economically possible” for most Chinese farmers to keep dairy cattle, “plowing cattle and [water] buffaloes” might be sources of milk for the young and the ill.¹⁷⁶

By the mid-1950s, this practice, known as “integrated usage” 綜合利用, had become popular. In one agricultural cooperative in Zhejiang Province, farmers were able to collect a daily average of 2 *jin* [approximately 1 kg] of milk per female ox. This would be enough for the 65 children of the collective, and would allow their mothers to take part

¹⁷⁵ SHAC 23-1-3116 Nonglinbu sannian shizheng jihua gangling, fazhan quanguo chumu shouchan shiye’an deng youguan wenshu 農林部三年施政计划纲领、发展全国畜牧兽产事业案等有关文书 [Documents related to MOAF three-year plan for developing livestock production nationwide] [PDF page 50].

¹⁷⁶ UNRRA S-0528-0119 “Agricultural Resources of China” folder—contains report of same title, (First Draft) Chinese version by Tsung-han Shen [Shen Zonghan], Ph.D., Acting director, National Agricultural Research Bureau, MOAF, English translation by Shou-yu Feng, Technical assistant to US Agricultural Attaché, Shanghai, June 1946, p. 49.

in farm work.¹⁷⁷ Integrated usage offered a way to make use of oxen during the slack seasons for farming: when not plowing, they could at least be producing milk.¹⁷⁸

Still, integrated usage posed some challenges to cattle. Whereas dairy cows were accustomed to being milked, draft oxen were not. Farmers therefore had to tie their legs and massage their teats to calm them.¹⁷⁹ In addition, these dams and calves were not used to being fed separately, and the young would refuse to eat. The editors of a guide on the subject warned that the separation would be “hard for them to bear, and they will call out day and night. The calf may even trample crops.”¹⁸⁰ After collecting and skimming the milk from a nursing ox, the feeder therefore had to warm the liquid to the body heat temperature of 35 degrees Celsius, and offer a thumb for the displaced calf to suck in place of a teat.¹⁸¹

Whether for reasons of taste or prestige, it appears that humans preferred dairy cows’ milk to the offerings of draft oxen. Although their nutritional contents were comparable, the “Draft Guidelines for the Dairy Industry” stipulated that the milk of water buffalo and sheep must be clearly labeled and kept separate from dairy cows’ milk.¹⁸² Listed in a section on quality control, alongside bans on dyes and other additives, this rule suggests that consumers preferred to drink from cattle bred for milking.

¹⁷⁷ Gengniu Zonghe Liyong Jingyan Huibian 耕牛综合利用经验汇编 [*Collected Experiences in Integrated Usage of Cattle*], Beijing: Nongye Publishing 农业出版社, April 1959, p.57.

¹⁷⁸Ibid. p.45.

¹⁷⁹Ibid. p.35.

¹⁸⁰Ibid. p.58

¹⁸¹Ibid. p.32.

¹⁸² SMA S118-4-51, “Draft Guidelines for the Dairy Industry,” [no date on original], page 22.

Dairy specialists argued that draft animals could be milked without substantially reducing their labor capacity.¹⁸³ Yet this technique had risks, especially when adequate fodder was unavailable. Like breastfeeding humans, lactating cows require additional calories.¹⁸⁴ By the end of the 1950s, as the effects of the Great Leap famine became clear, officials saw a need to balance the possibility of increased milk yields against the risk of over-burdening their already malnourished herds. In a draft of his speech to a local meeting of Jiangsu's Agriculture Industry Department in July 1959, department head Wang Yixiang 王一香 suggested that integrated usage was appropriate for places with "rather good economic conditions," such as the areas around cities and along the Shanghai-Nanjing railway.¹⁸⁵ Such locales could provide enough fodder to sustain the animals for both farm work and milking. Like their human masters, draft oxen were already strained to the breaking point during these lean years. To demand both their labor and their milk could be calamitous for cows, and for the humans who relied upon them.

¹⁸³ Gengniu Zonghe Liyong Jingyan Huibian 耕牛综合利用经验汇编 [*Collected Experiences in Integrated Usage of Cattle*], Beijing: Nongye Publishing 北京: 农业出版社, April 1959, p.14.

¹⁸⁴ The Mayo Clinic suggests 500 additional calories per day (<http://www.mayoclinic.org/healthy-lifestyle/infant-and-toddler-health/in-depth/breastfeeding-nutrition/art-20046912> [Accessed August 22, 2017]. Lactating cows require carefully adjusted fodder levels to provide extra calories and nutrition. See University of Minnesota Extension, "Feeding the Dairy Herd," <https://www.extension.umn.edu/agriculture/dairy/feed-and-nutrition/feeding-the-dairy-herd/nutrition.html> [Accessed August 22, 2017].

¹⁸⁵ Jiangsu Province Archive [hereafter JPA] 4069-002-0215 江苏省农林厅畜牧兽医局本厅、局关于畜牧兽医工作的发言和社论、评论（1959）在地市委农工部长会议上的发言（记录稿）Wang Yixiang draft remarks, July 9th, 1959, page 5.

Women Working for Calves, Cows Working for Children, All Working for The People

The capabilities and aspirations of the new PRC government brought human women and female dairy cattle into a trans-species sisterhood of production and reproduction. For reasons of efficiency and hygiene, the state supported the creation of many large collective dairy farms and thousands of nurseries. The government also provided detailed directions for the feeding, cleaning, and organization of young individuals in both farms and nurseries. “Liberating” the productive potential of human women by encouraging them to work in farms and factories required finding alternative food sources for their children, whose mothers were unable to breast-feed during the workday. The newly centralized and dramatically expanded dairy herds helped to fill this need. To enter the paid work force, human women weaned their babies early. They then entrusted the children directly to female caretakers at state-sponsored nurseries, and indirectly to the female bovines whose milk gave the youngsters essential sugar, fat, and protein. Dairy calves, meanwhile, were cared for largely by human women, whose supposed gentleness and attention to detail made them best suited for this work. But however solicitous their caretakers and milkers, dairy calves and dams were prematurely separated so that most of the cows’ milk could foster young humans. The dairy industry thus bound together human women and female cattle in perhaps the most intimate of bodily functions: nursing the young.

Much of this discussion has focused on the instrumental and observational histories of dairy cattle. Yet wherever possible, I have sought to interpret the lived

experiences of the human and bovine participants. Many women surely appreciated the opportunity to earn work points outside the home by participating directly in the construction of socialism, in the rice paddies and on the factory floor. Meanwhile, in the nurseries, their children could play safely and learn values such as patriotism, all while receiving a healthy diet including plenty of milk. Yet we have seen as well that women's "liberation" did not overturn patriarchal power relations, or free women from grueling, sometimes dangerous levels of physical exhaustion. Tedious meetings and political discussion groups filled much of the time they would once have spent with their children. And of course, mismanagement and shortages in the dairy industry resulted in physical harm and emotional distress for babies and their parents. The rise of nurseries and the growth of dairy herds simply meant that many working mothers and their female relatives swapped one form of difficult, stressful work for another.

To interpret the experiences of dairy cattle, we have read the historical record in conjunction with the scientific literature of cattle physiology and behavior. Contemporary experts agreed that for both humans and bovines, their own mother's milk was the optimal food source. Satisfying the needs of intensive socialist production meant denying this food source both to calves, and to human babies just a few months old. Neither group can speak articulately on the matter. But the sources suggest that many calves and babies experienced ill health and discomfort as a result of prematurely adopting an artificial diet.

The evidence is clearer that calves and dams suffered from separation. Based on indicators such as blood cortisol levels, vocalizations, ear posture, and eye movements, modern veterinarians conclude that separating calves from their mothers is emotionally stressful for both. Furthermore, these calves were often neglected or put to death, having

served their purpose by inducing lactation in their mothers.¹⁸⁶ Finally, we have examined the living conditions of cattle on collective farms. To boost yields, dairy farmers did strive to maintain hygienic and peaceful conditions for their cattle. But the frequent, public admonitions for dairy workers to take better care of the herds suggest that for cows in such facilities, life was mentally and physically taxing. So that human women could set aside their children and go into the fields, dairy cows had to stay in the barns and surrender their calves.

¹⁸⁶ Jiaoyu yangruniuhu baohu xiaoniu 教育養乳牛戶保護小牛 [“Teach dairy-farming households to protect calves”], Fujian Ribao 福建日報 *Fujian Daily*, January 10, 1956; Muniu he xiaoniu 母牛和小牛 [“Dams and calves”], Fujian Ribao 福建日報 *Fujian Daily*, January 7, 1956 [HKBU collection, reel D106].

Chapter 2 Lymph: The Eradication of Cattle Plague in China, 1946-1956

On a warm spring day in 1946, an ox in a small Chinese village began to weep. Its tears were ‘ocular and nasal discharges,’ accompanied by acute fever and ‘oral and gastrointestinal tract ulceration, diarrhea, dysentery, dehydration, protein loss, and immune-suppression.’¹⁸⁷ The cow’s genitals showed ‘necrotic lesions,’ and as the disease progressed, the animal underwent ‘severe abdominal pain, thirst, and tenesmus [rectal cramping].’¹⁸⁸ Anyone looking inside the ox’s mouth would find a gruesome scene [Figure 2.1]¹⁸⁹:



Figure 2.1: The mouth of a cow with rinderpest.
Note the ulcerations and dead tissue on the gums.

¹⁸⁷ P. Roeder, J. Mariner, R. Kock, ‘Rinderpest: the veterinary perspective on eradication,’ *Philosophical Transactions of the Royal Society, B* 368: 20120139. (2013).

¹⁸⁸ “Rinderpest: Cattle Plague,” Iowa State University Center for Food Security & Public Health and Institute for International Cooperation in Animal Biologics, www.cfsph.iastate.edu, August 2008, Minor updates January 2016.

¹⁸⁹ Iowa State University of Science and Technology, ‘Disease Images: Rinderpest,’ Center for Food Security & Public Health, <http://www.cfsph.iastate.edu/DiseaseInfo/disease-images.php?name=rinderpest&lang=en>, accessed April 20, 2017.

The ox had contracted rinderpest. Known as ‘cattle plague,’ this virus of the family *Paramyxoviridae* had been the scourge of European and Asian farmers for centuries, afflicting common cattle, yaks, water buffalo, and wild animals such as camels and giraffes.¹⁹⁰ Incurable and highly lethal, the disease wreaked havoc on farmers by depriving them of draft labor, manure for fertilizer and fuel, and protein-rich foods such as meat and milk. For the cattle themselves, the illness was excruciating and almost always terminal. Eradicating this disease would be a public health success not only for the herds, but also for the humans who depended on them.

For the first half of the twentieth century, near-annual outbreaks of rinderpest claimed the lives of hundreds of thousands or even millions of cattle in China each year. Dubbed ‘the disease of war,’ rinderpest thrived in the chaos and poverty of that battle-damaged country.¹⁹¹ The sick cow who began this essay was tragically commonplace, as was the suffering and grief of the peasants who mourned his death.

Convoluting, risky, and ultimately successful, the campaigns to exterminate rinderpest in China offer new perspectives on several facets of recent history. This account places China within a transnational web of expertise, capital, and genetic material. Government veterinarians under successive political regimes ensured the success of the eradication campaign by adapting medical technology to local scientific and social conditions. Recognizing cattle as intelligent, social actors, we will make our

¹⁹⁰ C.A. Spinage, *Cattle Plague: A History*, New York: Kluwer Academic/Plenum Publishers, 2003.

¹⁹¹ J. R. Crowther, “Rinderpest: at war with the disease of war,” *Science Progress*, Vol. 80, No. 1 (1997), 21-43.

first cautious steps toward discovering their history during a period of intense political turmoil.

Saving Animals to Stave off Communism

It is difficult to overstate the importance of animal draft labor in Chinese agriculture during the first three-quarters of the twentieth century. The economist Barry Naughton has shown that until the early 1970s, ‘animal traction and human muscle were the sources of power’ in the countryside.¹⁹² A 1944 report from the Nationalist [Kuomintang, or KMT] Government to the United Nations Relief and Rehabilitation Administration (UNRRA) claimed that ‘water buffaloes, cattle, horses, mules and donkeys are raised largely as work animals’ for sixty million farms accounting for 1.4 billion *mu* [93.3 million hectares] of cropland.¹⁹³

Violence among humans sharply reduced animal populations. From 1937-1945, the ‘pillage, shortage of feeds, and animal epidemics’ of the Anti-Japanese War sharply reduced the nation’s livestock population [Table 1].¹⁹⁴ Writing in English for the benefit of UNRRA administrators, the Nationalist authorities had an incentive to emphasize the severity of wartime losses in hopes of encouraging donors’ generosity. Furthermore, the

¹⁹² Barry Naughton, ‘Motive Power in the Countryside,’ in *The Chinese Economy: Transitions and Growth*, Cambridge, MA: MIT Press, 2007, 263.

¹⁹³ Hoover Institution Archive, William J. Green Collection, Box 15, Folder 15.4, ‘China Office of UNRRA program and estimated requirements’ Program and Estimated Requirements for RELIEF AND REHABILITATION IN CHINA Presented to UNRRA by the Government of the Republic of China 10 September 1944 Annex F: Agriculture, p. F-8.

¹⁹⁴ *Ibid.*

difficulty of compiling such data means that these statistics deserve some skepticism. The Nationalist government could use slaughter tax receipts to estimate animal numbers. But given the lack of a comprehensive animal census, and the remoteness of many farms, many animals certainly remained invisible to the state. Nevertheless, abundant wartime and postwar eyewitness accounts make clear the precipitous decline in China's non-human populations.

Table 2.1: Official estimated percentage decreases in animal populations in 1944, relative to the average numbers during the prewar years of 1933-1937:

Type of animal	Change relative to prewar average	Type of animal	Change relative to prewar average
Water buffalo	-26%	Hogs	-37%
Cattle	-13%	Sheep	-19%
Horses	-31%	Goats	-36%
Mules	-26%	Hens/chickens	-42%
Donkeys	-22%	Ducks	-35%

Data source: Chinese National Agricultural Research Bureau, cited in *Program and Estimated Requirements for RELIEF AND REHABILITATION IN CHINA*. Presented to UNRRA by the Government of the Republic of China, 10 September 1944, p. F-8.

Due to the interdependence of the country's human and animal populations, veterinary disease control became a priority for the Nationalist government and its American patrons. For our purposes, the nationwide loss of nearly one in seven cattle,

and one in four water buffalo, will be most salient. These animals were susceptible to the rinderpest virus. This ‘most dangerous and wide-spread’ cattle disease was ‘reported from practically every hsien [*xian*, or county].’¹⁹⁵ Recognizing the severity of this crisis, the Chinese authorities argued that postwar veterinary disease control was ‘as important as the human disease control insofar as the *people’s livelihood* is concerned’ [emphasis added].¹⁹⁶ By neatly invoking one of founding father Sun Yat-Sen’s Three People’s Principles, the KMT authorities highlighted the importance of protecting the country’s livestock.

The suffering and death of China’s cattle became relevant for the United States in the late 1940s, as America’s hot war with Axis fascism faded into a Cold War with Soviet socialism. Keen to prevent impoverished societies from aligning with the Soviets, the US and its allies invested in ambitious programs of reconstruction and renewal. Anticipating their ultimate victory, the Allies created UNRRA in 1943. Before the organization’s mandate lapsed at the end of 1947, America contributed \$474 million (\$6.3 billion in 2017 dollars) of the organization’s total \$670 million budget for China.¹⁹⁷ The historian David Ekbladh has written that the aim of UNRRA’s successor, the Joint Committee on Rural Reconstruction, was to ‘stem the Communist tide.’¹⁹⁸ Indeed, one former head of UNRRA’s China Office saw that aiding the countryside was key to

¹⁹⁵ Ibid., F-38

¹⁹⁶ Ibid., F-8

¹⁹⁷ David Ekbladh, ‘To Reconstruct the Medieval: Rural Reconstruction in Interwar China and the Rise of an American Style of Modernization, 1921—1961,’ *The Journal of American-East Asian Relations*, Vol. 9, No. 3/4 (FALL-WINTER 2000), 188. The 2017 equivalent value is according to the Bureau of Labor Statistics CPI Inflation Calculator.

¹⁹⁸ Ibid., 191.

winning the support of the rural population, ‘without which the [Nationalists’] struggle against the Communists was doomed.’¹⁹⁹

In a society reliant on draft animals, veterinary care was one of the most effective means of assisting rural people. One UNRRA observer determined that in Jiangxi Province alone, the annual economic loss due to animal deaths equaled the operating costs of two top American veterinary schools.²⁰⁰ In early summer of 1947, UNRRA experts ‘conservative[ly]’ estimated that 100,000 head of cattle had been saved by postwar animal disease control, with the prospect for saving over one million per year, ‘if funds are available.’²⁰¹ Much like the Nationalist government, the aid agency had financial incentives to play up both the merits of its activities and its pressing need for resources. Still, it is certain that not just humans were suffering and dying in China’s mid-century wars. An ambitious vaccination program could benefit the Chinese citizens, the Nationalist government, and their anxious Cold War patrons, as well as the animals themselves.

A Good Vet is Hard to Find

¹⁹⁹ Ibid., 190.

²⁰⁰ Yang Shanyao 楊善堯, ‘Dongwu yu Kang Zhan: Lun Zhongguo junma yu junde zhi zhengbei (1931-1945)’ 動物與抗戰：論中國軍馬與軍鴿之整備 [Animals and the Anti-Japanese War: The Training of Chinese Warhorses and War Pigeons (1931-1945)] in Cheng-ta Shiza 政大史雜 (December 2011) 21: 129-156.

²⁰¹ UNRRA Box S-1136-0000-0228, folder ‘Veterinary Program- Plans and Policy,’ 7 June 1944 Report.

During the Republican period (1912-1949), popular spiritualism collided with the scientific agenda of the modernizing state.²⁰² This fundamental tension extended to the veterinary realm. ‘Treating Rinderpest,’ a short story that appeared in *People’s Weekly* 民眾週刊 in 1948, clearly conveys the official position on magical medicine, while also suggesting cattle owners’ considerable emotional investment in their beasts.²⁰³ It is tempting to dismiss author Hu Yiqun’s didactic parable as an urban writer’s sentimental portrayal of farm life. But for many readers, perhaps only a generation or two removed from the countryside, the story rang true. Despite its sentimental tone and propaganda value, Hu’s story shows the KMT government’s aspirations for a productive, scientifically-minded citizenry. The subsequent Communist government shared this aim. For these reasons, the story deserves a close reading.

In Hu’s tale, moderately prosperous Guizhou tenant farmer Liu Laifu and his wife Wu respond to a rinderpest outbreak by walking three times around their cowshed each day, burning incense and praying that the Bodhisattva of rinderpest 牛瘟菩薩 does not pay a visit. When Liu’s cow falls ill, he brings it to a traditional doctor, who asks, ‘When the Bodhisattva wants to collect her cow, what can we humans do?’ Stymied by this reply, Liu returns home to think. When his son points out that the gravely ill cow is crying, Liu tearfully tells the animal, ‘You’re my long-term employee. You don’t want to die, and I can’t bear to lose you! When you die, I’ll bury you. I won’t even take your

²⁰² Rebecca Nedostup, *Superstitious Regimes: Religion and the Politics of Chinese Modernity*, Cambridge, MA: Harvard University Asia Center, 2010.

²⁰³ Hu Yiqun 胡亦群, Zhi Niuwen 治牛瘟 (故事) [“Treating Rinderpest (Story)”] 民眾週刊 第五期 *People’s Weekly*, Number 5, 1948: 2-4

hide. I won't let you down.' Over his wife's objections to the cost of treating a mortally ill animal, Liu brings the afflicted beast to a modern veterinarian in a nearby town. He explains, 'When I watch him dying, I feel terrible. Even if the treatment doesn't work, we want to be sure that we've tried everything.' When the cow miraculously recovers thanks to Western medicine, the veterinarian declines both a cash payment and Liu's offer to take him drinking. He simply urges the farmer to tell his neighbors about the efficacy of modern treatment. In the accompanying illustration, a proud Liu shows off his healthy cow to a crowd of peers, saying 'Look at my cow- has it recovered or not?' [Figure 2.2].



Figure 2.2: Liu Laifu shows off his healthy cow²⁰⁴

²⁰⁴ Ibid.

The tale of Liu's cow illuminates a discourse of veterinary public health in late-Republican China. The farmer's vain prayers to Buddhist deities and the useless advice of the traditional animal doctor encourage readers to reject these outmoded responses to disease. Furthermore, Liu's heart-rending reaction to his animal's poor health exceeds a purely rational response to an economic loss. Readers are to understand that Liu's cow is not merely an asset but also a colleague and cherished member of the family, whose owners would forego the modest compensation they could obtain by selling his hide. The widespread loss of these animals would entail grievous emotional and monetary harm among rural people, making the imperative for treatment all the greater.

Most curious, however, is the suggestion of a cure for rinderpest. While some cattle do recover from the disease, its lethality and resistance to medicines, Western or otherwise, was well-known in China by the 1940s. Vaccination was and is by far the most effective measure for protecting cattle. In this sense, while encouraging readers to embrace Western-style medicine, the author has potentially set them up for serious disappointment. The gambit may have seemed worthwhile if it could convince farmers to seek the proven vaccine before their herds got sick. But this rhetorical strategy also risked alienating distraught owners when the supposedly marvelous treatment failed to cure their ailing animals.

Like their Nationalist peers, officials in the early PRC were frustrated by the prevalence and persistence of homegrown techniques for treating rinderpest. Veterinary cadre Guo Liang 郭亮, dispatched to Qinghai province in the early 1950s, described a counterproductive treatment known as 'flooding the flower' 灌花. Herders would boil some red willow in a copper pot. When this mixture had cooled, they would combine it

with blood drawn from a sick cow, then add ‘a little something,’ recite some Buddhist scriptures, and immediately pour the stew into the nostrils of a healthy cow.²⁰⁵ In Guo’s view, the technique was ‘unscientific,’ and had been ‘rolled out for wide use without adequate testing.’ Guo blamed this method, common in pastoral areas, for the spread of the virus.²⁰⁶ Chinese observers like Guo frequently expressed their dismay not only at the self-defeating results of such rustic treatments, but also at the backward, ‘uncivilized’ worldview they revealed.

Popular ‘superstition’ and ‘fatalism’ were not limited to frontier peoples. Several participants in the PRC’s rinderpest eradication campaigns commented on the difficulty of overcoming cattle owners’ fatalism about the disease, and their preferences for religious or homeopathic treatments. Cadre Meng Yuanji relayed an old Guangxi veterinarian’s comment that ‘If ten cattle fall ill [with rinderpest], nine will die. It’s very hard to treat.’ Meng added that peasants begged the spirits to protect their herds from the disease. Some decorated their cowsheds with a ‘five finger seal’ made with limestone slurry on white paper. These amulets were meant to show that Daoist deity Jiang Taigong was suppressing nearby demons and protecting the cattle. Meng noted sadly that the charms were ineffective, and the draft cattle still fell ill.²⁰⁷

²⁰⁵ Guo Liang 郭亮, Youguan 50 niandai Qinghai sheng fangzhi niuwen de yixie huiyi 有关 50 年代青海省防止牛瘟的一些回忆[“Some memories of rinderpest prevention in Qinghai province during the 1950s”]. In Zhongguo xiaomie niuwen de jingli yu chengjiu 中国消灭牛瘟的经历与成就[*History and Accomplishments in China’s Extermination of Rinderpest*], edited by Yin Dehua 尹德华 Beijing : Zhongguo nongye kexue jishu chubanshe, 2003, p. 481.

²⁰⁶ Ibid.

²⁰⁷ Zhongguo Zhongguo Renmin Zhengzhi Xieshanghuiyi Guangxi Xing’anxian Weiyuanhui wenshi ziliao weiyuanhui, 中国人民政治协商会议广西兴安县委员会文史资料委员会 [Chinese People’s Political Consultative Conference Cultural and Historical Materials Committee of Guangxi Province’s Xing’an County] Xing’an wenshi ziliao di 2 ji 兴安文史资料 第 2 辑 [*Historical and Cultural Materials of Xing’an, Volume 2*] 1989, p. 82.

For all their paternalistic skepticism about local veterinary medicines, some PRC vaccinators were able to assess such treatments objectively, and even admit their utility. Wang Shiqi 王士奇, who worked in Qinghai Province's Yushu 玉樹 county, recalled that ethnically Tibetan herdsmen practiced a 'primitive inoculation method,' called *gabao* 尕保. In this technique, blood was extracted from a wild sheep or cow that had died of rinderpest. When dried, this 'attenuated-virus blood powder' was stored inside a sheep's stomach and kept in a cool, dark place. Mixed with sheep's milk or some other dilutant, the concoction was fed to healthy cattle. Wang noted that 'specialists in the tribes and temples' made and stored this vaccine, which was a 'secret formula passed down through families,' and concluded, 'it [was] not something everyone [could] do.' Wang's rinderpest experiment team scientifically verified that *gabao* was indeed an attenuated virus and a reliable vaccination. He explained that most local herdsmen were 'completely confident' in the treatment, and allowed that it was effective against the disease. Still, Wang qualified his praise for this example of local learning and cultural transmission by observing that the virulence of *gabao* varied widely, and 'the practitioner must be guided solely by experience.' Credible though it was, *gabao*'s risks were substantial. Wang attributed a serious rinderpest outbreak at the end of 1954 to 'imprudent' use of the technique during the previous winter.²⁰⁸ Even as his own team of experts displaced the methods and expertise of previous generations, Wang was alert to the possibility of

²⁰⁸ Wang Shiqi 王士奇, 'Jianghe yuantou xiaomie niuwen jishi' 江河源头消灭牛瘟记实' [Record of rinderpest eradication in Jianghe Yuantou] in *History and Accomplishments in China's Extermination of Rinderpest*, p. 474.

viable, time-tested methods among herders who had lived for many years in the shadow of the disease.

Decades of war bore much responsibility for the lack of trained veterinary personnel and the popularity of idiosyncratic, largely ineffective practices. At the end of 1945, UNRRA veterinarian Dr. Henrik Stafseth noted with dismay that ‘Most of China’s 15 graduate veterinarians are now at Chengtu [Chengdu, in Sichuan province],’ having moved during the Anti-Japanese War (1937-1945) to the Nationalist safe haven in the southwest. Noting that America boasted 14,000 veterinarians in a population of 140 million, Stafseth was perturbed that China, with three times the population, had such a dearth. Moreover, America had ten operational veterinary colleges, while China had none, making it ‘the only country of any consequence whatever which finds itself in this situation.’²⁰⁹

Nearly a decade earlier, prominent Chinese veterinarian and rinderpest researcher Cai Wuji 蔡無忌, son of education reformer Cai Yuanpei 蔡元培, had voiced Stafseth’s concerns. Cai worried that only nine Chinese veterinary researchers had been trained in France, and four in Japan.²¹⁰ Moreover, while China had roughly five thousand people ‘promoting veterinary medicine,’ they did not understand recent developments and were ‘stuck in old ways.’ These semi-competent animal caretakers knew a bit about treating warhorses, ‘based on the needs of an army at war.’²¹¹ Scarce and poorly trained,

²⁰⁹ UNRRA S-0528-0375 folder ‘Veterinary Program Plans and Policy,’ Stafseth report, 19 December 1945.

²¹⁰ Cai Wuji 蔡無忌, ‘Zhongguo shouyi shiye qiantu zhi zhanwang,’ 中国兽医事业前途之展望 [The Future Prospects for Chinese Veterinary Medicine], *Chumu shouyi jikan 畜牧獸醫季刊 [Livestock Veterinary Medicine Quarterly]* 1937, p. 2.

²¹¹ *Ibid.*

Nationalist China's veterinarians were unequal to the task of rinderpest eradication. Writing in the heady early days of postwar reconstruction, Stafseth could not have known that his own organization's impressive resources and personnel would prove equally incapable of eliminating the tenacious virus.

By hampering efforts to train veterinary talent, China's grinding civil war and political dysfunction harmed the well-being of humans and their livestock. A course at National Taiwan University, with 46 students to be trained in veterinary techniques, had started on February 26, 1947. Two days later, the popular unrest and brutal Nationalist crackdown known as '2-28' [for February 28] scuttled this attempt to train badly needed veterinary personnel for the island. Stuck in a military quagmire on the mainland and suspicious of Communist sympathizers on their island redoubt, the American-backed Nationalist police and military authorities arrested and killed thousands of Taiwanese, opening a social wound that festers to the present day. An UNRRA staffer mildly observed, 'Unfortunately, the riots and political disturbances...prevented the full success of the [veterinary] course.'²¹² The same Cold War anxieties that justified UNRRA's veterinary program had in this case undermined the welfare of both animals and their human dependents.

War, Conquest, and Veterinary Progress

²¹² UNRRA Archive, excerpt from report on Agricultural Rehab Activities in Taiwan, March 1947.

While the realities of imperialism and war tightened the grip of rinderpest on Chinese cattle, the exigencies of conquest and the possibility of future violence helped to loosen it. Protecting the animal labor force in northeast Asia was vital to extracting agricultural surplus from the region, as Imperial Japan ‘used colonial development as a tool for metropolitan economic development.’²¹³ A CIA translation of the 1948 *Little Economic Encyclopedia of Northeast China* reveals that the Manchurian puppet government had intended to increase the number of cattle in the region by nearly tenfold, from 2.4 million in 1940 to 20 million by some future date.²¹⁴ Such an increase, which would bring 18.5 million hectares of unused land into agricultural production, would require defeating endemic livestock diseases such as rinderpest.²¹⁵ Motivated by the possibility of increased farm yields in their empire’s new territories in Manchuria and Korea, Japanese researchers designed the rinderpest vaccine that later saved millions of Chinese yaks, water buffalo, and cattle.

Meanwhile, at a facility in their colony of Taiwan, Japanese doctors produced drugs to protect the herds of the Empire’s southern holdings. In the summer of 1946, head UNRRA veterinarian H.E. Ferguson reported that this laboratory had been producing rinderpest drugs for South China and South Pacific islands ‘which either were, or they hoped would become, a portion of the Japanese empire.’²¹⁶ Speaking more

²¹³ Louise Young, *Japan's Total Empire: Manchuria and the Culture of Wartime Imperialism*, Berkeley, California: University of California Press, 1998, p. 432.

²¹⁴ CIA-RDP80-00809A000700110036-8, ‘Stock raising and animal products in the Northeast, 1940-1947,’ CIA trans., from Tung-pei Ching-chi Hsiao-ts’ung-shu, vol. VI [*Little Economic Encyclopedia of Northeast China*] 4, Mukden: February 1948.

²¹⁵ *Ibid.*, 5.

²¹⁶ UNRRA S-0528-0375 folder, “Veterinary Reports and informations [sic] from regions,” H.E. Ferguson, DVM, “Report on Trip to Formosa,” 23 August 1946.

generally on veterinary care in postwar China, Dr. Cyril Hopkirk commented that ‘Japanese occupation brought some order into disease control.’²¹⁷ By no means blind to the devastation inflicted on China’s humans and livestock by the Japanese occupation, these experts nevertheless appreciated the scientific rigor and operational effectiveness of the Imperial military’s disease control efforts.

In Canada and the United States, meanwhile, the Second World War and the nascent Cold War provided a powerful incentive for discovering a vaccine that could protect Western herds from enemy biological attacks. In December 1942, a team of six Americans and two Canadians stationed on the uninhabited island of Grosse-Île near Quebec City began work on a rinderpest vaccine.²¹⁸ These specialists devised a means of attenuating the virus by serial passage through chicken eggs. After numerous reproductive cycles, the rapidly-evolving virus’ adaptation to this new species degraded its ability to sicken the original bovine host. When a human injected the original host species with this attenuated virus, the animal’s immune system could resist the weakened invader and develop immunity. The resulting vaccine was relatively safe and effective, but required refrigeration. This trait, a minor inconvenience in areas with extensive electrical and highway grids, proved an insuperable obstacle to the use of this ‘avianized’ vaccine in the underdeveloped Chinese hinterland.

Producing, storing, and delivering the avianized vaccine was technically demanding. Keith Kesteven, a young Australian UNRRA veterinarian, explained to his

²¹⁷ UNRRA, S-0528-0375 folder, ‘Veterinary Reports and informations [sic] from regions,’ Hopkirk to Green et al., 30 June 1947.

²¹⁸ Donald Avery, *Pathogens for War: Biological Weapons, Canadian Life Scientists, and North American Biodefence*, Toronto: University of Toronto Press, 2013, 24.

superior that attenuation was ‘not a particularly easy task,’ as it required placing the virus ‘on the egg membrane of a hatching egg then allowing the egg to hatch for a further three days, then harvesting the membranes and placing this on another egg membrane.’ [Figure 2.3] After fifty repetitions of this painstaking process, the ‘avianized’ virus was ready for mass production.²¹⁹



Figure 2.3: Chinese and UNRRA scientists making avianized rinderpest vaccine with chicken eggs, c. 1947.²²⁰

²¹⁹ UNRRA, S-0528-0070, Keith Kesteven to W.J. Green, Chief, Agricultural Rehabilitation Division, ‘Procurement of Rinderpest Seed Virus from Africa,’ 22 July 1947.

²²⁰ UNRRA, S-0801-0005-0001-00098, ‘Local production of a vaccine to stamp out rinderpest, said to be the greatest livestock killing disease in China, is carried out in UNRRA laboratories.’

Despite its potentially grave side effects for certain breeds of cattle, and its need for refrigeration, the avianized vaccine was UNRAA's preferred version. Developed in a Canadian laboratory, it was most familiar to Anglophone doctors. Western researchers may also have been pleased with avianized vaccine's efficacy on cattle and water buffalo, which accounted for most of the bovines in southern China, where Nationalist control was strongest.

The Nationalist government's need for this vaccine drew China into a global network of genetic material and expertise. In April 1946, Chinese authorities imported nearly one million doses of UNRRA's Canadian-made vaccine for use in the southern and central provinces of Jiangxi, Hubei, Hunan, Guangxi, Guangdong, and Hainan.²²¹ From its origin in Grosse-Île, the vaccine was trucked to Montreal, then flown to New York City. Here, it was packed in fresh ice and flown to San Francisco, and re-iced in Honolulu and Guam, before finally arriving in Shanghai.²²² This complex transnational affair culminated in a publicity photo showing Drs. Ferguson and Cheng Shaojiong 程紹迺 inoculating a calf [Figure 2.4].

²²¹ No author. '雞胚化牛瘟疫苗' 'Lympholized Avianized Rinderpest Vaccine,' *Xiandai nongmin 現代農民* [*Modern Farmer*] Issue 11, No. 8, 1948, p. 7.

²²² Thomas W. Dukes, "'Grosse-Île': An overview of the island's past role in human and animal medicine in Canada," *Canadian Veterinary Journal*, Volume 42, August 2001, 644.



Figure 2.4: Chief UNRRA veterinarian H.E. Ferguson and Director of the National Research Bureau of Animal Husbandry Cheng Shaojiong inject a calf with avianized vaccine supplied by UNRRA, c. 1947.²²³

²²³ S-0801-0005-0001-00100, 'Dr CT Cheng [Cheng Shaojiong in Hanyu pinin] of the Ministry of Agriculture and Dr Harry Ferguson, chief UNRRA veterinarian, are vaccinating a cow against rinderpest with the new avianized vaccine brought to China by UNRRA.'

The Challenge of Domestic Vaccine Production During the Civil War

Although the Canadian doses were helpful, the convoluted and costly shipping process was not sustainable. Domestic production was imperative. When a Western doctor was dispatched to the Nationalist capital city of Nanjing to help make the vaccine, an UNRRA staffer noted, ‘Until the production of vaccines is accomplished the field programs will have to be curtailed.’²²⁴ Yet subsequent attempts at making the vaccine in China repeatedly failed. ‘Work was set back to a great extent’ in October 1946 when a faulty thermostat resulted in the loss of a viral sample being passed through eggs.²²⁵ Ever hopeful, in mid-April, 1947, UNRRA accepted delivery of fifty-nine ‘special white Leghorn chickens’ for the production of avianized vaccine in Nanjing.²²⁶ There, Dr. Robert Reisinger anticipated making domestic vaccine production ‘a reality instead of a beautiful dream.’²²⁷ The dream was one frustration-filled year away from coming true.

When seed virus from America failed, UNRRA’s Dr. Kesteven made a late summer trip to the Kabete laboratory in Nairobi, capital of the British colony of Kenya, to obtain another supply.²²⁸ British scientists had experience fighting the virus in their empire’s East African imperial possessions, which the historian Richard Waller describes as ‘partly founded on the wreckage left by the passage of rinderpest’ through the

²²⁴ S-0528-0375 folder ‘Veterinary Reports and informations [sic] from regions,’ April 2, 1947, Dr. Patton to go to Nanjing

²²⁵ S-0528-0375 folder ‘Veterinary Reports and informations [sic] from regions,’ October 9, 1946

²²⁶ S-0528-0375 folder ‘Veterinary Reports and informations [sic] from regions,’ April 23, 1947

²²⁷ S-0528-0375 folder ‘Veterinary Reports and informations [sic] from regions,’ Sept 2, 1947 Reisinger to Green

²²⁸ S-0528-0375 folder ‘Veterinary Reports and informations [sic] from regions,’ July 21, 1947, Kesteven weekly report to Green.

region.²²⁹ In the late nineteenth century, rinderpest-induced starvation had taken the lives of approximately one-third of the Ethiopian population, and two-thirds of Tanzania's Maasai people.²³⁰ As a result, by the mid twentieth-century, Kabete was gaining a reputation as the 'world centre for rinderpest vaccine production.'²³¹ The Australian veterinarian Kesteven thus visited an African colonial laboratory to obtain a virus to be attenuated in American poultry for the benefit of Chinese cattle. Still, despite UNRRA's high hopes for this cosmopolitan vaccine, the Kabete strain of rinderpest also proved disappointing.

Yet by the end of 1948, the dauntless Cheng Shaojiong, now Director of the KMT's National Research Bureau of Animal Husbandry, announced that Chinese veterinarians and specialists from the UN's Food and Agriculture Office (FAO) had created China's first batch of avianized rinderpest vaccine. The Nanjing laboratory was able to make ten thousand doses per week, but more equipment was necessary for an adequate yield [Figure 2.5]. The FAO optimistically estimated that within three or four years, the country would exterminate the disease within China and have a surplus of the

²²⁹ Richard Waller, 'Clean' and 'Dirty': Cattle Disease and Control Policy in Colonial Kenya, 1900-40,' *The Journal of African History*, Vol. 45, No. 1 (2004), 46.

²³⁰ Dennis Normile, 'Driven to Extinction,' *Science: New Series*, Vol. 319, No. 5870 (Mar. 21, 2008), 1607.

²³¹ UNRRA S-0528-0375 folder, 'Veterinary Reports and informations [sic] from regions,' Hopkirk to Green et al., June 30, 1947.

vaccine for export.²³²



Figure 2.5: Chinese technician making rinderpest vaccine in UNRRA laboratory, c.1948.²³³

²³² No author. 'Jipeihua niuwen yimiao 雞胚化牛瘟疫苗' 'Lympholised Avianized Rinderpest Vaccine,' in *Xiandai Nongmin 現代農民 [Modern Farmer]* Issue 11, Number. 8, 1948, p.7.

²³³ UNRRA S-0801-0005-0001-00096, 'Local production of a vaccine to stamp out rinderpest, said to be the greatest livestock killing disease in China, is carried out in UNRRA laboratories'

The Challenge of Inoculation During the Civil War

Domestic production solved only part of the vaccination problem. Transporting the refrigerated vaccine from a few urban labs to the far-flung herds posed an acute logistical challenge for veterinary workers. A Doctor Yang noted that in Henan Province, ‘because of both war and heavy rainfall, the roads were flooded, the bridges were down and all our ox carts commandeered.’²³⁴ This situation made it impossible for vaccination teams to promptly deliver perishable vaccines to at-risk areas. Making matters worse, bureaucrats in Washington, D.C. did not always appreciate the scale of the difficulties. Chief UNRRA Veterinarian H.E. Ferguson’s exasperation comes through in a letter to his superior: ‘I am apparently not able to impress on your mind the fact that the lack of refrigeration is likely to cause the downfall of the entire field program....I promise I’ll continue screaming until you produce the refrigeration equipment which is so urgently needed by this Program here in Shanghai.’²³⁵ Both large fixed refrigerators and smaller kerosene-powered field units were in painfully short supply.

Because it had rare, functioning facilities for making ice, the port city of Yulin 榆林 served as a critical hub for vaccination teams traversing the war-ravaged southern island of Hainan. Dated August 9, 1946, exactly one year after the atomic bombing of Nagasaki, veterinarian Robert Reisinger’s memo describes his treacherous trip between

²³⁴ UNRRA S-0528-0010 folder UNRRA Honan-Honan Area, Dr. Yang [given name unclear], ‘Warehousing, Rail Transportation, and Ox Carts,’ August 1947.

²³⁵ UNRRA Washington, Veterinary Program- Plans and Policy, Dr. H.E. Ferguson to IG Cashell, October 3, 1946 (June 11, 1946 through roughly June 1947)

Yulin and the city of Hoihow: ten bridges had been ‘torn down or washed out,’ while the roads were ‘no longer in operating condition.’²³⁶ The local Nationalist military forces offered little support. UNRRA staffer Norman Ward explained that army authorities could furnish only a 1935 Japanese-model Chevrolet too slow and clunky to deliver the perishable vaccine on time.²³⁷ Even local production of the vaccine was of little use without infrastructure to connect laboratories and herds.

Doctor Reisinger’s report to his superior about the difficulty of rinderpest control on Hainan Island demonstrates the considerable logistical obstacles to UNRRA’s avianized vaccination campaign. In mid-May 1946, UNRRA chartered a plane to bring refrigerators full of the recently-arrived Canadian vaccine from Shanghai to the sweltering southern island.²³⁸ Reisinger explained to his superior that a field technician might carry three thousand doses of vaccine, ‘cooled with ice in hand-sized thermos jars.’²³⁹ Dependent on ‘extremely unreliable’ public trucks or ‘possibly a locally-hired car,’ the technician was almost certain to arrive late to the vaccination rallying point. By this time, the cattle owners, who were ‘none too enthusiastic about having their cattle vaccinated,’ would have brought their animals home. Reisinger’s team were often only able to vaccinate half of their intended quota. The unused doses soon became impotent ‘unless promptly returned to the refrigerator.’ Indeed, the ‘magistrate of Yoi Shien [sic]’

²³⁶UNRRA S-0528-0375 folder ‘Veterinary Reports and informations [sic] from regions,’ Reisinger to Green, ‘Rinderpest Control on Hainan Island,’ 9 August 1946.

²³⁷ UNRRA, S-0528-0375, folder ‘Veterinary Reports and informations [sic] from regions,’ Norman Ward letter on Hainan rinderpest vaccination to Director Green, June 22, 1946.

²³⁸ UNRRA, S-0528-0375, folder ‘Veterinary Reports and informations [sic] from regions,’ Ferguson to Green, May 15, 1946

²³⁹UNRRA, S-0528-0375, folder ‘Veterinary Reports and informations [sic] from regions,’ Reisinger to Green ‘Rinderpest Control on Hainan Island’ August 9, 1946.

reported a sixty percent loss of efficacy on the 5,000 doses delivered by Reisinger's team.²⁴⁰

The locals' reluctance to protect their cows from a fearsome disease seems counterintuitive at first. But decades of war had taught cattle owners that outsiders did not always have their best interests in mind. During the island's wartime occupation, Japanese soldiers had treated water buffalo as 'war goods.' They confiscated livestock after compelling the 'natives' to deliver their herds to central locations, ostensibly for convenient vaccination. The historian R. T. Phillips estimates Hainan's wartime cattle losses at 250,000 head.²⁴¹ Describing his colleague's experience to a superior at UNRRA, technician Norman Ward explained that 'the mistrust is still there, and Dr. Reisinger had to work against that all the way.'²⁴² Inadequate infrastructure and skeptical cattle owners made the effective but temperamental avianized vaccine unworkable for a nation scarred by war.

In Sichuan province, just four months after the end of the Anti-Japanese War, UNRRA veterinarian Henrik Stafseth noted 'a good deal of mistrust among livestock owners as to the use of serums and vaccines.' He continued, 'Death from anthrax was reported to have followed anti-rinderpest vaccination and vice versa [sic].' Stafseth suggested that such disasters were due to 'improper potency testing [of the vaccines], and, at times, total lack of it.' He mused that inept veterinarians' 'faulty diagnosis and

²⁴⁰ Ibid.

²⁴¹ R. T. Phillips, 'The Japanese Occupation of Hainan,' *Modern Asian Studies*, Vol. 14, No. 1 (1980), 93-109.

²⁴² UNRRA, S-0528-0375, folder 'Veterinary Reports and informations [sic] from regions,' Norman Ward letter on Hainan rinderpest vaccination to Director Green, June 22, 1946.

consequent application of the wrong treatment' were equally likely explanations.²⁴³

Although they did not use the same vocabulary as Western veterinarians, locals understood that rinderpest inoculation could induce an alarming and sometimes fatal reaction in bovines.

With so many false starts and obstacles, Chinese researchers were less sanguine about the prospects for avianized vaccine than their Anglophone peers. In autumn 1947, Dr. Keith Kesteven reported to his superior that the Chinese scientists seemed 'unmotivated' to produce eggs for weakening the virus.²⁴⁴ That summer, Kesteven had noted that the vaccine's need for refrigeration was Chinese researchers' 'most serious objection' to this method of attenuation.²⁴⁵ Nor was this the first time the Chinese scientists had questioned UNRRA methods. One year earlier, Dr. Cheng Shaojiong had 'politely but rather definitely declined to accept the advice and assistance' of two UN veterinarians in producing hog cholera serum.²⁴⁶ The American-educated Dr. Cheng's battle with rinderpest extended from the early 1930s to the final eradication of the disease in the mid-1950s. He and his colleagues were keenly aware of China's challenging veterinary public health environment. Techniques that delivered results in peaceful countries with ample infrastructure and veterinary personnel did not necessarily translate to the demanding circumstances of wartime China.

²⁴³ UNRRA 'Veterinary Program- Weekly Reports,' Stafseth to Green on trip to Chengtu and Jungchang [Chengdu and ???] Dec 6 1945.

²⁴⁴ UNRRA S-0528-0375 folder, 'Veterinary Reports and informations [sic] from regions,' November 3, 1947 Kesteven Report to Green.

²⁴⁵ S-0528-0375 folder, 'Veterinary Reports and informations [sic] from regions,' July 10, 1947 Kesteven Report to Green.

²⁴⁶ UNRRA Folder 'Veterinary Program- Weekly Reports, June 28 1946. The document refers to him by the Wade-Giles Romanization, 'S.C. Cheng,' for Shao-Chiung Ch'eng.

The limitations of the avianized vaccine drove Chinese specialists to seek alternatives. In Japanese-occupied Korea during the late 1930s, veterinarian Nakamura Junji 中村稔治 had created a ‘lapinized’ attenuated rinderpest vaccine by ‘adapting the virulent Pusan [Busan] strain to rabbits.’²⁴⁷ In June, 1947, UNRRA official Glen Briggs informed the director of the Kabete laboratory that ‘Chinese veterinarians are becoming increasingly sold on the lapinized vaccine first used by the Japanese in North China,’ despite the Western scientists’ attempt at ‘influenc[ing] them’ to use the avianized variant.²⁴⁸ Nationalist veterinarians had obtained the Nakamura strain in January, 1946, when they assumed control of the Northern China Agricultural Experiment Station in the former Japanese colony of Manchuria.²⁴⁹ When Communist forces took over these facilities a few years later, PRC veterinarians gained the wherewithal to eliminate rinderpest nationwide.

The Needle is Mightier than the Sword

War endangered animals and humans alike. But the end of the worldwide conflagration did not necessarily mean greater security. One American observer had

²⁴⁷ F. Njeumi, et al., ‘The long journey: a brief review of the eradication of rinderpest,’ *Rev. sci. tech. Off. int. Epiz.* 2012, 31 (3), p.732.

²⁴⁸ UNRRA S-0528-0070 folder China Veterinary Program, Briggs to Veterinary Research Lab Director, Kabete, Nairobi, Kenya, 9 June 1947.

²⁴⁹ *Brief Biographies of Chinese Science and Technology Experts* 中国科学技术专家传略, 农学编——养殖卷, 中国科学技术协会 编, 中国科学技术出版社, 北京 Beijing: Zhongguo Kexue Jishu Chubanshe, 1993, p326.

noted that brigandage was rife on Hainan during the late 1940s, and ‘the [Nationalist] military usually manage to arrive within the next four or five hours after the bandits have left. The military call the bandits Communists, and the bandits call themselves bandits.’²⁵⁰ When visiting a vaccination site to obtain a treatment that was itself risky, farmers and herders faced the loss of their livelihood to roving marauders. It should be no surprise that some chose to keep their cattle at home.

Recognizing the physical dangers lurking in areas far from state oversight and security, China’s post-1949 authorities took measures to protect both vaccination teams and cattle owners. Bayin Menghe 巴音孟和, Chief Veterinarian of the Inner Mongolia Farming and Livestock Bureau immediately after the founding of the PRC, recalled that vaccination teams traversed plains, forests, and deserts. He recalled the work as ‘extraordinarily dangerous,’ with both wild animals and bandits everywhere.²⁵¹ The frightening animals were likely wolves, which then claimed an estimated 200,000 head of livestock in Mongolia each year.²⁵² To guard against such threats, vaccinators mobilized teams of People’s Militia to help transport the medicines, round up cattle, and to maintain order.²⁵³

While it is thus clear that PRC authorities saw a role for physical force in their veterinary public health agenda, some American observers misunderstood the exact

²⁵⁰ UNRRA S-0528-0375, folder ‘Veterinary Reports and informations [sic] from regions,’ Norman Ward to Director Green, Hainan rinderpest vaccination, 22 June 1946.

²⁵¹ Bayin Menghe 巴音孟和, ‘Neimenggu xiaomie niuwen huiyilu’ 内蒙古消灭牛瘟回忆录 [‘Recollections of Rinderpest Extermination in Inner Mongolia 1949-1950’], (September 1, 1996) in *History and Accomplishments in China’s Extermination of Rinderpest*, p. 413.

²⁵² CIA-RDP80-00809A000600330462-2, Mongolian People’s Republic (Moko Jinmin Kyowakoku), Toa Kenkyusho, Tokyo: January 1945, Distributed: August 1950, 11-12.

²⁵³ Bayin Menghe, *History and Accomplishments in China’s Extermination of Rinderpest*, p.413.

nature of military support for vaccination teams. An analyst for the U.S. Central Intelligence Agency (CIA), writing in spring of 1952, favorably compared the veterinary capacity of the Chinese Communists to their Imperial Japanese predecessors. The author noted that while they had encouraged cattle owners to vaccinate their herds, the Manchurian puppet authorities never employed ‘extreme or compulsory measures for fear of provoking uprisings.’ The change of government augured well for rinderpest eradication, for ‘the Communist regime, which resorts much more readily to force, should have no difficulty in enforcing preventive injections.’²⁵⁴ This enthusiasm for coercive tactics and grudging respect for distasteful regimes that could at least ‘get the job done’ characterized much of American foreign policy during the Cold War.

Contra the CIA analyst’s speculation, there is little evidence that the new government undertook coercive inoculation. Chinese officials understood better than their American observers that the balance of power favored farmers and herders. Zhao Yungai 趙雲陔, a PRC veterinary technician in Qinghai Province, remembered decades later that ‘hiding cattle or faking the injection were very common’ among local herders.²⁵⁵ Cattle owners seeking to protect their most precious assets could easily have foiled a heavy-handed injection campaign. Even a tiny percentage of holdouts would leave a viral reservoir and the risk of catastrophic outbreaks. Moreover, the small number of capable veterinary technicians could not have mounted a nationwide, top-down effort backed only

²⁵⁴ CIA-RDP82-00457R012100260007-6, ‘Expert Opinion on Communist Claims of Accomplishments in Inner Mongolia,’ May 22, 1952.

²⁵⁵ Zhao Yungai 趙雲陔, Huiyi Yushu fangzhi niuwen gongzuo 回忆玉树防止牛瘟工作 [Remembering rinderpest prevention work in Yushu] in *History and Accomplishments in China’s Extermination of Rinderpest*, p.486.

by violence or intimidation. Mindful of these realities, the Communists strove to earn the trust and cooperation of locals, educating cattle owners about the perils of the disease while training local talent in the arts of prevention. Persuasion and consent, not violence and coercion, were the hallmarks of this endeavor.

For veterinary cadres, establishing trust with locals thus became as vital to the eradication campaign as any medical breakthrough. Writing three decades after his participation in Inner Mongolia's 1951 rinderpest elimination, Tan Xinzong 谭信忠 reminisced about his service as head of a three-person vaccination team. Tan was at pains to demonstrate the campaign's multiple layers of cooperation and mutual support: between Han cadres and ethnic minorities, supervisory cadres and field workers, and the Party and the 'masses.' He noted that a number of Han 'comrades' made a sincere effort to learn Mongolian, and everyone 'respected the ethnic minorities' customs.'²⁵⁶ Before setting out for the countryside, vaccination teams purchased bricks of tea, towels, moon-cakes, fruit, sugar, and perfumed soap as gifts for the herdsmen with whom they would live.²⁵⁷ In Qinghai, cadre Lu Rongchun employed a similar technique, using gifts of canned food and sweets to win the favor of the local chieftains [*hada* 哈达].²⁵⁸ These leaders, whom Lu described as 'equivalent to village heads 村长,' then convinced the

²⁵⁶ Tan Xinzong 谭信忠, 'Yijiuwuyi nian zai yuanwumeng diqu xiaomie niuwen de jishu,' 一九五一年在原乌盟地区消灭牛瘟的技术 [Technology in the 1951 rinderpest extermination campaign in Yuanwumeng region] in *Wulanchabumeng wenshiziliao* 乌兰察布盟文史资料, edited by Zhongguo renmin zhengzhi xieshanghuiyi neimenggu zizhiq Wuanchabumeng weiyuanhui wenshiziliao weiyuanhui, 中国人民政治协商会议内蒙古自治区乌兰察布盟委员会文史资料研究委员会编, 79 (Vol. 1, May 1984).

²⁵⁷ Tan, "Yijiuwuyi," p. 78.

²⁵⁸ Lu Rongchun 鲁荣春, "How Rinderpest campaigns in Tibet/Qinghai Different from China proper," in *History and Accomplishments in China's Extermination of Rinderpest*, p. 408.

local herders to deliver their precious beasts to the agreed-upon vaccination sites.²⁵⁹ As teams became adept at the swift inoculation technique they called the ‘flying needle 飞针,’ each worker could inject 1,800 animals per day.²⁶⁰ This rate dwarfed the dogged efforts of the vaccination teams on Hainan Island, just a few years prior. What might have been a frantic and futile roundup thus became an orderly and efficient procedure.

Even with such efficient techniques, life in the countryside was challenging for the vaccination teams. Far from urban centers, and unaccustomed to riding horses or camels, they could return home only once every three months. Dedicated to their vital work, some postponed weddings, or declined time off to visit wives who were recovering from childbirth.²⁶¹ Tan Xinzong recalled picking fleas off his companions by the light of oil lamps, while female cadres cut each other’s hair with surgical scissors.²⁶² Memoirists can gain credibility and prestige by reminiscing about suffering and sacrifice. Still, there is no doubt that the vaccination field campaign imposed substantial burdens on participants, who had to rely on the state, the locals, and each other. Their willingness to forgo creature comforts made thousands of creatures comfortable.

Cooperating to protect animals helped to bring together the ethnicities of the newly established PRC. In the evenings, recalled Tan, the Mongolian herdsmen, who were ‘good at singing and dancing,’ would hold energetic performances for the cadres, who ‘couldn’t dance.’²⁶³ While this remark echoes the familiar and condescending trope

²⁵⁹ Ibid.

²⁶⁰ Ibid.

²⁶¹ Tan, “Yijiuwuyi,” 79.

²⁶² Ibid.

²⁶³ Ibid.

of frivolous minorities and serious Han, the cadres also contributed to the fun by performing the ‘rice-sprout song 扭秧歌.’ Emblematic of the Communist revolution, this popular Northern Chinese dance was an entertaining way to build inter-ethnic friendship while celebrating the newly victorious regime.²⁶⁴

The cadres recognized that such comity not only helped pass the time, but also contributed to the success of the campaign. Tan himself explicitly noted that the rapid completion of the vaccination program was ‘inseparable’ from the broad support of the cadres and ‘masses’ of all ethnicities.²⁶⁵ On the vast and unforgiving prairie, it would have been easy for disgruntled or suspicious herders to hide their cattle from inexperienced Han on horseback. Successful vaccination required and reinforced trust between the parties: Han cadres relied on the Mongolians for logistical support and the timely delivery of their herds, while the herders had to accept the newcomers’ assurances about the safety and soundness of a peculiar injection.

Yaks: The Final Frontier

After decades of combat, the end of the Chinese civil war had created the social conditions for nationwide rinderpest eradication. While the KMT-UNRRA eradication efforts had largely driven the disease from the more prosperous coastal and Yangtze River delta regions, the virus lingered in the poorer, more isolated periphery of Inner

²⁶⁴ For the political significance of this dance, see Chang-Tai Hung, *Mao's New World: Political Culture in the Early People's Republic*, Ithaca: Cornell University Press, 2011, 75-91.

²⁶⁵ Tan, “Yijiuwuyi,” p.79.

Mongolia, Qinghai, Gansu, Xikang, Tibet, Yunnan, and Guizhou.²⁶⁶ Newly equipped with the Japanese researchers' rabbit-attenuated virus, and finally able to traverse the country without military interference, PRC veterinarians could bring health and comfort to even the remotest herds. Vaccinating the hinterlands would both guarantee herders' livelihoods, and eliminate viral reservoirs that threatened the cattle and water buffalo of the Chinese heartland.

In addition to its obvious benefits for cattle, eradicating rinderpest in the Himalayan border regions paid political dividends to successive Chinese governments. Turbulence and uncertainty had characterized the Nationalist state's relations with Tibet in the early 1940s, as the historian Chang Jui-Te has shown. As they swept through southeast Asia, Japanese armies imperiled 'Nepal, Bhutan, Sikkim, and Tibet,' as well as southwest China.²⁶⁷ The historian Yang Zhiyou has argued that Chiang Kai-shek's timely and substantial assistance during a severe 1942 rinderpest outbreak in Qinghai stemmed from the strategic sensitivity of the afflicted area, and the Generalissimo's policy of 'appeasing the locals.'²⁶⁸ Unbeknownst to the yaks, their precarious position in a strategic buffer zone helped them to secure scarce medical resources, even as the cattle plague lingered in other parts of the country.

²⁶⁶ Peng Kuangshi, Yin Dehua 彭匡时, 尹德华, 'Measures adopted and successes achieved in rinderpest eradication in New China,' in *History and Accomplishments in China's Extermination of Rinderpest*, p.29.
²⁶⁷ Chang Jui-Te, 'An Imperial Envoy: Shen Zonglian in Tibet, 1943-1946,' in *Negotiating China's Destiny in World War II*, Hans van de Ven, Diana Lary, and Stephen R. McKinnon, eds., Stanford, CA: Stanford University Press, 2015, p.53.
²⁶⁸ Yang Zhiyou 杨智友, '1942 nian Qinghai niuwen an shulun' 1942 年青海牛瘟案述论 [An evaluation of the 1942 Qinghai rinderpest outbreak,] *Zhongguo Zangxue* 中国藏学, Issue 3, 2006, 96.

Like their Nationalist predecessors, Communist officials recognized the geopolitical importance of Tibetan bovines. Vaccinating the yaks accomplished a number of strategic aims. Healthy animals could produce more food, fiber, and fuel, increasing the prosperity of the plateau. Furthermore, vaccination teams spread not only immunity to the virus but also awareness and acceptance of science-based medicine, replacing ‘backward’ and ‘superstitious’ practices and integrating the remote plateau into the modern socialist state. Finally, PRC veterinarians realized that yaks constituted a perilous reservoir of disease. So long as rinderpest lingered among these herds, the cattle of China proper would never be safe.

Saving Tibet’s yaks was therefore crucial to the CCP’s vision of a unified, industrial Chinese nation. These beasts of burden had brought much-needed food aid to the people of the region in the years before the 1954 completion of highways linking Tibet to Qinghai and Xikang.²⁶⁹ The historian Felix Wemheuer has shown that in 1952, the Chinese government used over 66,900 animals, including mules and yaks, to bring 28 million pounds [12.7 million kg] of rice ‘from Guangdong Province to West Bengal and from there to Tibet.’²⁷⁰ Whether by placating restive minorities with food assistance, or by fostering animal husbandry in Tibet, the eradication of rinderpest promised substantial benefits for China’s central authorities.

With their scientific acumen and political savvy, Drs. Cheng Shaojiong and Cai Wuji had moved seamlessly from top positions in the KMT government to leading roles

²⁶⁹ Felix Wemheuer, *Famine Politics in Maoist China and the Soviet Union*, New Haven: Yale University Press, 2014, p.179.

²⁷⁰ *Ibid.*

in the PRC. In his capacity as head of the Livestock Veterinary Office within the Ministry of Agriculture of the PRC, Cheng attended the first national rinderpest prevention meeting in 1951. Arguing that the Qinghai-Tibet plateau would be the final battleground against the disease, he suggested universal vaccination in pastoral regions.²⁷¹ After a second national meeting, convened in Lanzhou during winter 1952 and focused solely on the plateau, Cheng began work on a vaccine suitable for yaks.²⁷² To counter these animals' harmful reactions to the Japanese lapinized vaccine, Cheng and his colleagues further weakened the virus by passing it through sheep and goats, a process called caprinization. This 'caprinized-lapinized' rinderpest vaccine induced no serious side effects and conferred immunity for several months.

The new caprinized and lapinized vaccines were both more effective and more suitable to China's geography and infrastructure than their predecessors. Essentially, they allowed veterinary technicians to circumvent the limits of thermodynamics. From the moment it emerged from an urban laboratory, a dose of avianized vaccine required constant refrigeration. As we have seen, veterinarians in the countryside struggled to keep vaccines cool without reliable roads or electricity. By contrast, vaccines incubated in rabbits and goats did not require artificial cooling powered by fossil fuels. Instead, technicians could take advantage of these temporary host animals' natural homeostasis.

²⁷¹ Cheng Shaojiong 程绍迥 in *Zhongguo kexue jishu zhuanjia zhuanlüe: yangzhi juan* 中国科学技术专家传略: 养殖卷 [*Brief Biographies of Chinese Science and Technology Experts: Animal Breeding, hereafter Brief Biographies*], edited by Zhongguo kexue jishu xiehui 中国科学技术协会, p.217 (Beijing: Zhongguo kexue jishu chubanshe, 1993).

²⁷² Ibid. The fact that the meeting was in Lanzhou appears in Gansu Provincial Livestock Office, 'A Summary of Rinderpest Prevention Work in Gansu Province [Gansu Sheng Fangzhi Niuwen Gongzuo Zongjie]' in Yin Dehua 尹德华, ed. *History and Accomplishments in China's Extermination of Rinderpest*, 2003, p. 386.

For the final push to the country's frontiers, vaccinators traded their refrigerators for rabbits.

The authors of a 1951 handbook on lapinized rinderpest vaccine noted its suitability to China's conditions, saying 'wherever there are rabbits, it can be used.'²⁷³ Seed virus, 'completely domesticated 完全馴化' [i.e. rendered harmless to bovines] by serial passage through hundreds of rabbits, was available from 'any veterinary research institute.'²⁷⁴ On long trips into the field, teams should infect a healthy rabbit every four days to preserve the vitality of the virus and prevent breaks in supply.²⁷⁵ Working in the early morning to minimize exposure to bright light and heat, vaccinators were to kill and bleed the rabbit before extracting its lymph nodes, which could be used to make additional vaccine.²⁷⁶ A rabbit weighing 1.5 kg yielded 50 cubic centimeters of blood, enough for approximately 250 doses of vaccine.²⁷⁷ If there were too many cattle and not enough blood, teams could dilute the injection with sterile salt water.²⁷⁸ Procuring, feeding, and butchering locally procured rabbits was far more practical than using gasoline-fueled automobiles to carry kerosene-powered refrigerators through the vast, unpaved hinterlands.

²⁷³ Huabei Nongye Kexue Yanjiusuo Bianyi Weiyuanhui 華北農業科學研究所編譯委員會 [Editorial and Translation Committee of the North China Agricultural Science Research Station], Tuhua niuwen yimiao de zhizao ji yingyong 兔化牛瘟疫苗的制造及应用 [*Manufacture and use of lapinized rinderpest vaccination*], Beijing: Huabei nongye kexue yanjiusuo, January 1951., p.8

²⁷⁴ Ibid.

²⁷⁵ Ibid.

²⁷⁶ Ibid., p.6.

²⁷⁷ Ibid., p.5.

²⁷⁸ Ibid., p.7.

Without the burden of cumbersome refrigerators, vaccination teams were no longer confined to well-trodden paths. Due to the inadequate road network, Tan Xinzhong's team traversed the Inner Mongolian countryside on foot, or astride horses and camels.²⁷⁹ The provincial Livestock Bureau sent staff to obtain seed virus from a central government laboratory, and also to the city of Datong in nearby Shanxi province to buy the domestic rabbits that served as incubators for the vaccine. Inoculating over 130,000 cattle across their 100,000 square kilometer jurisdiction took the lives of about 9,000 rabbits.²⁸⁰ Administering the vaccine could be difficult: Tan recalled that fluid might leak out if the bovine was 'unruly' during the injection. Some animals ran away in fear, requiring the team to immediately give a remedial shot.²⁸¹ Still, the work went far more smoothly than had been possible with electric iceboxes and road-weary jalopies.

Effective on frontier bovines, and capable of continual regeneration during lengthy trips to remote pasturelands, the lapinized vaccine had clear advantages over its predecessors. The low level of skill required to administer this vaccine was another selling point. According to the 1951 handbook, a 'high-level supervisor who can resolve last-minute problems' should oversee production, although making the vaccine required no special veterinary training.²⁸² A handful of highly educated urban researchers, building upon the findings of colonial veterinarians, had done the difficult work of attenuating the virus and testing its usefulness. Hundreds of doughty, less specialized cadres, working in tandem with local headmen and herders, fanned out across the country

²⁷⁹Tan, *Yijiuwuyi*, p.75.

²⁸⁰ *Ibid.*

²⁸¹ *Ibid.*, p77.

²⁸² Huabei, *Tuhua*, p.8.

to accomplish the equally vital task of on-site injection. Cheap, transportable, broadly effective, and not reliant on scarce fossil fuels or sophisticated veterinary techniques, the lapinized vaccine was ‘just what the veterinarian ordered.’

Arms Race, Hoof Race

Humans were not the only Cold Warriors. Animals took part in this global power struggle as workers, laboratory subjects, carriers of disease (and vaccine), and victims of enemy attack. State violence and veterinary medicine thus intersected in the bodies of millions of animals worldwide. The same laboratories that enabled imperialism and aggression also yielded discoveries that improved the lives of countless humans and animals. Just as astronauts breached the heavens and reached the moon on repurposed missiles, vaccines born in a climate of suspicion and anxiety allowed millions of humans and cattle to escape the horrors of cattle plague. Less studied than their rocket-powered peers, the technological spinoffs of the veterinary arms race left a profound imprint on the daily lives of humans and animals worldwide.

Fear of enemy biological warfare was an impetus for much valuable veterinary research during the Cold War. Such anxieties also occasionally led to comical misunderstandings and opportunistic propaganda. A CIA bulletin from January 1955 warned that a cattle virus, possibly rinderpest, had been discovered in socialist East Germany. There, state-controlled media darkly blamed the outbreak on ‘our

opponents.²⁸³ Three months later, investigators discovered that the apparent epidemic had resulted from accidental contamination of the animals' fodder with a type of binding twine that included the chemical tricresyl phosphate. This toxin induced symptoms much like those of the dreaded rinderpest. Nevertheless, the East German government continued to blame 'American agents.' A CIA analyst noted that this 'propaganda line' helped to '[conceal] the inadvertent use of a toxic substance in binder twine,' while also explaining away 'the critical East German meat shortage.'²⁸⁴

East Germany was hardly the only state suspicious that its enemies were enlisting animals in biological warfare during the early 1950s. The historian Ruth Rogaski has discussed the Chinese Communist Party's accusations that American forces used rats and voles as plague vectors in the Korean War.²⁸⁵ Cai Wuji, the veterinarian who had worried about the poor quality of animal doctors in pre-war China, took part in an international scientific investigation of this claim, organized by the PRC and North Korean governments.²⁸⁶ Although groundless in this case, such concerns had some basis in reality: American and Canadian researchers had reactivated the Grosse-Île laboratory in 1948 to meet the perceived threat of Soviet biological attacks on North American livestock.²⁸⁷ They soon weaponized veterinary diseases such as 'African swine fever, Venezuelan equine encephalomyelitis, Newcastle disease, fowl plague, hog cholera,

²⁸³ CIA-RDP79T00975A001900650001, Central Intelligence Agency (CIA), 'Current Intelligence Bulletin,' January 21, 1955, p.7.

²⁸⁴ CIA-RDP79T00975A009000330001-5, CIA 'Current Intelligence Bulletin,' April 22, 1955, p.9.

²⁸⁵ Ruth Rogaski, 'Nature, Annihilation, and Modernity: China's Korean War Germ-Warfare Experience Reconsidered,' *The Journal of Asian Studies*, Vol. 61, No. 2 (May, 2002), 381-415.

²⁸⁶ 'Cai Wuji' 蔡无忌 in *Brief Biographies*, 155.

²⁸⁷ Milton Leitenberg, 'The Korean War Biological Weapon Allegations: Additional Information and Disclosures,' *Asian Perspective*, Vol. 24, No. 3, Rethinking Capitalist Development in East Asia (2000), 159-172.

rabies, and Rift Valley fever.’²⁸⁸ Like football coaches, Cold Warriors committed to mutually-assured destruction believed that the best defense was a strong offense.

Three Ways of Looking at Multispecies History

By 1957, PRC authorities eradicated rinderpest nationwide. An instrumental analysis of this feat emphasizes that safeguarding the country’s cattle, water buffalo, and yaks meant substantial gains in economic productivity, both immediately and in the subsequent decades. Intrepid vaccination teams extended the reach of veterinary care and state influence into the remotest corners of the new nation. Among rural people, eliminating cattle plague enhanced the prestige and credibility of the central government by sparing farmers from constant anxiety about their valuable, vulnerable animals. The campaign also encouraged rural people to embrace medical rigor and reject outmoded veterinary thinking and techniques. The vaccination program thus benefitted humans and their societies.

The observational approach notes the disappearance of reports showing cattle with rinderpest symptoms. To be sure, other livestock diseases such as anthrax persisted, and cattle suffered in new ways during the late 1950s. Further research will explore how other contemporary social and technological developments affected the well-being of cattle and yaks. Already we can see that millions of Chinese bovines no longer endured

²⁸⁸ Avery, *Pathogens*, p.74.

the genital and dental lesions, ‘projectile diarrhea,’ and lethal dehydration typical of cattle plague.²⁸⁹

The interpretive approach calls attention to the experiences of cattle and yaks themselves. Eliminating this pervasive disease spared these animals a great deal of pain and death. The philosopher Lori Gruen has coined the phrase ‘entangled empathy’ to describe a process that combines ‘affect and cognition’ when humans attempt to understand the experiences of others.²⁹⁰ A historian writing sixty years and ten thousand kilometers from his bovine subjects cannot presume to speak for them. But it is neither presumptuous nor sentimental to treat rinderpest eradication as a public health success for millions of intelligent, non-human beings.

²⁸⁹ Crowther, ‘Rinderpest,’ p.22.

²⁹⁰ Lori Gruen, ‘Conscious Animals and the Value of Experience,’ in *The Oxford Handbook of Environmental Ethics*, Stephen M. Gardner and Allen Thompson, eds., New York: Oxford University Press, 2017, p.98.

Chapter 3 Sweat: Draft Oxen and the Hazards of Changing Ownership, 1944-1959

The Chinese Civil War and revolution profoundly altered the daily lives and welfare of cattle, for good and ill. Previous chapters of this dissertation have shown how the burgeoning national dairy industry of the 1950s strained bovines' familial bonds, and how the Chinese Communist Party (CCP) managed to eradicate the devastating cattle plague after a decades-long campaign. Showing how oxen experienced their transfer from private to collective ownership, this chapter addresses another key aspect of the revolution: the re-writing of property regimes. By passing these strong but sensitive animals through a series of unfamiliar and inexperienced hands, the revolution increased their risk of death from malnutrition, exposure to the elements, and overwork.

The complexity and variety of sharing and rental arrangements make it difficult to defend sweeping arguments about the work and life experiences of draft cattle in pre-1949 China. Certain methods of sharing or renting oxen gave all parties clear incentives to feed the animals well, to avoid over-working them, and to protect them from theft or harm. On the other hand, some rental relationships were exploitative to poor farmers, and gave them little reason to care about the welfare of their rented nonhuman workers. Rather than attempting an overly broad synopsis of ox experiences before 1949, this paper will analyze numerous documented scenarios, to give a sense of the work and living environments of draft animals governed by rural legal systems.

After the establishment of the People's Republic of China (PRC) in 1949 and the redistribution of land and property during the early 1950s, draft animals' situation was more precarious. By the middle of the decade, most were the collective property of advanced cooperatives, which could include dozens or hundreds of households. Whereas rental contracts had explicitly stated individual humans' obligations toward their livestock, the unclear lines of responsibility in cooperatives hampered efforts to achieve accountability in the care and usage of these indispensable yet underappreciated workers. Perverse economic incentives exposed cooperative herds to inattentive care and excessive workloads. The unattainable quotas of the Great Leap Forward that began in 1958 further intensified the animals' hardships. As a result, many thousands of cattle suffered and died.

Toward a Multispecies Labor History of Modern China

Animal experiences offer a fresh perspective on the meaning of temporal divisions in accounts of history. Tracing the institutional and ideological continuities between Nationalist and Communist rule, historian William Kirby argues, "Ultimately the Chinese civil war had offered no fundamental choice to the Chinese people."²⁹¹ Kirby notes that the Chinese Communist Party (CCP) preserved many of the Nationalists' tools of governance, such as the *danwei* work unit, as well as "the theory of democratic

²⁹¹ William C. Kirby, "The Nationalist Regime and the Chinese Party-State, 1928-1958" in Merle Goldman and Andrew Gordon, eds., *Historical Perspectives on Contemporary East Asia*, Cambridge, Massachusetts: Harvard University Press, 2000, p. 229.

centralism, party tutelage, the centrality of the Leader and the small group of men around him, and the overwhelming militarization of political and economic priorities.”²⁹² In this light, the establishment of the People’s Republic of China (PRC) in 1949 represented merely “an exchange of *zhengdang*, or ruling parties,” and the two systems truly diverged only in 1958 with the mainland’s Great Leap Forward and Taiwan’s shift away from heavy, military-oriented industry.²⁹³ This interpretation of political developments during the 1950s is persuasive--for humans. Expanding the scope of analysis to include the many millions of intelligent nonhuman beings in China challenges this narrative of elite displacement atop a foundation of basic continuity.

Draft oxen were central to the mid-century economic and military endeavors of both the Nationalists (Kuomintang, or KMT) and CCP. During the Anti-Japanese War and Civil War of the 1940s, both parties recognized the importance of animal labor in lengthy military campaigns. After the Communists established the People’s Republic of China (PRC) in 1949, draft animal labor was essential for increasing crop yields, which would produce surpluses for the support of heavy industry. Oxen experienced the contending parties’ attempts to expand their reach into the countryside by working with or against local elites, from the notorious “local bullies and evil gentry” to prosperous farmers and low-ranking officials. As middlemen standing between the central government and its much-desired crop surpluses, these local elites were a nuisance to the

²⁹² William C. Kirby, “The Nationalist Regime and the Chinese Party-State, 1928-1958” in Merle Goldman and Andrew Gordon, eds., *Historical Perspectives on Contemporary East Asia*, Cambridge, Massachusetts: Harvard University Press, 2000, p. 229, 232.

²⁹³ William C. Kirby, “The Nationalist Regime and the Chinese Party-State, 1928-1958” in Merle Goldman and Andrew Gordon, eds., *Historical Perspectives on Contemporary East Asia*, Cambridge, Massachusetts: Harvard University Press, 2000, p. 229.

industrializing states. At the same time, the KMT and CCP governments tried to ameliorate the shortage of draft animal labor and improve efficiency by experimenting with various production incentives and ownership systems. These state policies, and the responses of ordinary farmers, had serious implications not only for humans but also for their draft animals.

When discussing the major economic transformations of mid-century China, including Land Reform and collectivization, scholars have not tended to distinguish between nonhuman laborers, and other fiercely contested but inanimate productive assets such as land and farm tools. Scholars including Vivienne Shue, Felix Wemheuer, Hu Yingze and Guo Xingang have examined the transformation in livestock ownership during China's land reform and collectivization.²⁹⁴ Researchers including Robert Conquest have also noted that collectivization in the Soviet Union and Central Europe had dire effects on economic productivity due to high livestock mortality rates.²⁹⁵ Such analyses convey the drama of these social transformations, but only from a human perspective in which the animals have purely instrumental value.

Even scholars describing the emotional bonds between oxen and their owners have tended to focus on the humans' perceptions and experiences. "Animals were a possession of a special kind," observe the authors of one study of Romanian farm

²⁹⁴ Vivienne Shue, *Peasant China in Transition: The Dynamics of Development toward Socialism, 1949-1956*, Berkeley, California: University of California Press, 1980, p79-79; Felix Wemheuer, *Famine Politics in Maoist China and the Soviet Union*, New Haven, Yale University Press, 2014, p144; Hu Yingze 胡英泽 and Guo Xingang 郭心钢, "Region, Class and Draft Animal Distribution in Rural Areas: with Shanxi in 1930s - 1950s as the Example 区域、阶级与乡村役畜分配——以20世纪30—50年代山西省为例," *Open Times* 开放时代, April 2017, pp. 71-88.

²⁹⁵ Robert Conquest, *Harvest of Sorrow: Soviet Collectivization and the Terror-Famine*, New York: Oxford University Press, pp. 158-159.

collectivization during the 1950s. Many of their interviewees likened draft animals to family members, and some posed for pictures with the beasts before surrendering them to collectives.²⁹⁶ Such poignant observations show the symbolic and sentimental meaning of these animals in farmers' lives, beyond their instrumental role as farm laborers. Still, considering the bovines' own capacity for emotion, historical accounts should also consider how changing ownership affected the daily experiences and welfare of the animals themselves.

Because draft cattle can learn, feel, and suffer, and because they are both workers and assets, taking these animals as historical subjects yields a new way to examine the transformation in labor and property relations in mid-twentieth century China. Unlike other assets that changed hands during Land Reform and the redistribution of property during the 1950s, animals such as cattle have physiological and emotional needs. A plow or loom does not suffer from being transferred, neglected, misused, or destroyed. Oxen, by contrast, are not senseless and inert, but require careful feeding, housing, and handling. Improper treatment causes them physical and mental anguish. Due to their economic importance and emotional sensitivity, an account of property redistribution that overlooks the experiences of these animate assets is like a history of schools that omits children. An account of changing institutions and ideas provides an essential skeleton, but including the lived experiences of all participants puts meat on the bones.

Like the rest of this dissertation, this chapter uses three analytical lenses to assess the changes in the animals' experiences of war and revolution. The “instrumental

²⁹⁶ Gail Kligman and Katherine Verdery, *Peasants Under Siege: The Collectivization of Romanian Agriculture, 1949-1962*, Princeton: Princeton University Press, 2011, p.97.

perspective” treats draft cattle solely as productive assets that derive value from their usefulness to human endeavors. The “observational perspective” examines records of the animals’ behavior and health, created by the humans who interacted with them, such as farmers, veterinarians, and officials. Finally, the “interpretive perspective” makes cautious inferences about the inner states and experiences of the animals, based on available textual data.

These non-exclusive perspectives are integral to a history of the revolution with the experiences of cattle at its center. A local cadre, noting that each ox in a cooperative is plowing more land than its privately owned peers, is employing the instrumental perspective. A government investigator, noting that the overworked animals are emaciated and lethargic, and therefore unable to work, uses observational data to produce an instrumental analysis. A historian, interpreting the investigator’s report across a gulf of space and time, can infer that the starved and exhausted oxen were not only unproductive, but also experienced pain and fatigue. Combining these perspectives allows historians to come closer to understanding both how contemporary humans viewed the effects of the revolution on oxen, and what these changes meant to the animals themselves.

Too Many People, Too Few Oxen

A national dearth of draft animals was the underlying reason for the various ownership regimes discussed in this chapter. Understanding this shortage is essential for making sense of the diverse methods of possession and usage discussed in this section, as well as their effects on the daily experiences of draft animals. The causes of the draft

animal shortfall were many, and varied by region. Natural disasters, political instability, epidemic disease, and a high human population all contributed to the lack of draft animals. Crucially, the shortage was not evenly distributed across space and social class. The location and wealth of their human owners and users determined the systems of possession and usage to which draft animals were subject, thus shaping their work and living conditions, for better or worse.

Natural disasters could compel farmers, whose income was precarious in the best of times, to sell their draft animals at bargain prices. The cataclysmic Yangzi river flood of 1931 not only killed an estimated two million cattle, but also depressed the value of the surviving animals. The floodwaters ruined an enormous area of pasture, raising the price of fodder until farmers could no longer afford to keep draft animals. Reluctant to kill their loyal livestock but unable to feed them, desperate farmers instead sold the precious beasts at sharply reduced rates.²⁹⁷ During a severe drought in 1934 near the capital city of Nanjing, farmers sold their oxen for 30-40 yuan, a sharp drop from the historic average of 100 yuan, “and no one thought it was strange.”²⁹⁸ The liquidated animals soon became food for humans.

Widespread political violence claimed the lives of many additional animals. Some cattle died directly at the hands of soldiers. One observer in Sichuan noted that upon

²⁹⁷ Chris Courtney, *The Nature of Disaster in China: The 1931 Yangzi River Flood*, Cambridge: Cambridge University Press, 2018, pp. 71-72.

²⁹⁸ Xu Chang 徐暢. “Gengchu jiedai yu nongye jingying—yi 20 shiji er-sanshi niandai Changjiang zhongxiayou diqu nongcun wei zhongxin” 耕畜借贷与农业经营——以 20 世纪二三十年代长江中下游地区农村为中心 [Livestock loans and farm operations – a study of villages of the lower-middle Yangzi River during the 1920s and 1930s] *Anhui Shixue 安徽史学 Anhui Historical Studies* (2002) Number 2, p. 71.

entering a village, provincial or Nationalist forces killed and ate the local cattle to deprive the Communists.²⁹⁹ Many other animals died in the Nationalist Army's scorched earth effort to slow the Japanese invasion in 1938. Some 220,000 draft animals died in the flooding of the North China plain after the Nationalist Army destroyed Yellow River dikes to flood the countryside, and despairing farmers sold off many more in the Henan famine of 1942-1943.³⁰⁰ Even combat far from Chinese soil meant premature death for thousands of bovines. When the Pacific War intensified after the bombing of the American fleet at Pearl Harbor in late 1941, the cattle population of colonial Manchuria fell by 32% between 1942-1943, as the Japanese Navy increased its consumption of Chinese beef.³⁰¹

By endangering bovines, the combination of state violence, virulent disease, and economic collapse imperiled the state. After the Japanese surrender in 1945, ox labor shortfalls continued to undermine the Nationalist government in its civil war against the Communists. Veterinarian Cheng Shaojong 程紹迥, architect of the campaign to eradicate cattle plague, observed that by killing an estimated one million animals per year, the disease directly threatened rural economies, and indirectly foiled “national

²⁹⁹ Sichuan de nongju zujie 四川的农具租借 [Loans for Farm Tools in Sichuan], *Zhongguo Nongcun* 中国农村 [*China's Villages*], 3 卷 2 期, 页 41-42, Feb. 1937, cited in Zhang Youyi 章有义, ed. *Zhongguo jindai nongyeshi ziliao disanji* 中国近代农业史资料第三辑 1927-1937 [*Historical materials on modern Chinese agriculture, volume 3, 1927-1937*], Beijing: Sanlian, 1957, p. 872.

³⁰⁰ Micah Muscolino, *The Ecology of War: Henan Province, the Yellow River, and Beyond: 1938-1950*. New York: Cambridge University Press, 2015, p. 191.

³⁰¹ Ma Wei 马伟, Yi Baozhong 衣保中, Riben dui Dongbei chuniu ziyuan luequ zhengyi – yi Mantie diaocha ziliao wei kaocha zhongxin 日本对东北畜牛资源掠取刍议—以满铁调查资料为考察中心 [“Japanese livestock seizures in Northeastern China: An investigation based on Mantetsu materials”] *Zhongguo Nongshi* 中国农史 [*Agricultural History of China*] March 2017, p. 76.

construction” by depleting military grain supplies and the state’s finances.³⁰² Fearful that their animals would die, farmers believed that raising oxen was “most risky.” Facing sharply inflated costs for fodder, households that would ordinarily keep six or seven cattle were “unwilling to face such severe losses again” and had ceased to raise the animals.³⁰³ For many years, landlords in cattle plague-infested Guangxi Province had felt that buying land was a more stable form of investment than oxen, which could die *en masse* in an outbreak.³⁰⁴ As discussed in Chapter 2, pervasive combat and banditry hindered veterinarians’ attempts to eradicate the cattle plague in the countryside. Wartime inflation, driven by the Nationalist government’s heavy military spending and confiscatory taxation of grain, further undermined animal husbandry both by raising the price of fodder and by hindering the eradication of cattle plague. This lack of draft animals sabotaged the Nationalist government’s ability to fight its enemies, both foreign and domestic.

³⁰² SHAC 23-1-2630, Cheng Shaojiong “Paiqian daibiao canjia dongfei niuwen fangzhi huiyi shuoming shu” nonglinbu youguan guofang niuwen fangzhi huiyi de wenshu” 程紹迴 “派遣代表參加東菲牛瘟防治會議說明書,”农林部有关国防牛瘟防治会议的文书 June-Sept, 1948, p. 15.

³⁰³ SHAC 23-1-1800, Nonglinbu liangshi zengchan weiyuanhui buzhu gesheng jiangli gengniu fangzhi zanxing banfa jihua ji zhongyang nongye shiyansuo ganzhi xueqing gong Sichuan peidu fujin xian fangzhi niuwen de youguan wenshu 農林部糧食增產委員會補助各省獎勵耕牛繁殖暫行辦法計畫及中央農業實驗所趕製血清供四川陪都附近縣防治牛瘟的有關文書 1941 六月—1942 三月, [“Documents related to the MOAF’s Grain Production Increase Committee temporary subsidy plan to reward each province for breeding draft oxen and the Central Agricultural Research Station’s rapid production of plasma to supply counties near the provisional capital in Sichuan for cattle plague prevention, June 1941-March 1942”], p. 50.

³⁰⁴ Shou Min 寿民 Guangxi nongcun jingji xianjieduan de xiezhen 广西农村经济现阶段的写真 [Impressions of the current village economy in Guangxi] Zhongguo Jingji 中国经济 *China’s Economy*, Volume 2, Issue 12, p. 8, December 1934, cited in Zhang Youyi 章有义, ed. Zhongguo jindai nongye shi ziliao disanji 1927-1937 中国近代农业史资料第三辑 1927-1937 [*Historical materials on modern Chinese agriculture, volume 3, 1927-1937*] Beijing: Sanlian, 1957, p. 872.

Military obligations also depleted livestock numbers in Communist-controlled regions during the Civil War. In the three years before March 1949, over 900,000 draft animals were requisitioned for military service in the northeastern region of the country.³⁰⁵ This number includes workhorses and mules, as well as oxen, yet the overall effect on livestock raisers' enthusiasm was similar to that in Nationalist areas. To encourage farmers to increase their draft animal holdings, in autumn of 1948 the local authorities granted newly purchased livestock a six-month reprieve from military requisition, and forbade the military from "arbitrarily seizing" work animals.³⁰⁶

Disease, inflation, and war were not the only reasons for China's undersupply of draft animals. Agricultural historian Cao Xingsui concludes from his analysis of southern Jiangsu province that the region's high population density reduced the demand for oxen. In this "crowded agricultural society," human labor was relatively cheap, and pastureland was too scarce to provide adequate nutrition.³⁰⁷ Based on farm surveys undertaken by the South Manchuria Railway Company, he argues that as fodder costs grew higher and human wages fell lower, farmers were obliged to substitute their own labor for the work

³⁰⁵ Dongbei xingzheng weiyuanhui minzhengbu 东北行政委员会民政部, Dongbei sannianlai gedi renli, chuli, zhanqin tongji 东北三年来各地人力、畜力、战勤统计表 ["Human, livestock, and military logistics statistics for Northeastern China during the past three years"] (March 12, 1949), Dongbei jiefangqu caizheng jingjishi ziliao xuanbian disiji 东北解放区财政经济史资料选编 第四辑 [*Historical materials on economics and finance in liberated areas of Northeast China, volume 4*], Harbin: Heilongjiang People's Publishing House, 1988, p.566.

³⁰⁶ Dongbei xingzheng weiyuanhui Ji-Cha-Re-Liao banshichu 东北行政委员会冀察热辽办事处 Dongbei Executive Committee Ji-Cha-Re-Liao Office, Guanyu hufu he fazhan shengchu de bugao 关于恢复和发展牲畜的布告 ["Announcement on recovering and developing livestock"] (September 10, 1948), Dongbei jiefangqu caizheng jingjishi ziliao xuanbian diyi ji 东北解放区财政经济史资料选编 第一辑 [*Historical materials on economics and finance in liberated areas of Northeast China, volume 1*] Harbin: Heilongjiang People's Publishing House, 1987, p. 488.

³⁰⁷ Cao Xingsui 曹幸穗, Jiu Zhongguo Sunan Nongjia Jingji Yanjiu 旧中国苏南农家经济研究 [*Economic Research on Agricultural Households in Southern Jiangsu Province in Pre-1949 China*], Zhongyang Bianyi Publishing 中央编译出版社, Beijing 1996. p. 104.

of draft animals, creating a “historical retrogression in productive capacity,” which he describes as the shift from “the culture of the plow 犁耕文化” to “the culture of the hoe 锄耕文化.”³⁰⁸ In northern Jiangsu Province during the 1930s, one observer was dismayed to see that humans, not draft animals, were “toiling bitterly” at plowing the fields, even in regions that once had “magnificent tools.”³⁰⁹

Both Nationalist and Communist agriculture officials recognized that boosting farm yields would require increasing the size of the county’s draft ox population. Yet many farmers were reluctant to raise oxen for fear of losing the costly animals to war, natural disaster, and pestilence. Many who had the means to keep animals were deterred by the relative cheapness of human labor, and the prospect of easier profits in other ventures. Amidst the dearth of animal labor and the glut of human muscle power, many poor farmers could only afford to hitch themselves to their plows. Richer farmers and landlords, meanwhile, chose to hire cheap humans rather than keeping costly beasts that were vulnerable to marauders, droughts, and epidemics. The result was a cycle of deepening poverty for inefficient and overburdened human tillers, and reduced crop yields for a frustrated state.

Possibly because the other causes of the ox shortage seemed even more intractable, Nationalist officials and their Communist successors both blamed selfish, short-sighted merchants for depleting the herds. In December 1939, a county official in

³⁰⁸Cao, *Jiu Zhongguo*, p. 105-106.

³⁰⁹ Chen Hongjin 陈洪进, *Jiangsu yankenqu nongcun jingji suxie* 江苏盐垦区农村经济速写 [Quick notes on village economies in the salt and agricultural regions of Jiangsu], *Zhongguo Nongcun* 中国农村 [*Chinese Villages*], 1 卷 12 期, 页 85, Sept. 1935. Cited in Zhang Youyi, ed. 张有义, *中国近代农业史资料*, 第三辑 1927-1937, Beijing: Sanlian, 1957, p. 876.

Sichuan Province beseeched Wu Guozhen 吳國禎, mayor of the Nationalists' temporary wartime capital of Chongqing, to clamp down on the city's illicit trade in draft oxen. The local official wrote that due to the province's hilly terrain, and the conscription of young men to fight the Japanese, the labor of draft oxen was vital to securing the "national livelihood." Yet greedy cattle merchants, "ignorant of the greater good and seeking personal profit," were buying up at least one hundred oxen per day for slaughter and consumption in Chongqing. Although Wu promptly agreed to this request, urban consumers' demand for meat continued to draw working animals out of the countryside.³¹⁰

³¹⁰ Yanjin yunshou zaisha gengniu an 严禁运售宰杀耕牛案 ["Transporting and selling draft oxen for slaughter is strictly forbidden"] Chongqingshi Zhengfu gongbao 重庆市政府公报 1939 年第 2-3 期, from <http://bfqk.5read.com/>.



Figure 3.1: Humans tilling a field³¹¹

The shortage of animal draft power increased human farmers' workloads while hindering the state's ability to collect agricultural surpluses. In disaster-stricken Shaanxi Province, pairs of farmers who had lost their oxen tilled the earth by tying a plow to a plank. One farmer pulled the plank and the other pushed the plow, "advancing very slowly." Resting every few steps, "their sweat fell like rain." A child would sometimes walk in the middle, helping pull the plow, and "his suffering [was] easy to imagine."³¹² In

³¹¹ Lloyd E. Eastman, *Family, Fields and Ancestors: Constancy and Change in China's Social and Economic History, 1550-1949*, New York: Oxford University Press, 1988, p. 66.

³¹² Shi Sun 石筍, *Shaanxi zaihou de tudi wenti he nongcun xin konghuang de zhankai, xin chuangzao* 陕西灾后的土地问题和农村新恐慌的展开, *新创造* 2 卷 1、2 期, 页 230, July 1932. Cited in Zhang Youyi, ed. *张有义 Zhongguo jindai nongyeshi ziliao, disanji* 中国近代农业史资料, 第三辑 1927-1937, Beijing: Sanlian, 1957, p. 877.

Figure 3.1 above, two youngsters and one adult struggle to pull a plow, while another adult pushes from behind. Even in a faded black and white photo, the miserable inefficiency of this task is clear.

Nations at war cannot afford to squander labor in this way. Framing the Anti-Japanese and Civil Wars as struggles to control natural resources and energy, historian Micah Muscolino shows how the contending armies directed and made use of the mighty power of the Yellow River.³¹³ Draft animals were another important embodiment of energy, or the capacity to work. At the height of the Anti-Japanese War in 1941, the Nationalist Agriculture Ministry's Committee for Increasing Grain Production described the economic consequences of the ox energy shortage. Chen Zhushan, the chief representative of the Committee in Sichuan Province, noted that due to the "extreme" lack of draft animals in many regions, "human power 人力 is plowing the fields, which is both uneconomical and ineffective."³¹⁴ The previous year, the provincial veterinary medicine production facility had reported draft ox death rates of 46% and 57% in two counties due to disease, and practically every county had suffered losses of at least 20-30%.³¹⁵ With this grievous loss of draft power, "how can we even speak of increasing

³¹³ Micah Muscolino, *The Ecology of War: Henan Province, the Yellow River, and Beyond: 1938-1950*, New York: Cambridge University Press, 2015.

³¹⁴ SHAC 23-1-1800, Nonglinbu liangshi zengchan weiyuanhui buzhu gesheng jiangli gengniu fanzhi zaxing banfa jihua ji zhongyang nongye shiyansuo ganzhi xueqing gong Sichuan peidu fujin xian fangzhi niuwen de youguan wenshu 農林部糧食增產委員會補助各省獎勵耕牛繁殖暫行辦法計畫及中央農業實驗所趕製血清供四川陪都附近縣防治牛瘟的有關文書 1941 六月—1942 三月 ["Documents related to the MOAF's Grain Production Increase Committee temporary subsidy plan to reward each province for breeding draft oxen and the Central Agricultural Research Station's rapid production of plasma to supply counties near the provisional capital in Sichuan for cattle plague prevention, June 1941-March 1942"], p. 53.

³¹⁵ *Ibid.*, p. 50.

yields?”³¹⁶ For a wartime government in exile that had lost access to the customs revenue, salt production, and industry of the east coast, the imperative to boost crop yields by increasing cattle numbers was all the greater.³¹⁷

War's Effect on Bovine Social Class and Workloads

During the turbulent decades before 1949, draft animal ownership in many areas became concentrated among farmers that the Communists labeled “middle peasants.” A report from 1934 explained that because warlords had confiscated the best draft animals in two central counties in Henan Province, both landlords and rich farmers preferred to hire cheap farm hands instead.³¹⁸ In Communist controlled northeastern China, meanwhile, many rich farmers preferred to use their capital to make usurious loans, rather than incur the costs of time, effort, and money required to raise cattle.³¹⁹ Table 3.1 below illustrates the widespread phenomenon of simultaneously increasing draft animal

³¹⁶ Ibid., p. 50.

³¹⁷ On the Nationalists' wartime fiscal troubles, see Robert A. Kapp, “The Kuomintang and Rural China in the War of Resistance, 1937-1945” in F. Gilbert Chan, ed. *China at the Crossroads: Nationalists and Communists, 1927-1947*, Boulder: Westview Press, 1980, p. 151-176.

³¹⁸ Xi Chao 西超, Henan nongcun zhongdi guyong laodong 河南农村中底雇佣劳动 [“Sharecropper labor in Henan villages”] *Dongfang Zazhi* 东方杂志 [Eastern Miscellany] September 1934, Volume 31, Issue 18, p.70. Cited in Zhang Youyi, ed. 张有义, 中国近代农业史资料, 第三辑 1927-1937, Beijing: Sanlian, 1957, p. 877.

³¹⁹ Zhongguo renmin yinhang dongbei quhang 中国人民银行东北区行 [People's Bank of China, Northeastern China Branch], Dongbei dangqian nongcun jingji qingkuang ji nongcun jinrong gongzuo baogao 东北当前农村经济情况及农村金融工作报告 [“Current economic situation and village finance work report for Northeastern China”], August 1952, ZL4-10 in Zhongguo Shehui Kexueyuan, Zhongyang Dang'anguan 中国社会科学院, 中央档案馆 [Chinese Academy of Social Sciences, Central Archives] *Zhonghua Renmin Gongheguo jingji dang'an ziliao xuanbian nongye juan 1949-1952*, 中华人民共和国经济档案资料选编农业卷 1949-1952 [*Selections from the economic archives of the PRC, 1949-1952*], Shehui Kexue Wenxian chubanshe 社会科学文献出版社 Beijing, 1991, p.497.

ownership by middle peasants, and decreasing ownership by landlords, rich peasants, and the very poor. The region is atypical for its slight increase in the total number of draft animals, as wartime declines were precipitous in many locales. But the sharp decline in the number of oxen owned by wealthy farmers and landowners is consistent with trends around the country.

Table 3.1: Changes in Draft Animal Ownership by Class During the Anti-Japanese War in Three Farming Districts in Shandong Province

Class background	Number of livestock		Percentage of livestock held by this class		Proportional change (1944 ownership as share of original ownership percentage)
	1937	1944	1937	1944	
Landlord	124	60	11.96%	5.42%	-54.71%
Rich peasant	191	146	18.42%	13.18%	-28.46%
Middle peasant	460	601	44.36%	54.24%	+ 22.28%
Poor peasant	248	291	23.92%	26.26%	+9.82%
Hired hand (僱農)	14	10	1.35%	0.90%	-33.15%
Total	1037	1108	100.00%	100.00%	

Data source: Huadong junzheng weiyuanhui tudi gaige weiyuanhui 華東軍政委員會土地改革委員會 [East China Military Administration Land Reform Committee, hereafter ECMALRC] 沐水縣（新設）石河、臨沐縣（新設）蛟龍、大興三個區農村經濟情況 [“Rural economic situation in the three districts of Mushui County (newly established) Shihe, Linmu County (newly established) Jiaolong and Daxing”], Huadong gedazhong chengshi jiaoqu nongcun diaocha (Shandongsheng) 華東各大中城市郊區農村調查（山東省） [Shandong Province Village investigation of periphery of mid- and large-sized cities of Eastern China], December 1952, p. 72-73 [rare book collection of Shanghai Library].

The user's class background was a major determinant of an ox's workload. In general, landlords and wealthier peasants used their oxen to plow smaller areas than their poor- or middle-peasant counterparts. Table 3.2, based on pre-land reform survey data of a village in Anhui Province in 1950, illustrates this point. Landlords and rich peasants used their oxen to plow an average of slightly over 11 *mu* [0.74 hectares], whereas oxen belonging to middle peasants plowed 12.3 *mu* [0.83 ha.] and poor peasants used their animals to plow 18.5 *mu* [1.23 ha.]. In sum, oxen employed by rich or middle peasants were responsible for plowing just two thirds as much land as those employed by poor peasants.

Table 3.2: Ownership and usage of draft oxen by class background in Dongjiadian village, 1950

Class background	Number of draft oxen owned	Draft oxen used	Land area plowed (rounded to nearest <i>mu</i>)	Average area plowed per ox (in <i>mu</i>)
Landlord	21.5	15	171	11.4
Rich peasant	32.5	21	238	11.3
Middle peasant	80	86.5	1,067	12.3
Poor peasant	21.5	29	536	18.5

Data source: ECMALRC *Shandong Province Village investigation*, p.119. [Shanghai Library rare book collection].

Table 3.3, based on data from a smaller village in Zhejiang Province, is a more extreme illustration of the same phenomenon. Here, oxen employed by rich peasants plowed less than half as much land as those used by poor peasants (26.1 *mu* versus 56 *mu*). It is reasonable to infer that the single oxen belonging to the village's landlord and poor peasant households were not solely responsible for plowing the areas shown in the chart (30.9 *mu* and a back-breaking 358 *mu*). Rather, both landlords and poor peasants in this region would have hired or traded for cheap human labor to complete their plowing.

Table 3.3: Ownership and Usage of Draft Oxen by Background in Village 2, Hujie Township (June 1950)

Class Background	Draft oxen used	Land area plowed (rounded to nearest <i>mu</i>)	Average area plowed per ox (in <i>mu</i>)
Landlord	1	31	31
Rich peasant	21.5	560	26.1
Middle peasant	15.5	868	56.0
Poor peasant	1	358	358
Hired hand	0	22	X
Artisan	0	28	X
Other	0	22	X

Data source: ECMALRC, *Zhejiang Province Village investigation* p. 206.

The animals' class-based workload gap may not have been as dramatic as these statistics suggest. First, as Table 3.2 suggests, landlords and rich peasants did not use all

their oxen, but rented out some to poorer peasants.³²⁰ Therefore, while an ox that belonged to a poor peasant in Dongjiadian was sure to plow approximately 18.5 *mu*, an ox belonging to a rich peasant or landlord might also plow this amount, if she were rented by a poor peasant. The owner's class background played a role in determining an animal's workload, but the more salient variable was the class background of the user. Next, some landlords and rich peasants took part in ancillary industries. They not only used their cattle to plow, but also to transport goods, grind grain, press sugarcane, or perform other farm work. These charts do not capture such labor. Finally, the source data do not describe the soil types of the land being plowed. It is possible that landlords owned darker soils, which were richer in organic matter and thus both more fertile and difficult to plow. In Shandong Province, for instance, a single mature ox could plow 35 *mu* [2.33 hectares] of sandy or loess soil per season, whereas richer, darker soils required two oxen.³²¹ A small field of dense, black earth might thus prove as strenuous to plow as a larger plot of loose, sandy soil.

The complexity and variety of draft animals' work frustrated official attempts to rationally quantify and reward nonhuman labor after the redistribution and cooperativization of farm assets during the 1950s. Inflexible work quotas sometimes lacked context such as temperature and soil type. This system gave human farmers, using collectively owned draft animals as tools, economically rational incentives to work the oxen harder than real-world conditions and common sense suggested. According to one

³²⁰ The source data include figures for "oxen rented" and "oxen rented out" by each class. But as these figures can be inferred from the discrepancies between ownership and usage, I have omitted them for simplicity.

³²¹ ECMALRC, *Shandong Province Village Investigation*, p. 27 [rare book collection of Shanghai Library]

expert on Hungarian labor history, “The work unit [i.e. work point] system constituted a matrix of value, designed by officials to set the value of labor scientifically rather than through the customary means of market mechanisms.”³²² The situation was similar in China. Oxen had worked hard before the revolution, but private or pooled ownership regulated by rental contracts and social pressure had aligned the interests of humans and animals reasonably well. Attempting to promote efficiency and equity by rationalizing labor quotas, the post-1949 state in fact encouraged farmers to disregard the gritty details of their work environments, thus exposing draft animals to excessive work and exhaustion. Although cooperativization reduced the disparity among draft animals’ workloads, on the whole it did not lessen their considerable burdens.

Ox Rental and Usage Rules Before the Revolution

In the decades before the revolution, many households were unable to afford their own draft animals. These farmers often resorted to renting, or to sharing draft oxen with neighbors and kin. The conditions of shared or common usage affected not only the monetary rights and responsibilities of farmers, but also shaped their relations with the rented bovines. Many arrangements to share or rent oxen were oral, based solely on mutual trust or kinship among the concerned parties. Fortunately for historians, however, several surviving examples of written contracts illustrate the terms of exchange. A close

³²² Martha Lampland, *The Value of Labor: The Science of Commodification in Hungary, 1920-1956*, Chicago: University of Chicago Press, 2016, p. 183.

reading of the terms and conditions of draft ox rental agreements reveals the contracted parties' obligations to each other, and permits cautious inferences about their treatment of rented bovines.

Scholarship on contracts in China before 1949 has tended to address urban and commercial agreements.³²³ One monograph on business contracts in the first fifteen years of the People's Republic reveals the contract system's debt to Soviet models, and the utility of contracts in long-term industrial planning. The same scholar's article on agricultural contracts deals mainly with commodity purchasing agreements between the state and the farm population.³²⁴ By shifting the focus from urban, commercial, and governmental agreements to rural labor agreements, scholars analyze the working conditions of the majority of the national population. Studying ox rental arrangements has the additional benefit of illuminating the work experiences of this invaluable but hitherto invisible nonhuman rural labor force.

Contracts apportioned responsibility for the feeding and care of animals, the disposal of calves, and compensation in the event of the bovine's death or loss. In a village near Fuzhou at the time of Land Reform, a typical contract read:

Yearly rent: 500 *jin* of grain; any calves are to be split evenly between the owner and renter; the renter is responsible for feeding the ox, and must compensate the owner if the ox is

³²³ See for instance, Madeleine Zelin, Jonathan K. Ocko and Robert Gardella, eds. *Contract and Property in Early Modern China*, Stanford: Stanford University Press, 2004.

³²⁴ Richard M. Pfeffer, *Understanding Business Contracts in China, 1949–1963*, Cambridge: Harvard University Asia Center, 1973 and Richard M. Pfeffer, "Contracts in China Revisited, With a Focus on Agriculture, 1949–63" in *The China Quarterly*, vol. 8, October 1966, pp. 106-129.

stolen; if the ox dies of disease, the renter is not responsible for compensation after notifying the owner.³²⁵

The legal requirement to adequately feed and care for the animal helped to deter neglect or malnourishment. During the 1920s in Guangxi Province's Baise County, when one farmer's rented ox died of thirst, he was required to pay the owner a cash penalty, and surrender the animal's carcass.³²⁶ Renters who were liable for compensation in the event of theft had further reason to keep a close eye on the draft animals and to secure them at night.

In Zhejiang Province's Lishui County, written contracts were used only if the human parties did not trust each other. As in Fuzhou, the parties would evenly share the proceeds from the sale of any calves born during the rental term.³²⁷ This provision allowed the owner to profit from his possession of the mother, while also compensating the renter both for his investment of additional fodder for the embryonic calf and nursing mother, and for the reduced workload of which a cow is capable during pregnancy and after giving birth. In this way, the prospect of future profit gave the renter an incentive to

³²⁵ ECMALRC,福建省農民協會 [Fujian Province Farmers' Association], Fujian gengniu gengniu diaocha 福建耕牛耕牛調查 ["Investigation of Draft Oxen in Fujian"], Fujiansheng nongcun diaocha 福建省農村調查 [*Investigation of Fujian Province Villages*] December, 1952, p. 236 [Shanghai Library rare book collection].

³²⁶ Chen Zheng 陈峥, Minguo shiqi Guangxi nongcun gengchu jiedai tanxi 民国时期广西农村耕畜借贷探析 ["Exploration of village livestock loans in Republican-period Guangxi"] *Gujin Nongye 古今农业* [*Agriculture Past and Present*], Volume 3, 2008, p. 39.

³²⁷ ECMALRC,福建省農民協會 [Fujian Province Farmers' Association], Fujian gengniu gengniu diaocha 福建耕牛耕牛調查 ["Investigation of Draft Oxen in Fujian"], Fujiansheng nongcun diaocha 福建省農村調查 [*Investigation of Fujian Province Villages*] December, 1952, p. 236 [Shanghai Library rare book collection].

avoid inducing miscarriage by overworking the mother, a topic to be discussed in greater detail in Chapter 5 on reproduction.

Renters in Fuzhou and in Zhejiang Province's Lishui County were not liable if the animal died in a natural disaster or epidemic. The renter was responsible, however, if the ox were stolen, or if it died of malnutrition or thirst.³²⁸ In these regions, unpredictable and inevitable outbreaks of disease were thus considered *force majeure*, whose prevention was impossible even for the best-intentioned renter. By contrast, renters in Guangxi were responsible if the animal died of disease.³²⁹ Considering the prevalence of cattle plague in this southwestern province, this provision placed a heavy burden on the renter.

To redress the inefficient farming caused by the shortage of draft animals in the areas they controlled before 1949, the Communists set up labor exchanges in which poor farmers could trade their muscle power for the use of oxen. Favorable exchange rates would supposedly induce wealthier farmers to raise more oxen, which in turn would increase crop yields. If the exchange rates were unappealing, however, the wealthy cattle-owning farmers might respond by selling off their animals. This occurred in the autumn of 1944 in the Binhai region of Shandong Province. To make matters worse, the local rent reduction program fragmented large land holdings, and the poor farmers were unable to raise the animals independently on their small plots. As a result, the joint raising of oxen among several households arose “naturally” in response to the poor farmers’ lack of draft labor in the region.³³⁰

³²⁸ Ibid.

³²⁹ Chen Zheng, “Exploration of village livestock loans,” p. 39.

³³⁰ Geng Guangbo 耿光波, Shandongsheng nonglin hezuo huiyi zongjie 山东省农林合作会议总结 [“Summary of Shandong Province agricultural cooperative meeting”] January 1946 in Shandongsheng

While several families could jointly raise and use draft animals sustainably and efficiently, problems arose when cadres tried to expand the scope of joint ownership to encompass entire villages. They “failed to walk the mass line” by compelling all villagers to turn over their oxen and donkeys for collective ownership and feeding. Those who refused were labeled “stubborn,” a clear violation of “the principle of democratic autonomy.”³³¹ Foreshadowing the problems of the cooperatives and communes of the late 1950s, Shandong farming officials concluded in 1946 that large-scale joint raising of draft animals “could not exist” because no one had good reason to monitor their feeding and usage.³³² Frequent conflicts among villagers who wished to use the animals at the same time were inevitable considering the brief windows in which to plow and plant. Furthermore, villagers failed to provide the animals with “additional love and care,” and sometimes worked them to death.³³³ (Although this particular observation referred to donkeys, the same principle applied to oxen.) Finally, prosperous farmers preferred to raise the animals on their own, both because they got other benefits such as manure from the animals, and because independent ownership allowed for earlier planning and preparation of the fields, and could “guarantee the health and robustness of the ox.”³³⁴ Agriculture officials reasoned that “as far as the entire society’s economy is concerned,”

Dang’anguan, Shandong Shehui Kexueyuan lishi yanjiusuo bian 山东省档案馆、山东社会科学院历史研究所合编 [Shandong Provincial Archives, Historical Research Institute of the Shandong Academy of Social Sciences, eds.] Shandong geming lishi dang’an ziliao xuanbian di shiliuji 山东革命历史档案资料选编第十六辑 [*Selections from Shandong Revolutionary History Archives, Volume 16, Nov. 1945-May 1946*], Shandong People’s Press 山东人民出版社, Jinan, 1984, p. 154.

³³¹Ibid.

³³²Ibid., p. 155.

³³³Ibid.

³³⁴Ibid.

forcing rich peasants to contribute their oxen for public raising and usage not only failed to improve productivity, but in fact worsened it.³³⁵

In sum, many draft animal ownership regimes co-existed in pre-revolutionary China. Both KMT and CCP observers understood that the health and labor power of oxen relied in large part on making farmers feel responsible for their animals. Viewing these arrangements through the instrumental lens of their authors, it is clear that draft animals were valuable assets deserving of legal protection. Historians viewing these agreements through an interpretive lens can suggest how the bovines experienced the changing systems of ownership. By dissolving the direct economic and emotional bonds between human and nonhuman farmers, the property redistribution of the 1950s weakened the animals' position relative to their human colleagues, exposing them to hardship and suffering.

Meddling Middlemen Sapping the State

The welfare of draft cattle provides a fresh lens for assessing the struggles of the KMT and CCP to use grain surpluses to support defense and industry. One scholar has argued that the chief difference between the Nationalist and Communist efforts to extract rural economic surplus was the CCP's elimination of "the local power-holding elite with which the KMT had neither the wish nor the strength to struggle."³³⁶ This assessment is

³³⁵ Ibid.

³³⁶ Robert A. Kapp, "The Kuomintang and Rural China in the War of Resistance, 1937-1945" in F. Gilbert Chan, ed. *China at the Crossroads: Nationalists and Communists, 1927-1947*, Boulder: Westview Press, 1980, p. 175.

unfair, as historian Patricia Thornton has shown that Nationalist officials were painfully aware of the corrosive effects of the government's uneasy alliances with unsavory strongmen.³³⁷ These local elites, taking advantage of their poorer, weaker neighbors and obstructing the state's claims to rural economic surplus, are practically stock characters in the established narrative of pre-revolution China.³³⁸ The effects of these exploitative middlemen on the wellbeing of draft animals have received less attention. The following cases of a politically connected draft ox baron and a monopolistic plowing cartel demonstrate farmers' and state agents' fraught interactions with local elites. From the government's instrumental perspective, breaking the grip of strongmen on bovine populations was central to the struggle to control draft animal labor, and thus, grain yields. The interpretive perspective, on the other hand, permits some cautious inferences about how this power struggle affected the living and working conditions of a huge rural labor pool: draft oxen.

A corrupt landlord in southern Anhui Province built an ox-rental empire at the expense of his impoverished customers. Wang Jinke, a sometime "transient ruffian" and cattle merchant, used his relationship with a Nationalist county representative to buy a position as a cattle tax collector. He used this post to control the buying and selling of oxen in the vicinity of his village. At his peak, he owned seventy oxen, which he rented to local farmers. According to a Communist investigation shortly before Land Reform, Wang often forced his rental customers to exchange the oxen that they had fattened for

³³⁷ Patricia M. Thornton, *Disciplining the State: Virtue, Violence, and State-Making in Modern China*, Cambridge: Harvard University Press, 2007, especially pages 100-126.

³³⁸ Cf. Mao Zedong, *Report From Xunwu*, trans. Roger R. Thompson, Stanford: Stanford University Press, 1990, p. 132-151.

young, scrawny animals. Some customers had to exchange their animals three times in a single year. Wang also compelled his neighbors to trade their own fat oxen in exchange for his weak, undesirable animals. The Communist investigators noted that because they lacked cattle, the locals had no choice but to rent from him. Because they feared his powerful patron, they were furious but did not dare speak out.³³⁹

In effect, Wang outsourced the feeding and rearing of his herd to less powerful and well-connected farmers, to the detriment of both humans and animals. Hard-pressed villagers had little reason to form emotional bonds with animals that Wang fed at their expense. The possibility that Wang might snatch the animals away further lessened their incentive to feed and care for their nonhuman colleagues. It would be understandable if resentful villagers resisted his depredations by over-working or even abusing his animals. Indeed, the Communist investigators noted that in this region, if rental terms were not clearly specified, a cattle renter was still obliged to pay any outstanding rent if the owner reclaimed his animals or exchanged them for scrawny ones partway through the rental period.³⁴⁰ Under these circumstances, farmers had every reason to feed the animals just enough to sustain the maximum intensity of farm work. While the Communist investigators justifiably focused on the exploitation of the human farmers, the cattle suffered in silence.

³³⁹ Zhonggong Wannanqu dangwei nongweihui Shexian Qiankouqu xishancun niuzu diaocha: niuzu xingshi yu boxue qingkuang 中共皖南區黨委農委會 歙縣潛口區西山村牛租調查：牛租形式與剝削情況 [The CCP's South Anhui region Party Committee Agricultural Committee Investigation of Cattle Rental in the Shexian Qiankou region's Xishan village] (June, 1950), in East China Military Administration Land Reform Committee (ECMALRC), Anhuisheng nongcun diaocha 安徽省農村調查 [*Investigation of Anhui Province Villages*] December 1952, p.199.

³⁴⁰Ibid.

In other regions, plowing cartels controlled the supply and usage of draft animals. During the Spring of 1950, the Fujian Farmers' Association reported that although only a single road separated the villages of Qianyu and Houyu, the price of an ox rental was far higher in the latter. Residents of Houyu did not dare to hire oxen in Qianyu, nor did Qianyu ox owners make bold to offer their services in Houyu. This was the result of a local "feudal organization" known as the "Ox Cartel" 牛福. The members of the Houyu Ox Cartel held a feast approximately one month after Spring Festival [i.e. in early March] on the birthday of the Ox Spirit 牛神. At this time, they determined the rental prices for the coming year, as well as the members' allocations of cattle. The resigned residents of Houyu grumbled, "Every time the Ox Cartel gets together, rental prices increase." The Farmers' Association investigators remarked that such complaints were "not unreasonable."³⁴¹

This brief report reveals several analytical points about the welfare of the farmers and their animals. First, the postwar dearth of draft animals, and the substantial investments of time and resources required to produce a working ox, contributed to exploitative, economically wasteful relations within and between villages. By artificially constraining the rental market between Qianyu and Houyu, the Ox Cartel denied profits to enterprising Qianyu farmers who might have plowed the neighboring village's fields, while also extracting surplus rents from the hapless denizens of Houyu. This created what

³⁴¹ Fujiansheng nongmin xiehui 福建省農民協會 [Fujian Province Farmers' Association], Fujian gengniu gengniu diaocha 福建耕牛耕牛調查 ["Investigation of Draft Oxen in Fujian"] (Spring 1950) in East China Military Administration Land Reform Committee (ECMALRC), Fujiansheng nongcun diaocha 福建省農村調查 [*Investigation of Fujian Province Villages*] December, 1952, p. 196-197.

economists call a “deadweight loss” or “allocative inefficiency,” in which the distribution of resources does not fit the needs of consumers--in this case, the farmers. Such market distortions were a drag on the inter-village economy. Farmers in one nearby village, whose oxen typically pressed sugarcane, made extra money by renting their animals to nearby farm communities. Qianyu farmers were unable to earn extra profits from their draft animals in this way.³⁴² The Cartel also deprived Houyu farmers of scarce capital that they might otherwise have invested more usefully in projects such as irrigation, or handicraft industries.

The Cartel also reduced the state’s tax income. Not only did the alliance of local elites add no value, it actually undermined the productive potential of the region. If hardscrabble farmers had the means to buy or breed draft animals, both farm yields and taxes would rise, as the Cartel would be unable to sustain its rent-seeking behavior. Increasing the national draft animal population would loosen the grip of the Cartel, bringing more wealth into government coffers while also undercutting a social group that most farmers despised. This situation was one impetus for the breeding program to be discussed in Chapter 5.

The story of the cartel further shows that in some locations, the bonds between farmers and their nonhuman colleagues did not suddenly break during the collectivization of the mid-1950s. Economically fair and emotionally rich relationships were certainly common among farmers and oxen before the revolution. Yet in villages like Houyu, some humans’ opportunistic response to the scarcity and cost of draft animals created the

³⁴² Ibid. p. 189.

conditions for exploitation and abuse. Only the fear of reprisal by the cartel deterred a Houyu farmer from exhausting or mistreating his overpriced rental ox. As far as the welfare of the animal was concerned, such an impersonal relationship, against a background of simmering resentment toward the Cartel, was no substitute for the years-long relationships of mutual reliance and respect common among farmers and their bovines in other locales.

Finally, the story of the Cartel illustrates the diversity of working conditions even in close geographic proximity. The authors of the report explicitly argued that the gap in ox rental prices was due solely to the wily Houyu cattle owners' social organization, and not to any ecological differences between the villages.³⁴³ The significant difference in ox prices between these otherwise similar communities should encourage a measure of caution among scholars (including this author) seeking to draw general conclusions from fragmentary documentary evidence.

Professional Plowmen

The crooked ox rental tycoon and the plowing cartel illustrate how some local elites profited by commodifying the labor of draft oxen at the expense of poor farmers, the oxen, and the state. By contrast, some local professional plowing associations used their cattle, and their expertise in working with the animals, to fill gaps in the rural labor supply. Such arrangements benefitted the animals, the farm households who hired them,

³⁴³ Ibid., p. 196.

and the revenue-hungry state. Although its advantages were evident to early Communist investigators, this system did not survive Land Reform and cooperativization. By transferring ox-tending responsibilities from these veteran middle peasants to their poorer, politically purer neighbors, the Party contributed to a decline in the health and longevity of the animals.

Higher human labor prices in cities than in the countryside spurred the formation of groups of plowing specialists. These small but efficient organizations helped prevent economic slowdowns resulting from the outflow of human farm labor. Investigating the hinterland of the southern city of Fuzhou at the start of the 1950s, a Communist team observed that many men had ventured into the metropolis seeking higher wages in the industrial and commercial sectors. The resulting “extreme shortage of male labor” in the periphery of the city at first compelled women to plow the fields with oxen, which they found difficult. Fortunately, the region’s irrigated paddies drew water from a tributary of the Min River, which rose and fell with the tide. The state surveyors explained that locals pedaled water wheels to irrigate their fields. Women commonly performed this task. As a result, the men remaining in the countryside provided not only animals but also plowing services for neighboring households. According to the Communist surveyors, this practice created a group of “professionalized ox users” who were able to plow “far more effectively.” In villages with these plowing experts, a single bovine could plow from 70-100 *mu* per season. As an extra bonus, these skilled plowmen required fewer draft

animals, and provided “substantial convenience” for fellow villagers whose male relatives were working in the city.³⁴⁴

How did the work experience of an ox employed by a professional plowman differ from an animal rented to numerous farmers for brief periods? The sparse documentary data allow several cautious inferences. First, establishing a close working relationship with his draft animal was easier for a professional plowman than for a temporary renter. A single consistent user could recognize changes in the animal’s behavior or performance, making timely rest or medical care more likely. In addition, as with many tasks, mastery of the skill of plowing also reduced the chance of injury to human or animal due to missteps or equipment mishaps, compared to less confident and capable operators.

As many of these owner-operators earned most of their income not from farming but from plowing, they had a strong incentive to keep their animals healthy, rather than overwork or underfeed them.³⁴⁵ Rental prices varied nationwide. But in no location were trained draft animals plentiful and cheap enough that a plowman could afford to rapidly exhaust and discard them. By contrast, because payment was fixed and upfront, a temporary user had greater reason to make the most of the rental period by working the animal strenuously. This phenomenon is perhaps best expressed in the dictum that “no one washes a rented car.”³⁴⁶

³⁴⁴Ibid, p.194-195.

³⁴⁵On plowing as the source of most of their income, see Fujian Province Farmers’ Association, “Investigation of Draft Oxen in Fujian,” p.194-193.

³⁴⁶ Thomas Peters and Nancy Austin, *A Passion For Excellence*, New York: Random House, 1985, cited in Charles Clay Doyle, Wolfgang Mieder, Fred R. Shapiro, eds. *The Dictionary of Modern Proverbs*, New Haven: Yale University Press, 2012, p. 33.

Unfortunately for the survival of their livelihoods, the professional owner-operators of oxen were likely to be from the “middle peasant” class, with relatively long experience keeping and using the animals. The lure of higher wages in big cities was greater for poor or landless farmers. Well-to-do individuals, who owned productive assets like oxen, could remain in the countryside. As we have seen, in the years before 1949, draft ox ownership had become more prevalent among middle peasants than among the poor. Indeed, a Communist survey of twenty-two villages in Fujian Province revealed that on average, middle peasants owned 61% of the draft cattle, while poor peasants and hired hands together owned 36%.³⁴⁷ These poorer farmers were the chief renters of draft oxen and plowing services. A professional plowman had more experience handling these powerful beasts than his poor peasant client. Such familiarity reduced the stress, difficulty, and danger of plowing for both human and animal. The Communist investigators noted that as poor households sold off their equipment and allowed their skills to fall into disuse, they became ever more reliant on the services of the professional plowmen.³⁴⁸ Within a few years of this report, the Party’s fitful attacks on the “middle peasant” class, and the collectivization of productive assets such as draft animals, proved fatal to these professional plowing associations and to many of their bovine members.³⁴⁹

³⁴⁷Fujian Province Farmers’ Association, “Investigation of Draft Oxen in Fujian,” p.189-190.

³⁴⁸ *Ibid.*, p.194.

³⁴⁹ On shifting Party treatment of middle peasants, see Kenneth R. Walker, “Collectivisation in Retrospect: The “Socialist High Tide” of Autumn 1955-Spring 1956,” *The China Quarterly*, No. 26 (Apr. - Jun., 1966), pp. 1-43; Huaiyin Li, “Confrontation and Conciliation Under the Socialist State: Peasant Resistance to Agricultural Collectivization in China in the 1950s,” *Twentieth-Century China*, Volume 33, Number 2, April 2008, pp. 73-99.

Between Land Reform and Cooperativization

Emerging victorious from the Civil War in 1949, the CCP swiftly introduced Land Reform and property redistribution in formerly Nationalist areas. This process moved cattle into the hands of farmers who sometimes lacked the skill or means to care for them properly. The government worked hard to correct this problem by presenting positive examples of animal husbandry, and providing bonuses and recognition to farmers whose oxen flourished. Press reports suggested that nurturing and protecting draft oxen was both practical and patriotic. In one account, Guangdong Province model farmer Cheng Cao cooked sweet potato congee for his water buffalo, and lit a fire in his stable to keep the animal warm in cold weather. On summer evenings, he burned insect repellent to keep mosquitoes away from her. Mindful of the buffalo's workload, Cheng allowed her to rest or soak in a puddle every two hours. Cheng's solicitude paid off: his eighteen-year old animal was "both fat and strong," and still able to plow 24 *mu*. Having given birth to ten calves, all of which survived, she was pregnant once more. On the day when Cheng was recognized as a "Grade One Model for Cattle Raising," both he and his water buffalo were adorned with red flowers. Cheng remarked that "Cattle are capital 本钱 for people who plow. If we want to patriotically boost production, cattle are good assistants 好帮手." While the word "capital" suggests a pragmatic, impersonal investment, Cheng's painstaking efforts on the animal's behalf and his use of "assistant," a word normally reserved for fellow humans, showed that his investment was emotional as well. Cheng's careful husbandry allowed his animal to work and multiply until a ripe

old age. As a result, both man and beast were commended for answering their nation's call.³⁵⁰

By taking good care of their oxen, farmers could create a virtuous cycle that benefitted both humans and their animals. Oxen that ate and rested appropriately could help farmers coax greater grain yields from their small plots of land. By “loving and protecting” his animal, model cattle raiser Li Hou of Guangdong Province managed to improve both his economic status and the health of his ox.³⁵¹ In 1946, the tenant farmer had bought a draft ox to increase his grain yields. Because his family was poor, he could only afford an animal of roughly 100 *jin* [50 kg]. Although his neighbors doubted the wisdom of keeping such a scrawny beast, Li quadrupled the animal's weight by “treating it as a family member.” During the summer, Li took the ox to a swimming hole, and let it rest in the shade of a tree. Within a few years, Li and his younger brother were relying completely on this ox to plow their 12 *mu* plot, and their grain yields were on the rise. Readers could draw the clear lesson that investing time and energy in caring for their draft animals was not a waste. What was good for the oxen was also good for the farmers.

The glowing press coverage of celebrity farmers like Cheng and Li made little mention of the key role that an owner's economic position played in the well-being of his animals. Media reports depicted the model farmers' painstaking care for their beasts as a universal norm to which all could aspire. Yet many farmers in areas colder than semitropical Guangdong province could not provide proper housing for their livestock.

³⁵⁰ Deng Deqiang 鄧德強, Xingfu niu 幸福牛 [“A Happy Cow”] Hong Kong Wenhui Bao 香港文匯報, December 3, 1953 [collection of HKBU, reel D-25].

³⁵¹ No author, 牛是家寶, 必須養好 [“Cattle are a Family's Treasure, and Must Be Raised Well”] Guangzhou Ribao 廣州日報 *Guangzhou Daily*, March 29, 1954 [collection of HKBU, reel D-25].

In Hubei, for instance, many cattle shivered through the winter in trenches, or crude grass huts.³⁵² Likewise, a veterinary inspection team in Jiangsu province noticed shabby cattle sheds, “leaky on top and damp below, and windy on all four sides.”³⁵³ Farmers and cattle in conditions like these could not match Farmer Cheng’s ability to provide a cozy stable. “There’s no trick to keeping cattle,” chuckled Farmer Li. “You just have to be constantly mindful of them, and love and protect them.”³⁵⁴ However sincere, Li’s blithe remark gave little encouragement to farmers whose poverty left them unable to follow his example.

Farmers’ economic and political status determined the daily life and work experiences of their draft animals. Yet the redistribution of land and property in the early 1950s were curiously absent from the accounts above. Farmer Li’s improved economic condition in the 1954 newspaper profile was surely due in part to his lowly background, which had made him eligible for an allocation of land. This enhanced position gave him the wherewithal to pay meticulous attention to the health of his ox, increasing the well-being of both man and animal. But by eliding the transformative effect of government policies such as Land Reform on rural economies, media coverage obscured the reality that “love and protection” alone could not guarantee healthier animals and more prosperous farmers.

³⁵² Neibu Cankao 內部參考 [Internal Reference], Hubeisheng gongxiaoshe jiejie gengniu guodong de banfa 湖北省供銷社解決耕牛過冬的辦法 [“How marketing and supply cooperatives in Hubei province helped draft oxen to survive the winter”] December 30, 1954, p. 498-499 [CUHK collection].

³⁵³ Neibu Cankao 內部參考 [Internal Reference], Wei Wenhua 魏文華, Jiangsusheng qunian zaisha gengniu you shiwan duotou 江蘇省去年宰殺耕牛有十萬多頭 [“Last year over 100,000 draft oxen were slaughtered in Jiangsu province”], January 13, 1955, p.211-212.

³⁵⁴ No author, Niushi jiabao, bixu yanghao 牛是家寶，必須養好 [“Cattle are a Family’s Treasure, and Must Be Raised Well”] Guangzhou Ribao 廣州日報 Guangzhou Daily, March 29, 1954 [collection of HKBU, reel D-25].

Problems with Prices

When advanced cooperatives moved oxen into collective ownership in the mid-1950s, many farmers were reluctant to incur losses by selling their animals at discounted prices to these organizations. As the least desirable draft animals, calves and old cattle were most vulnerable to the market distortions resulting from collectivization. Farmers in Guangxi Province's Yulin County complained that the cooperatives were paying less for calves than for dogs, and even a full-grown ox fetched just half the outside market price.³⁵⁵ Cadres in many cooperatives in Jiangsu Province felt that keeping old cattle was “not prestigious,” while raising calves was “uneconomical.”³⁵⁶ Instead of accepting the cooperatives' low prices for these less productive animals, farmers sold them to the Provincial Livestock Products Company, which purchased 187,200 oxhides in 1955, a 50% increase on the previous year.³⁵⁷ In one county in Shandong Province in late 1955, the prices for mature oxen and calves had fallen to 70 and 25 yuan respectively, from 120 and 50 yuan just one year earlier. Complaining that raising oxen was less profitable than keeping hogs, farmers declined to treat their sick bovines, saying that “curing them would

³⁵⁵ Neibu Cankao 内部参考 [Internal Reference] Yulinxian he Daoyaoshan Yaozuzhizhixian fasheng gengniu siwang xianxiang 郁林縣和大瑤山瑤族自治縣發生耕牛死亡現象 [“Draft oxen are dying in Yulin county and the Dayaoshan Yao Autonomous County”] March 8, 1956 p. 70-71 [CUHK collection].

³⁵⁶ Neibu Cankao 内部参考 [Internal Reference] Xu Wen 徐文, Jiangsusheng Nongcun zaisha gengniu xianxiang yanzhong 江蘇省農村宰殺耕牛現象嚴重 [“Serious slaughtering of draft oxen in Jiangsu Province”] December 3, 1955, p. 29-30 [CUHK collection].

³⁵⁷ Ibid.

not recoup the price of the medicine.” When no one would buy his calf for 25 yuan, one farmer slaughtered the young animal and sold its meat for 32 yuan.³⁵⁸

Resourceful cooperatives devised ways to profit from the distorted market in which cattle were often worth more dead than alive. In one egregious case, a cooperative in Henan Province hired a buyer to procure draft oxen from neighboring counties. In just ten days, he bought forty oxen. To make the animals eligible for slaughter, he crippled them, beating the oxen until “their hips were dislocated and their legs were lame.” After deciding that two of the animals were still able to work, the cooperative slaughtered the remaining oxen and sold their meat.³⁵⁹ The author and elite government readers of an *Internal Reference* report on this incident viewed this wastage of working animals through the instrumental lens of misused productive assets. An interpretive reading of the same document suggests that due to their artificially low prices, cattle suffered increased risks of abuse and premature slaughter during the “high tide of cooperativization.”

In addition to actual state policies and market conditions, rumors and hearsay further strained the protective bonds between farmers and their livestock. In this environment, draft animals faced a heightened risk of mistreatment and death. In the months before Land Reform in several provinces, farmers sent thousands of healthy draft cattle for slaughter. The author of a confidential report for government leaders blamed “Nationalist agents” for telling farmers that the government would soon collect an

³⁵⁸ Neibu Cankao 内部参考[*Internal Reference*] Shandongsheng Linyi zhuanqu gengchu diejia xianxiang yanzhong 山東省臨沂专区耕畜跌价现象严重[“Serious drop in draft animal prices in Shandong Prov’s. Linyi special district”], November 5, 1955, p.26-27 [CUHK collection].

³⁵⁹ Neibu Cankao 内部参考[*Internal Reference*] Henansheng bushao defang lansha gengchu xianxiang feichang yanzhong 河南省不少地方濫殺耕畜现象非常嚴重 [“Illicit killing of draft animals is very serious in many places in Henan province”] November 24, 1955 [CUHK collection].

enormous cattle tax, and would also issue generous loans for buying draft oxen. The duped farmers, deciding that keeping cattle was no longer worthwhile, sold their animals to evade the tax and enjoy the subsidized loan.³⁶⁰ Hearing that everyone who did not own an ox would receive one during Land Reform, other farmers killed their oxen so as to become eligible for new animals.³⁶¹ As cooperativization gathered momentum during the mid-1950s, some farmers sold off their cattle to avoid being labeled wealthy.³⁶² Complaining that they had raised the beasts in vain, other farmers sold off their animals in response to rumors that draft cattle and production materials would belong to the cooperatives.³⁶³ One middle peasant, who had rejected offers of 100 RMB for his two oxen, hurriedly sold the animals for 70 RMB upon hearing that an advanced producers' cooperative would be established.³⁶⁴ Still others sold their cattle in the belief that tractors would soon make draft animals obsolete.³⁶⁵ Rumors, both alarming and exciting, induced farmers to sell off their bovine assets. Gossip and hearsay thus shaped the lives of cattle,

³⁶⁰ Neibu Cankao 内部参考[*Internal Reference*] Hunan, Guangxi, Sunan, Chuanbei deng di pubian faxian zaisha yu waiyun gengniu xianxiang 湖南, 广西, 苏南, 川北等地普遍发现宰杀与外运耕牛现象 ["Draft cattle are being slaughtered and exported to other areas in Hunan, Guangxi, Southern Jiangsu, and northern Sichuan"] October 26, 1950, p. 207 [Collection CUHK].

³⁶¹ Ibid.

³⁶² Neibu Cankao 内部参考[*Internal Reference*] Jianchangxian jianshezhong fasheng zhongnong chumai gengniu de xianxiang 建昌县建社中发生中农出卖耕牛的现象["Middle Peasants Selling Draft Oxen During Estab. of Cooperatives in Jianchang County [Rehe]"] August 25, 1954 p362-363 [Collection CUHK].

³⁶³ Ibid.

³⁶⁴ Neibu Cankao 内部参考[*Internal Reference*] Heilongjiangsheng bufen nongcun zai jianli gaojisheng faxian nongmin zaisha he chumai gengchu xianxiang 黑龍江省部分農村在建立高級社中發現農民宰殺和出賣耕畜現象 ["In parts of Heilongjiang province, farmers in some villages are slaughtering and selling their draft animals during the establishment of advanced producer cooperatives"] February 16, 1956 p. 128-130.

³⁶⁵ Neibu Cankao 内部参考[*Internal Reference*] Henansheng bushao defang lansha gengchu xianxiang feichang yanzhong 河南省不少地方濫殺耕畜現象非常嚴重 ["Illicit killing of draft animals is very serious in many places in Henan province"] November 24, 1955 [CUHK collection].

independent of actual changes in their ownership and value. For the animals, this often meant exchanging the plow blade for the butcher's knife.

How Cooperative Ownership Changed the Workloads of Cattle

After the widespread formation of advanced cooperatives in 1955, the continuing shortage of draft animals, and their uneven geographic distribution, meant that the animals' workloads continued to vary widely even within a single county. In October 1957, draft oxen in D- County in central Jiangsu Province were responsible for plowing an average of 81.3 *mu* per year. As Table 4 shows, however, oxen in over 300 cooperatives had to plow over 100 *mu*. The disparity was due in part to uneven distribution: the western portion of the county lacked oxen, while the east had a surplus.³⁶⁶

Table 3.4: Draft Ox Workloads in D- County, Jiangsu Province, November 1957

Annual Plowed Area Per Ox (<i>mu</i>)	Number of Cooperatives
<40	9
40-60	54
60-70	77
70-100	151

³⁶⁶ D-xian 1958 dao 1967 nongye fazhan chubu jihua (zai san, wu nian nei shi nongyeshe ganshang fuyu zhongnong de shuiping) XX 縣 1958 年到 1967 年農業發展初步規劃（在三、五年內使農業社趕上富裕中農的水平）[D-County's preliminary agricultural development plan for 1958-1967 (to catch up to rich middle peasant level within three to five years)], p. 22. in Zhonggong XX xian Shenzao Renmin Gongshe weiyuanhui 中共 XX 县沈灶人民公社委员会 [CCP XX county Shenzao People's Commune Committee] February 1958, [Zhang Letian collection of Fudan University---anonymized place name].

100-120	108
120-150	66
>150	153

Data source: XX 縣 1958 年到 1967 年農業發展初步規劃（在三、五年內使農業社趕上富裕中農得水平）, p. 22. in 中共 XX 縣沈灶人民公社委员会, Oct. 30, 1957 in Fudan University Zhang Letian collection.

Excessive optimism characterized the D- county government's plan to use oxen to demonstrate the superiority of collectivized farming. Rapidly increasing the size of the cooperative herds would reduce the animals' workloads and yield manure that could nourish vast fields of crops. Noting that the shortage of draft animals harmed both the timing and quality of plowing, officials drafted an ambitious five-year plan to increase the number of animals capable of plowing by one third, from 16,294 to 21,837, by the year 1962.³⁶⁷ As each ox produced 6,000 kg of manure per year, the added animals would yield over 33 million additional kg of high quality fertilizer, which could enrich almost 250,000 *mu* [16,667 ha].³⁶⁸ Even more importantly, with more animals to share the workload, each ox could plow just 57.7 *mu* per year, or 29% less than the status quo.³⁶⁹ Imagined benefits notwithstanding, official statistics show that the projected bovine population increase was unrealistic. Between 1953-1957, the population of cattle had increased only twelve percent, while from 1958-1962 bovine numbers actually declined by six percent.³⁷⁰ Tripling the growth rate of the ox population was not among the many

³⁶⁷Ibid.

³⁶⁸Ibid., p. 15..

³⁶⁹Ibid., p. 22.

³⁷⁰ Zhongguo tongji nianjian 中国统计年鉴 1981 [*China Statistical Yearbook 1981*] Zhongguo tongji chubanshe 中国统计出版社 (1982) p. 162 [Accessed via 中华数字书苑 China Digital Library].

accomplishments of cooperative ownership of the means of production in the countryside.

County officials enthused that their plan would yield not only more animal assets and crop yields, but also an ideological tool for demonstrating the wonders of collective farming. From the cooperative officials' instrumental perspective, lower quotas would improve the quality of plowing and extend the animals' working lives. The interpretive perspective suggests that a less grueling schedule would increase their comfort and health. But county officials also observed that before joining a cooperative, the average rich-middle-peasant's ox was responsible for plowing 62 *mu* per year. By 1962, when the much-anticipated larger draft labor pool reduced the average cooperative ox's workload to 57.7 *mu*, "we will beat [the rich-middle-peasants] in terms of oxen."³⁷¹ This future victory, contingent on five years of unprecedented bovine population growth, inspired county officials. The draft animals' experience of collective farming, based not on columns of statistics but on hours in the yoke, was less thrilling. For oxen in the hands of rich-middle-peasants, the simple truth remained that joining a D- county cooperative would increase their average workload by roughly a third, from 62 to 81 *mu* per year. Ultimately, the events of the late 1950s foiled the county officials' instrumental agenda for the animals. The herds failed to increase, and the animals' workloads did not decrease. Moreover, far from revealing the glory of "rural socialism," the long-suffering oxen were living, breathing proof of the failings of collective ownership.

³⁷¹D-County's preliminary agricultural development plan for 1958-1967, p. 22. [Zhang Letian collection of Fudan University---anonymized place name].

The Hazards of Belonging to a Cooperative, Part I: Neglect

Unlike earlier methods of shared or pooled ownership, cooperatives provided few incentives for farmers to care for the animals and use them sustainably. Whereas private ownership and rental agreements had made farmers responsible for a particular animal over a long period, the advanced cooperatives of the mid-1950s treated oxen as interchangeable tools, who belonged at once to everyone and no one. Just a decade earlier, a farmer who worked an ox to exhaustion could incur social and legal sanctions for endangering the welfare of the households with whom he shared the animal. The diluted sense of ownership among farmers in cooperatives, and the lack of work limits and responsible caretakers, helped to obscure each member's responsibility for the dire condition of the herd.

Due to the lack of personal economic and emotional commitments between farmers and livestock, cooperatively held draft animals fared worse than their privately owned peers. In Guangxi Province during late spring 1955, cooperatives' draft oxen were "universally thinner and weaker" than the previous year, and their ability to plow had declined sharply. Investigators noted that the death rate for cooperatively owned oxen was higher than for animals belonging to individual farmers. According to local farmers, "You know without asking that a skinny ox belongs to a cooperative." Wobbling as they walked, the starving animals were said to have grown horns on their backs, meaning that their bones were visible under the skin. When these so-called "ghost oxen" became too

scrawny to work, they were slaughtered, and “the people simply did not care.”³⁷² In the Huaiyin region of Jiangsu Province, at least nine thousand draft cattle died in the first three months of 1957. Investigators blamed this high mortality rate on the fact that “Cooperative members do not take as good care of their draft oxen as they used to when they were individual farmers.” In the frigid winter weather, many cattle received hard-to-digest uncut grass and cold water. In one cooperative, a dozen cattle were standing outside in rain and snow, with no one to bring them indoors.³⁷³

Inadequate regulation and compensation for tending cattle caused the deaths of many oxen in cooperatives of ethnic Miao farmers in western Hunan Province. Officials argued that cattle in one cooperative died because “no one in particular is designated to care for them.” Responsibility for looking after cattle rotated daily among households.³⁷⁴ This system prevented caretakers from learning the individual capabilities and needs of the animals in the cooperative’s herd. Moreover, caretakers were responsible for looking after six cattle per day, and earned only one work point per animal. The same workers could earn at least ten points by doing farm work.³⁷⁵ In this economic environment, the most ambitious, hardworking people had little reason to care for the cattle.

³⁷² Neibu Cankao 内部参考[Internal Reference] Guangxisheng gengniu siwang he zaisha qingkuang reng jixu fasheng 廣西省耕牛死亡和宰殺情況仍繼續發生[“Death and slaughter of cattle in Guangxi continues”] April 28, 1955, pp. 430-431[Collection CUHK].

³⁷³ Neibu Cankao 内部参考[Internal Reference]Huaiyin zhuanqu gengniu siwang yanzhong 淮陰專區耕牛死亡嚴重 [Serious draft oxen deaths in Huaiyin”] Feb 28,1957, p.429-430 [Collection CUHK].

³⁷⁴Neibu Cankao 内部参考[Internal Reference] Xiangxi Miaozu zizhizhou pubian fasheng gengniu siwang xianxiang 湘西苗族自治州普遍发生耕牛死亡现象 [“Widespread death of draft oxen in Miao autonomous region of Western Hunan”], April 7, 1956, p. 172 [Collection CUHK].

³⁷⁵ Ibid.

The effects of changing ownership appeared swiftly: in 1956, just one month after the establishment of two advanced cooperatives in Jilin Province, the local county Communist Party Committee found that 40 out of their 141 cattle had lost approximately 15 kg, while nine cattle lost 30 kg. Twenty-one of the animals were “totally exhausted,” and five calves had died.³⁷⁶ In addition to the animals’ sudden weight loss, investigators also observed that manure piled high in their pens had rotted their hooves.³⁷⁷ Taking an instrumental perspective on the animals, farming officials worried that the enfeebled cooperative herds would be unable to clear and plow 97 hectares as planned.³⁷⁸

The officials traced this calamity to the lack of rules and accountability in the care and usage of cooperatively owned livestock. In this poorly regulated environment, corruption and mismanagement were rampant. Some cooperative members were trading the animals’ fodder for the alcoholic beverage soju. Others were making tofu from soybeans intended for the draft animals, or stealing fodder to feed their own pigs.³⁷⁹ As there was no system for rewarding or punishing cooperative members for their use of the common herd, some members, eager to earn extra work points, paid no mind to the size and strength of individual draft animals, and worked them to the point of exhaustion.³⁸⁰

Jilin’s cooperatives were not unique. The South Shanxi Province Livestock Bureau found that nearly 3,000 draft animals had died since the start of spring 1956, an

³⁷⁶ Neibu Cankao 内部参考[Internal Reference] Wangqingxian ge nongyeshe gengchu guanli buhao 汪清县各农业社耕畜管理不好 [“Poor management of draft animals in all cooperatives in Wangqing county [Jilin]”] April 13, 1956, p.288-289[Collection CUHK].

³⁷⁷ Ibid.

³⁷⁸ Ibid.

³⁷⁹ Ibid.

³⁸⁰ Ibid.

increase of 50% over the same period in the previous year. The investigators discreetly omitted mentioning the correlation between these deaths and the recent “high tide” of establishing cooperatives. They did note that “in all areas,” the animals’ strength had declined by some twenty percent, and many were unable to take part in springtime plowing. Furthermore, emaciated female animals suffered from delayed estrus, hampering their ability to reproduce. Cooperative members said that the animals might blow over in a stiff wind, and joked morbidly that “We should’ve taken them to the retirement home long ago!”³⁸¹ Although the investigators half-heartedly blamed “counter-revolutionary elements” for sabotaging the animals, they focused most of their criticism on the cooperative members’ failure to store adequate silage (fermented plant matter used as fodder) before the winter, and their generally poor feeding and care of the herds.³⁸² The situation was similar in Shandong Province, where most of the 3,900 cooperatives in one county prepared no silage for the winter of 1957-1958.³⁸³ Without clearly defined roles in caring for the herds, busy farmers were inclined to neglect unglamorous but vital tasks, such as preparing enough winter food for their nonhuman colleagues.

While the evidence presented so far paints a bleak picture of bovine experiences in the cooperatives, there is good reason to believe that some draft animals fared well

³⁸¹ Neibu Cankao 内部参考[Internal Reference] Jinnan gengchu siwang yingxiang chungeng 晋南耕畜死亡影响春耕 [“Draft animal deaths in southern Shanxi province impede spring plowing”], April 17, 1956, p. 363-364[Collection CUHK].

³⁸² Ibid.

³⁸³ Neibu Cankao 内部参考[Internal Reference] Shandongsheng gengchu shouruo, siwang qingkuang yanzhong 山东省耕畜瘦弱、死亡情况严重[“Serious weakness and death among draft animals in Shandong province”] February 8, 1958, p. 9-10 [Collection CUHK].

under collective ownership. The historian Wu Weizhen's detailed case study of cattle in Zhejiang Province's Longquan County shows that some cooperatives took excellent care of their herds. Wu's interview subjects recalled few if any instances of abuse or neglect of the animals, who were well fed and lived in stables clean and warm enough for humans to sleep in.³⁸⁴ One of the farmers also described oxen as "very intelligent, although unable to speak" and "in tune with human emotions 很通人的感情."³⁸⁵ In this case, the respectful and friendly relationship between human and animal farmers survived the cooperativization campaign intact.

A combination of local variation and source bias explains the discrepancy between this positive account and the unremitting horrors described in the *Internal Reference* documents cited above. First, cooperatives' acquisition and management of cattle differed by location: while one of Wu's interlocutors recalled cooperatives buying cattle at discounted rates 折價歸社, another recalled that farmers in his village had "handled [the sale of oxen to cooperatives] using our own method, without discounting."³⁸⁶ When such variation is expanded to the national level, it becomes clear that some animals, in George Orwell's notorious phrase, were "more equal than others."³⁸⁷ Secondly, the *Internal Reference* newsletter was "primarily a medium for the

³⁸⁴ Interviews with farmers Yao Renqin 姚任钦 and Lei Zhangsheng 雷章生, April 13-14, 2012, in Wu Weizhen 吴卫珍, *The research for the ownership changes of Chinese rural cattle in 1950s—taking Longquan country [sic], Zhejiang province as a case (1950s-1961s)* 1950年代中国农村耕牛归属权变化研究—以浙江省龙泉县为个案(1950-1961), Dissertation for Master Degree, East China Normal University, April 20, 2012, p.89-93.

³⁸⁵ Wu Weizhen, p. 91.

³⁸⁶ Wu Weizhen, p. 92.

³⁸⁷ George Orwell, *Animal Farm: A Fairy Story*, New York: Penguin (Plume), First Plume Printing, 2003, p. 92.

transmission of news and information from a nation-wide network of journalists to a small elite readership.”³⁸⁸ To solve political problems, the top-level decision-makers reading *Internal Reference* required detailed accounts of administrative malfunctions and corruption. This tends to give *Internal Reference* articles on many subjects a grim tone of impending disaster. Smoothly functioning cooperatives, on the other hand, received more than ample coverage in the public press. While *Internal Reference* is credible and informative, it is not entirely representative of national conditions. Nevertheless, from the perspective of the many thousands of cattle nationwide whose suffering is well documented, the fact that some cooperative herds fared well was cold comfort.

The Hazards of Belonging to a Cooperative, Part II: Overwork

Working animals cannot long survive a caloric deficit, in which energy consumed is less than energy expended. Cooperative members’ perverse economic incentives to neglect and overwork their commonly held draft animals led to a common endpoint: weak and hungry oxen. In the Dong Ethnicity Autonomous Region in what is now Guangxi Province, investigators reported that more oxen died in cooperatives than in private hands during the winter of 1954-1955. They attributed the loss of livestock to “poor operational management,” explaining that although some cooperatives gave work points for taking care of cattle, “there is no system of responsibility, and feeding and care are sloppy.” Furthermore, early springtime was the rainy season in this region, and many

³⁸⁸ Michael Schoenhals, “Elite Information in China,” *Problems of Communism*, 34(September-October 1985),p. 69.

animals died after being forced to plow and harrow wet, heavy soil. Attempting to earn extra work points, one deputy cooperative head “did not pay attention to the strength of the oxen,” and persisted in working the tired animals, which lay down by the side of the road and could not be roused. In another county, sixteen oxen were sent out to plow, but three of the exhausted animals collapsed by the side of the road and could not stand up.³⁸⁹ These observations of the animals’ visible behavior provide ample grounds for inferring that the oxen suffered before dying.

Dead or weakened cattle left behind extra work for their peers. In northeastern Liaoning Province, 146 oxen housed in “terribly dilapidated” cooperative stables froze to death in a single night late in December 1956.³⁹⁰ Province-wide, the deaths of some 260,000 draft animals since summer of the previous year increased each individual’s daily plowing responsibility by 23%, from 3.5 to 4.3 hectares.³⁹¹ According to a livestock inspection team that visited eleven cooperatives in Jiangsu Province, the declining population of draft oxen had raised individual workloads by 19%, increasing the animals’ plowing obligations from approximately 2 to 2.4 hectares between 1952-1955.³⁹² In Zhejiang Province’s Longquan county, barely two thirds of the 10,418 cooperatively-held

³⁸⁹ Neibu Cankao 内部参考[Internal Reference] Guixi Dongzu zizhiqū nongyeshē yǒu bǔshāo gēngniú sǐwáng 桂西侗族自治區農業社有不少耕牛死亡 [“Many draft ox deaths in the agricultural cooperatives of the Dong autonomous region of western Guangxi”] April 15, 1955, p. 234[Collection CUHK].

³⁹⁰Neibu Cankao 内部参考[Internal Reference] Liaoning henduo nongyeshē hūshì shēngchū ānquān guōdōng gōngzuò 遼寧很多農業社忽視牲畜安全過冬工作 [“In Liaoning, many agricultural cooperatives are neglecting to prepare for the safe wintering of draft oxen”], Dec. 18, 1956, p. 373 [Collection CUHK].

³⁹¹ Ibid.

³⁹² JPA 4069-002-0103 Chumu shouyiju 畜牧兽医局[Livestock veterinary office] Benting chumu diaochazu guanyu Rugaoxian chumu shengchan diaocha baogao 本厅畜牧调查组 关于如皋县畜牧生产调查报告 [“This office’s livestock investigation group’s report on livestock production in Rugao county”] (1955).

oxen and water buffaloes were able to plow in 1957. If they had all been strong enough to plow, every living bovine would have had to cover just over two hectares. Instead, the able-bodied animals were responsible for covering 3.2 hectares, an increase of over fifty percent.³⁹³ Making relatively healthy oxen responsible for their dead or disabled colleagues' plowing quotas increased the animals' risk of malnourishment, exhaustion, and death.

Reading these reports through the three analytical lenses allows historians to make arguments about how cattle experienced their changing ownership. From the livestock investigators' instrumental perspective, emaciated animals were virtually useless. Like a dull ax or rusty plow, a starving ox was mainly an impediment to efficient production. In fact, because it demanded care and fodder, a lame or weak animal was even less helpful than a broken tool. The observational perspective puts the animals' health in the foreground. It is based on vivid descriptions of the telltale signs of malnourishment and exhaustion provided by farmers and investigators. Finally, based on this recorded evidence, the interpretive lens argues that these animals experienced extreme discomfort and suffering before their untimely deaths. Interweaving these three perspectives allows historians to add empirically supported empathy to accounts of the animals' transition from private to cooperative ownership.

Shared Ownership Is Not Necessarily Harmful to Oxen

³⁹³ Wu Weizhen, p. 74-76.

Although the CCP's rush to collectivize rural production in the late 1950s caused extensive suffering and death for oxen, it would be a mistake to blame shared ownership *per se* for the misery of these animals. At first glance, sharing livestock seems like a clear example of ecologist Garret Hardin's "tragedy of the commons."³⁹⁴ Hardin argued that herders sharing a pasture would make the individually rational but collectively ruinous choice to increase the number of cattle they kept on the common grassland beyond sustainable levels. Since the publication of this theory in 1968, hundreds of economists and political theorists have debated the best means of preventing abuses by individuals seeking to maximize their personal gains, even at the expense of the communal good. While Hardin focused on the destruction of commonly held pastures, his reasoning applies as well to commonly held animals.

The tragedy of the commons seems to provide a handy theoretical weapon for anti-collectivists by precluding sustainable, common usage of scarce resources. Yet the political scientist Elinor Ostrom has critiqued the political implications of efforts to cast users of shared assets as "helpless individuals caught in an inexorable process of destroying their own resources."³⁹⁵ Ostrom uses empirical research and game theory to challenge the conventional remedies for the supposedly inevitable despoiling of common property. Neither a coercive military or governmental regulatory authority that she calls "Leviathan," nor exclusive privatization of ownership and usage rights, is necessarily optimal for the concerned parties.³⁹⁶ Instead of treating individuals as compulsively

³⁹⁴ Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (3859), 1243-1248.

³⁹⁵ Elinor Ostrom, *Governing the Commons: The evolution of institutions for collective action*. New York: Cambridge University Press, 1990, p.8.

³⁹⁶ Ostrom, pp. 8-12.

selfish consumers, she acknowledges the intelligence and agency of users of commonly held goods. Ostrom suggests “self-financed contract enforcement” as a means of ensuring that parties sharing a resource can both maximize their own benefits, and preserve the commonly held property.³⁹⁷

Like Ostrom, both Nationalist and Communist authorities recognized that sharing and pooling of draft animals could succeed with proper regulation. Contractual agreements, whether oral or written, were widespread among owners and users of draft oxen in early twentieth-century China. Some animals suffered from overwork or maltreatment, but the various systems of renting and sharing had ways to deter the human parties from selfishly exploiting commonly held livestock. Collective draft oxen ownership during the Great Leap Forward at the end of the 1950s was doomed not by some tragic and merciless principle of ecology or economics, but by specific policy failures. These included the excessive scale of cooperatives and People’s Communes, the lack of accountability in tending the animals, and misaligned worker incentives.

The Fate of the Nation’s Cattle

The Great Leap Forward in 1958 marked the beginning of several years of even more grueling work for many thousands of bovines who were reassigned from farm work to projects in construction and heavy industry. Historians have documented the Party’s excessively ambitious schedules for improving the country’s agricultural and industrial

³⁹⁷ Ostrom, p. 14.

capacity.³⁹⁸ To satisfy lofty production targets, both farmers and their bovine colleagues worked to the brink of collapse, and sometimes beyond. Chapter 5 will address the physical and mental consequences of draft animals' Leap-era energy deficit, induced by long, hard hours of work on a reduced caloric intake. The following section, in keeping with the focus of this chapter, will analyze the effect of changes in ownership on the work and welfare of draft animals.

As Great Leap-era planners assigned tens of thousands of human laborers to leave their farms to build irrigation works and dig rail tunnels, oxen also joined the campaign to improve the country's infrastructure. A report by the Nanchang County People's Committee in Jiangxi Province depicted a Dickensian work environment for draft animals in a local brick-making facility. Because the authors of the report found its concerns pressing enough to deserve wide circulation, and because it illuminates several main causes of draft animal abuse, the document merits a detailed analysis.

The inspectors who produced the report noted that because the workers were paid piecemeal, and were not accountable for the wellbeing of their non-human colleagues, they had every incentive to exploit the animals in pursuit of faster production. Their hefty builds and strong muscles made oxen a prime labor pool for the arduous task of tamping down clay into brick molds, known as briquetting 踩泥制坯. Ostensibly motivated by "selfishness and profit-seeking," the staff of one nationally-operated brick-making plant drove their 47 newly acquired draft oxen for twelve to fifteen hours per day, far beyond

³⁹⁸ Yang Jisheng 楊繼繩, Mubei: Zhongguo liushiniandai dajihuang jishi 墓碑: 中國六十年代大饑荒紀實 [*Tombstone: A Record of China's Great Famine of the 1960s*], Hong Kong: Cosmos Books, Limited, 2008.

the standard five or six hours of daily farm work.³⁹⁹ Twenty-five of the oxen died of exhaustion in the four months between their transfer to the brick plant in September 1958 and the drafting of the report in early January 1959. The plant's four cattle attendants were responsible only for bringing the animals to and from work, cleaning their pen, and giving them water. No one was responsible for keeping them alive while they worked.

Greedy workers on the factory floor were not the ultimate cause of the animals' suffering. As early as October 1958, the plant's leaders had already been criticized for the alarming number of cattle deaths at their facility.⁴⁰⁰ Although they agreed not to have the cattle start work before sunrise, and to keep the clay no more than one *chi* deep [0.33 m], they "merely practiced formalism," and did not enforce the improved work regulations. Even more damning, the factory's leaders imagined that they would be able to buy modern brick-making machinery when the oxen died. Therefore, they disregarded the animals' "bent backs and sagging bellies," refusing to provide veterinary care or warm winter lodging. When oxen collapsed while tamping clay, the cadres suggested that the animals were "old and useless," and asked a veterinarian to certify them for slaughter.⁴⁰¹

Even the factory managers were not the ultimate cause of these animals' suffering. It was easy enough for the authors of the inspection report to condemn the brick-makers as selfish profit-seekers. But the floor workers, their foremen, and the factory's managers were merely responding to the intensely competitive and frenetic pace

³⁹⁹ Guanyu dui Nanchangxian zhuanwa gongchang gengniu siwang qingkuang de diaocha baogao 关于对南昌县砖瓦工厂耕牛死亡情况的检查报告 ["Investigation report on the deaths of draft oxen in a brick-making factory in Nanchang county"], January 12, 1959. p.1 [Author's personal collection. I will donate to UCSD Geisel Library]

⁴⁰⁰ Ibid. p. 2.

⁴⁰¹ Ibid. p.1.

of work during the Leap. This frantic enthusiasm emanated from the top echelon of the Communist Party. No common farmer or worker wanted to be seen slacking off or failing to meet production targets. Overworked, anxious brick-makers had little empathy to spare for their factory's new non-human assets, which were in any case soon to be replaced by machines. It was the misfortune of these animals--strong yet vulnerable, sensitive yet mute--to become the property not of farmers with emotional and economic investments in their welfare, but of a state determined to extract as much of their labor as possible before discarding them.

Chapter 4 Ink: Livestock Insurance and the Welfare of Interdependent Species, 1934-1958

By linking the health and fitness of individual animals to the military, political, and economic welfare of the nation, livestock insurance helped and harmed both humans and bovines in China. Launched in the Republican period to connect surplus urban capital to underserved villages, the insurance program also built support for the Nationalist government in its civil war with the Communist Party. During the Anti-Japanese War, draft animal insurance aimed at encouraging farmers to breed more and better cattle despite the chance that disease or social disorder would claim these expensive living assets. In particular, insurance was a legal and economic response to the tenacious rinderpest (cattle plague) virus that devastated herds until its nationwide eradication in the mid-1950s. Mismanagement and rapidly-shifting property ownership regimes hindered the expansion of the program in the first decade of the People's Republic. Still, coverage far exceeded the levels of the prior government, before the program's ignominious end at the start of the Great Leap Forward. The significance of livestock insurance for human interests and agendas is clear.

Understanding the contradictory effects of livestock insurance on bovines requires examining how their individual and collective welfare served the interests of the state. Insurance improved the lives of individual draft animals by making veterinary care affordable. It also lowered their risk of contracting painful and lethal diseases by reducing farmers' incentive to sell off sick cattle that could infect neighboring herds. Yet by

evaluating, assessing, and commodifying animal bodies, and by securing farmers against their loss, insurance programs encouraged farmers to treat their animals less as loyal colleagues than as replaceable assets. Selectively granting coverage only to those animals it deemed most useful, state-run insurance programs pressed farmers to cull old, unfit or otherwise undesirable animals. By making animals disposable, insurance also explicitly encouraged farmers to breed or buy cattle despite the likelihood that the animals would die in cattle plague outbreaks or other mishaps. From the government's instrumental perspective, these individual sacrifices were necessary to secure the welfare of the nation's bovine population. From the perspective of a water buffalo too old or scrawny to insure, but still able to pull a plow, the program's effects were decidedly less beneficial.

This is the only chapter of this dissertation that focuses not on a bovine bodily fluid, but on a liquid produced and used by humans. Ink is the fluid of socially constructed bonds, including the obligations of care, usage, and compensation that bind together farmers, cattle, and governments. Ink records the things that humans did to cattle, and for them. Ink is also the fluid that makes the historian's task possible. Unlike the others, this chapter has little to say about bovine experiences of eating, working, or suffering. Here, the animals are explicitly instrumental assets for humans to monitor and exchange. Livestock insurance was one part of the bureaucratic substrate in which cattle lived and died. The animals' manmade legal and economic environment determined their likelihood of mistreatment, medical care, or premature death. Probing beneath the sterile and bloodless statistics and coverage guidelines reveals much about the conditions in which people and animals went about their lives.

Veterinary Public Health and Vaccination: Who Calls the Shots?

Whether for humans or animals, public health is always political. This chapter examines veterinary public health from three perspectives. The first is the anthropocentric position, which focuses on human interests. Successive Chinese governments invested in the health of livestock both to quell domestic unrest and to secure a farm labor pool that helped support a national economy and military. Secondly, we will consider draft animals as a fulcrum in the struggle between forces, both microbial and human, that try to extract energy and biomatter from their environments. Finally, we will consider bovines and microbes as agents in their own right, whose interests and capabilities compel humans to adapt and respond. Humans have tended to treat these other life forms as inert objects or obstacles, on which people can apply their unique ability to organize and execute plans. Placing nonhuman life at the center of this account will challenge our comfortable assumptions about the unique, self-contained nature of human agency.

Efforts to improve the health of populations are often a response to the human threats of warfare and revolution. Analyzing public health programs of the early twentieth century in Western nations, the sociologist Constance A. Nathanson notes, “Military defeat led British and French elites to an intense concern with the health of their respective populations.”⁴⁰² Only a fit and healthy populace could yield the soldiers necessary for protecting the nation and its and overseas colonies. Moreover, notes Nathanson, governments recognized the pacifying effect of preventive medicine on “the

⁴⁰² Constance A. Nathanson, *Disease Prevention as Social Change: The State, Society, and Public Health in the United States, France, Great Britain, and Canada*. New York: Russell Sage Foundation, 2007, p. 28.

revolutionary potential of the desperate poor huddled together in the teeming cities of the nineteenth century.” In short, “Public health was conceived as a means to public order.”⁴⁰³ A sickly, anxious populace hinders the state’s ability to repel threats from both external foes and domestic agitators.

Governments adjust the aims of social programs, such as insurance, to respond to their most pressing concerns. Analyzing the relationship between insurance policymaking and military mobilization in Japan during the Pacific War, the historian Gregory Kasza notes the shift from “social work” (*shakai jigyo*) to “welfare work” (*kosei jigyo*). Before the war, social work policies attempted to “ameliorate class struggle and to halt the spread of socialism.”⁴⁰⁴ Wartime policy makers, by contrast, employed welfare work “not to curb class struggle or socialism but to strengthen the nation’s resources for war.”⁴⁰⁵ Whether the threats came from domestic agitators or foreign armies, officials used the growing apparatus of public health and social welfare to guard the populace against ill health that would undermine the government’s struggle against its perceived enemies.⁴⁰⁶

These interpretations of state-directed social welfare programs focus on human agency and threats: from fearful and rebellious subject populations, or from lurking enemy forces. Framing public health campaigns as part of a struggle for energy and biological matter, by contrast, encourages historians to consider the agency and activity of microbial life. The historian William H. McNeill has described human societies as

⁴⁰³ Nathanson, *Disease Prevention*, p. 247.

⁴⁰⁴ Gregory J. Kasza, *One World of Welfare: Japan in Comparative Perspective*, Cornell University Press, 2006, p. 36.

⁴⁰⁵ Ibid.

⁴⁰⁶ Nathanson, *Disease Prevention*, p. 249.

occupying an “age-old position, intermediate between microparasites attacking invisibly and the macroparasitism of some men upon their fellows.”⁴⁰⁷ In McNeill’s framework, microparasites include “disease germs” such as bacteria, protozoans, and viruses, which cause harm by using human bodies as sources of energy, as reproductive hosts, and as vessels for transmitting their genetic material through space. Macroparasites, by contrast, are “other men who, by specializing in violence, are able to secure a living without themselves producing the food and other commodities that they consume.”⁴⁰⁸ The historian Micah Muscolino has applied McNeill’s concepts to the struggle for energy and materiel between the rural populace of the war-torn, water-logged Henan plains, and the microparasitic diseases that flourished after the destruction of the Yellow River dikes in 1938.⁴⁰⁹ While they do not have the capacity to reason, microparasites nevertheless substantially affect their living environments, adapting quickly to human efforts to suppress or repel them. Public health programs that bolster the defenses of individual bodies against the predations of microparasites help to defend the body politic against the onslaught of macroparasites.

Useful though they are, both the anthropocentric and micro/macroparasitic perspectives treat agency and expertise as self-contained powers that bend landscapes and lifeforms to human ends. The historian Timothy Mitchell shows the limits of this assumption in his analysis of the interlinked biological, hydraulic, and chemical factors in the Egyptian malaria outbreak of 1942. Nonhuman factors including mosquitos,

⁴⁰⁷ William H. McNeill, *Plagues and Peoples*, p. 294.

⁴⁰⁸ William H. McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000*, Oxford: Basil Blackwell, 1982, p. vii.

⁴⁰⁹ Muscolino, *Ecology of War*, p. 180.

fertilizers, pesticides, and rivers “[did] not just interact with the activities of human agents... They shape[d] a variety of social processes, sometimes according to human plans, but just as often not, or at least not quite.”⁴¹⁰ Mitchell therefore contends that human agency does not exist in isolation but “like capital, is a technical body, is something made.”⁴¹¹

Agriculture is another potent illustration of both the limits of human agency and the surprising potency of nonhuman environmental elements. Challenging the conventional claim that humans “invented” farming, the author Michael Pollan views agriculture as “a brilliant (if unconscious) evolutionary strategy on the part of the plants and animals involved to get us to advance their interests.”⁴¹² Humans, of course, do much of the work of farming: selecting, cultivating, and consuming our preferred strains and breeds. But this process has not been unilateral. “By evolving certain traits we happen to regard as desirable,” notes Pollan, certain species such as maize “got themselves noticed by the one mammal in a position not only to spread their genes around the world, but to remake vast swaths of that world in the image of the plants’ preferred habitat.”⁴¹³ By Pollan’s reckoning, domestication is a two-way street, with helpful and needy life forms at both ends.

By de-centering human agency, this perspective yields profound implications both for politics and for the study of history. Scientists and technocrats have accrued

⁴¹⁰ Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley: University of California Press, 2002. p. 30.

⁴¹¹ Mitchell, *Rule of Experts*, p. 53.

⁴¹² Michael Pollan, *The Omnivore’s Dilemma*, p. 23

⁴¹³ Michael Pollan, *The Omnivore’s Dilemma*, p. 23-24.

substantial prestige and political authority by overemphasizing the world-altering power of human agency and expertise, while downplaying the power of nonhuman and non-living forces to shape and constrain human action. Like Michelangelo chipping away at a block of marble to reveal the angel within, the social power of experts arises from their vaunted ability to discern and make manifest a pre-existing reality. But just as a statue arises not only from the skill of the carver but from the qualities of the stone, the power and agency of experts is less than their lofty social position might suggest. In this light, “human agency appears less as a calculating intelligence directing social outcomes and more as the product of a series of alliances in which the human element is never wholly in control.”⁴¹⁴ The non-anthropocentric worldview therefore encourages humility among experts, and skepticism among the lay public, about the singular power of human technical proficiency to shape the world as we see fit. For historians, this perspective is a reminder that the world is formed not only by human hands and minds, but also by invisible parasites, stagnant ponds, swaying cornstalks, and buzzing mosquitos. Though they create no textual records, these nonhuman forces are inextricable from the well documented agendas of more familiar human subjects.

How the Multi-species Perspective Helps Historians

What does all this heady philosophizing contribute to a chapter about veterinary public health, or a dissertation about bovine experiences? This project aims to show that

⁴¹⁴ Mitchell, *Rule of Experts*, p.10

twentieth-century China was a society not solely of *Homo sapiens*, but of people and bovines interwoven in myriad ways. In a nation of intensive sedentary agriculture reliant on domesticated animal labor, humans and bovines were inseparable. These intelligent mammals exchanged nutrients, labor, and affection. As Pollan suggests, people have done the bidding of corn by planting it worldwide, defending it from pests, and lavishing it with nutrients. This chapter shows that something similar happened between humans and bovines in China. Of course, nobody took orders from Chairman Cow, and the animals themselves were unaware that insurance improved their access to veterinary care and vaccination. Nevertheless, by dint of their indispensable labor, bovines drove humans to invest substantial scientific, financial, and organizational resources in their wellbeing.

The public health of domesticated animals and humans are inextricably connected. Although rinderpest does not infect people, its eradication helped humans as much as cattle. Protected from the microparasitic rinderpest virus, a vaccinated ox could contribute many years of productive labor, yielding crops that fed both humans and cattle. By contrast, humans without working cattle achieved lower farm yields, causing malnutrition which weakened their immune systems and left them vulnerable to microparasites of their own. This mutual reliance forms the core of the nascent interdisciplinary perspective known as One Health, or an “appreciation of the interconnectedness of human, animal, and ecosystem health.”⁴¹⁵ Like sharks and remoras, the cattle and farmers of China were **symbiotes**: life forms that live together.⁴¹⁶ The great

⁴¹⁵ Jeremy Youde, “Cattle Scourge No More: The Eradication of Rinderpest and Its Lessons for Global Health Campaigns,” *Politics and the Life Sciences*, Spring 2013, vol. 32, no. 1, p. 48.

⁴¹⁶ The *Oxford English Dictionary* cites other examples including fungi and algae in lichens, and even an 1894 reference to “Animals and Plants considered as a great symbiotic community.”

anxiety of government planners was that, without adequate veterinary care, humans and bovines would also die together.

Finally, not only at the social but also at the individual, internal level, the chapter broadens our view of history by showing the permeability of supposedly stark dividing lines between species. A novel perspective in anthropology holds that the concept of kinship exclusively within a single species is a chimera. For instance, in breast-feeding, “the most iconic image of kin making,” a mammalian mother shares with her baby “not just sugars and fats...but a plethora of microbes, bacteria and living communities.”⁴¹⁷ As they flourish in the warm, moist environment of the newborn’s body, these nonhuman life forms confer valuable digestive capabilities and immunity. Such microbes may even shape an individual’s temperament and behavior, affecting the development of depression, autism, and dietary preferences.⁴¹⁸ An even more radical definition of kinship proposes “replacing the metaphor of invasion with one of invitation and coalescence” in the relationship between virus and host.⁴¹⁹ After all, “anyone who has been vaccinated has chosen to meet and mingle with viruses.”⁴²⁰ By highlighting the blending of human, animal, and microbial genetic material, this chapter seeks to allay concerns that the

[<http://www.oed.com/view/Entry/196194?redirectedFrom=symbiote#eid19327200>] I am grateful to Professor Karl Gerth of UCSD for proposing this analytical category [personal correspondence, April 8, 2018].

⁴¹⁷ Agustín Fuentes and Natalie Porter, “Kinship” in Lori Gruen, ed. *Critical Terms for Animal Studies*, Chicago: University of Chicago Press, 2018, p. 184.

⁴¹⁸ Carl Zimmer, “Germs in Your Gut Are Talking to Your Brain. Scientists Want to Know What They’re Saying,” *The New York Times*, January 28, 2019 [Accessed at <https://www.nytimes.com/2019/01/28/health/microbiome-brain-behavior-dementia.html>]; Mireia Valles-Colmer, Gwen Falony, Youssef Darzi et al., “The neuroactive potential of the human gut microbiota in quality of life and depression,” *Nature Microbiology*, February 4, 2019 [Accessed February 4, 2019, <https://doi.org/10.1038/s41564-018-0337-x>].

⁴¹⁹ Agustín Fuentes and Natalie Porter, “Kinship” in Lori Gruen, ed. *Critical Terms for Animal Studies*, Chicago: University of Chicago Press, 2018, p. 186.

⁴²⁰ Ibid.

interests and welfare of nonhuman life are external or irrelevant to Chinese history. The cultural, political, and economic life of the nation is far too rich to confine to a single, socially constructed species.

Insuring Cattle to Stabilize Society

Because draft animals were both patients and property, the introduction of livestock insurance helped to stabilize society by improving both public health and social welfare. By extending the state's veterinary and financial resources to farmers' most valuable and vulnerable asset, livestock insurance promised both to protect a key source of labor, and to promote the circulation of capital between cities and the countryside. Improved liquidity would frustrate the spread of communism by reducing the precarity of the rural workforce and demonstrating the concern and competence of the Republican government. Nationalist officials also recognized that livestock insurance could boost the country's economic output, and thus military strength, by encouraging farmers to increase their draft animal holdings.

Livestock insurance initially grew from the fertile soil of excess urban capital and desperate rural penury. The program was a potentially lucrative investment for urban banks, while providing security for the most valuable and vulnerable tool of insecure farm households. During the 1930s, a shortage of capital for farmers was a major cause of China's rural poverty and resulting political instability. In addition to the global Great Depression and the flooding of the Yangzi and Huai rivers, one analyst blamed the grim situation in the countryside on "the efflux of specie from the interior" into port cities.

Calling the national financial center of Shanghai “a temple of money changers...the coffer into which vast hordes of money have been poured,” he cited Bank of China managing director Chang Kia-ngau’s finding that in 1933, approximately half of the nation’s coinage was in Shanghai.⁴²¹ This geographically imbalanced access to currency not only entailed “serious liquidity problems” for farmers.⁴²² Even more alarming, in the eyes of “urban industrialists, bankers, and economists,” was the possibility that a collapsing countryside would drive migrant workers to the cities, shrinking the national tax base and reducing cities’ food supply. The state would be compelled to raise taxes on the remaining farmers, causing a vicious cycle of failing farms and swelling cities.⁴²³ Livestock insurance therefore offered an appealing way to bring urban capital back into the countryside, while stabilizing both the livelihoods of farmers and the economic foundation of the country.

No longer merely a source of brute physical labor, cattle became the basis of a financial derivative that faraway banks and insurance companies could examine, evaluate, and trade. In the early 1930s, the national agricultural bank offered draft ox loans to encourage farmers to raise livestock and prevent them from selling their draft animals during famines or natural disasters. But, as a bank publication explained, mortgaged oxen carried no life insurance, and “neither creditor nor debtor had any security.” In 1934, the bank began partnering with insurance companies to issue draft ox

⁴²¹ Leonard T.K. Wu, “Rural Bankruptcy in China,” *Far Eastern Survey*, vol. 5, no. 20 (October 8, 1936), p.209.

⁴²² Tomoko Shiroyama, *China During the Great Depression: Market, State, and the World Economy, 1929-1937*, Harvard University Asia Center, 2009, p. 223.

⁴²³ Tomoko Shiroyama, *China During the Great Depression*, p.112.

life insurance contracts. These would compensate the owner of a working ox between the ages of three and eight in case of the animal's death.⁴²⁴ In the same year, to “ameliorate the backwardness of villages,” the Bank of Shanghai launched its first draft ox insurance trial, in Anhui Province's town of Wujiang. All working oxen were eligible in this campaign, by contrast with the agricultural bank's tight coverage rules that excluded animals before or after their physical prime.⁴²⁵ Urban bankers and officials analyzed the health, capability and value of rural oxen, linking the surplus capital of the metropolis to the cash-poor communities of the hinterlands.

The military and ideological struggle between the Nationalist and Communist governments in Jiangxi Province during the mid-1930s also affected the lives of both humans and bovines. It was in the provincial capital of Nanchang that the KMT launched its New Life Movement to create a “disciplined, patriotic, and vigorous” human populace.⁴²⁶ After expelling the Communists in 1934, Nationalist officials made Jiangxi into a model province, with a particular focus on Linchuan County 江西臨川. In its efforts to consolidate control and win the battle for public opinion, the KMT employed “a spectrum of activities much broader and more ambitious than is usually conveyed by the English term ‘bandit-suppression.’”⁴²⁷ Indeed, “the ‘reconstruction policies’ that the

⁴²⁴ Nonghang Yuekan 农行月刊 [*Agricultural Bank Monthly*], Benhang gongzuo baogao 本行工作報告 [“This bank's work report”] Volume 1, issue 8, 1934.

⁴²⁵ Xiao Huiqing 蕭惠慶, Shanghai Yinhang zai Wan shiban gengniu baoxian 上海銀行在皖試辦耕牛保險 [“Bank of Shanghai launches draft ox insurance trials in Anhui province”] *Hu Nong 沪农* [*Shanghai Farmer*] 1934 Volume 2, Issues 3-4, p. 29.

⁴²⁶ Hans van de Ven, “The Military in the Republic,” *The China Quarterly*, No. 150, Special Issue: Reappraising Republican China (June 1997), p. 370.

⁴²⁷ Stephen C. Averill, “The New Life in Action: The Nationalist Government in South Jiangxi, 1934-37,” *The China Quarterly*, No. 88 (December 1981), pp. 598.

GMD [KMT] practiced in Jiangxi were closely related to anti-Communist measures.”⁴²⁸ Livestock insurance was one such program. The bovine population of the province had been decimated by internecine violence, by the 1931 flood of the Yangzi River and its tributaries, and by the endemic cattle plague discussed in Chapter 2.⁴²⁹ By protecting farmers’ precious bovine investments, draft ox insurance could simultaneously promote economic growth, while persuading the human agricultural work force to cast their lot with the Nationalist government.

In tandem with the introduction of insurance in Jiangxi, the provincial government also established clinics for diagnosing and treating livestock. In early 1935, an ox belonging to farmer Jiang Cheng’en of the Linchuan Experimental District fell ill, and his head “swelled to the size of an urn” 腫大如甕. When the swelling spread to his neck, he struggled to breathe, and lost his appetite. Although no one believed that the ox would survive, a veterinary technician at the clinic successfully treated the afflicted animal, who recovered after ten days. Farmer Jiang praised the technician “incessantly,” and inscribed a horizontal board with the phrase “Like Saving My Own Life” 如活我命. He donated this placard to the clinic to hang above its doorway, and “the whole village talked admiringly” about the incident.⁴³⁰ Extending its medical expertise to the countryside to assess livestock for insurance and to protect covered animals, the

⁴²⁸ Peter Merker, “The Guomindang Regions of Jiangxi,” in *China at War*, ed. Diana Lary et al., Stanford University Press, 2007, p. 289.

⁴²⁹ Chris Courtney, *The Nature of Disaster in China: The 1931 Yangzi River Flood*, p. 70. Courtney estimates nearly two million draught animals died nationwide in this flood, but does not provide province-level numbers for bovines and other species.

⁴³⁰No author. Zhu Lin Jiachu zhenliaosuo gongzuo jinxun 駐臨家畜診療所工作近訊 [“News from the livestock clinic in Linchuan”] *Jiangxi Nongxun* 江西农讯 [*Jiangxi Farm Bulletin*] Volume 1, Issue 17, 1935, p. 322-32.

government rescued a suffering animal while also scoring a coup in the fight for public opinion.

Nothing less than the survival of the social order was at stake. A report on insurance in Jiangxi Province warned that epidemics of cattle disease could mean “enormous losses” for farmers, leading to the bankruptcy of villages and “shaking the country’s foundations” 動搖國本.⁴³¹ Describing livestock insurance in Guangxi Province several years later, one author noted that the program would encourage farmers to breed cattle at a time when the human labor pool was “constantly shrinking” due to the Anti-Japanese War. At the same time, he referred to the menacing appeal of Communism by claiming, “Only when farmers' lives are stabilized will society not have so many aberrant disturbances.”⁴³² The government thus explicitly connected the health of bovines to the wellbeing of farm economies and the survival of the nation. By virtue of their irreplaceable labor and their role in village economies, these mute animals drew the attention and resources of the state.

At the abstract, macroscopic level, the connections linking veterinary public health and social welfare to military strength and state stability are evident. On the personal level of individual experience, many foreign-trained doctors and veterinarians also understood that governments could bolster their popular support by applying their

⁴³¹ Wu Xizhang 邬锡章, Gengniu baoxian de tuijin yu nongcun fuxing 耕牛保险的推进与农村复兴 [“The promotion of draft ox insurance and village revitalization”] *Jiangxi Nongxun* 江西农讯 [*Jiangxi Farm Bulletin*], Volume 3, Issue 8, 1937, p. 1-2.

⁴³² Yu Xiaoguang, Mo Ganlin 于晓光 莫甘霖, Guangxi xianxing gengniu baoxian shiye de jiantao 广西现行耕牛保险事业的检讨 [“A review of the draft ox insurance program underway in Guangxi”] *Guangxi nongye tongxun* 广西农业通讯 [*Guangxi Farm Bulletin*], Volume 3, Issues 6-7.

administrative and technical acumen to the public welfare. In 1933, National Health Administration deputy director Jin Baoshan suggested that China's Rural Reconstruction movement should emulate the methods of the Japanese colonial regime in Korea and Taiwan. Whereas the Japanese administration in Korea had at first been deeply unpopular, Jin suggested that by "using medical and public health enterprises to win over the people's hearts," the imperial power had "succeeded in extending its influence into the fabric of [Korean] society."⁴³³ One historian has suggested that Jin "became fully aware of the political function of medicine and hygiene" during his studies at the Kitasato Institute of Infectious Disease, which produced "a network of physicians for Japanese colonial medicine extending from Taiwan, Shanghai, and Korea to Manchuria."⁴³⁴ Similarly, the experiences of the prominent Chinese veterinarian Fang Ti 方悌 (also known as Fang Zhongyou 方仲友) shaped his understanding of the power politics underlying public health. Born into the family of a poor shopkeeper, Fang earned a degree from the Imperial University of Hokkaido, Japan with a thesis (in German) on horse breeding in Korea.⁴³⁵ Spending his early career living and studying in recently incorporated regions of the Japanese empire, Fang realized that governments could use their medical expertise to win the acquiescence, if not the admiration, of restive farmers.

⁴³³ Sean Hsiang-Lin Lei, *Neither Donkey nor Horse: Medicine in the Struggle Over China's Modernity*, Chicago: University of Chicago Press, 2014, p.245.

⁴³⁴ Ibid.

⁴³⁵ Yang Ben 杨奔, Chumu xuezhe Fang Ti 畜牧学者方悌 ["Livestock scholar Fang Ti"], in Zhongguo Renmin Zhengzhi Xieshanghuiyi Zhejiangsheng Cangnanxian weiyuanhui wenshiziliao yanjiuwei yuanhui 中国人民政治协商会议浙江省苍南县委员会文史资料研究委员会 [Cultural and Historical Materials Committee of the CPCC Zhejiang Cangnan County committee, ed.] Cangnan wenshiziliao, di 5 ji 苍南文史资料 第5辑 [Cangnan Cultural and Historical Materials, volume 5], 1989, p. 6.

This understanding underlay his advocacy of a livestock insurance program in the beleaguered province of Jiangxi.

Trials and Errors

Just as farmers responded to cattle plague by making an economic calculation, Nationalist agriculture officials sought to use livestock insurance both to reduce the likelihood of cattle plague outbreaks, and to mitigate the economic damage they caused. Because urban insurance firms struggled to extend coverage into villages, Nationalist agriculture officials set up state-backed rural cooperatives that worked with local banks to provide livestock insurance. The historian Zhao Ke has presented a case study of a pioneering trial in Jiangxi Province's Linchuan county in 1936. Before an ox could be insured, it was inspected by a technician from the local Disease Prevention Office 防疫所, who discussed its value with the insurer. After they branded the animal and vaccinated it against rinderpest, the local bank collected the premium, a hefty 20% of the assessed value. Along with its high cost, this coverage differed from later insurance plans by providing not only 80% of the animal's value in case of death, but also free medical treatment in case of illness.⁴³⁶ As the cattle plague is fatal in approximately 90% of cases, this coverage would mostly have applied to other endemic diseases.

⁴³⁶ Zhao Ke 赵珂, *Minguo shiqi Jiangxi Linchuan de gengniu baoxian* 民国时期江西临川的耕牛保险 ["Draft Ox Insurance in Jiangxi Province's Linchuan County During the Republican Period"] *Shijiazhuang Tiedao Xueyuan Xuebao* 石家庄铁道学院学报 (社会科学版) *Journal of Shijiazhuang Railway Institute (Social Sciences Edition)*, Dec. 2007, Volume 1, Number 2, p. 54.

To expand the Linchuan program, the government decreed that “no matter whether man or woman, all draft ox owning households in the county have a duty to join the [insurance] cooperative.”⁴³⁷ Zhao observes that while the policy “caused considerable tumult,” the program was still quite popular. Even the government’s forceful promotion of insurance affected only a small number of animals and farmers. While Zhao asserts that the Japanese invasion put an end to the expansion of insurance in Jiangxi, more recent work by historian Zhu Wenguang shows continuing expansion, from 385 insured animals in 1936 to 10,286 in 1941.⁴³⁸ Still, as even this later number represents only a small fraction of the estimated 1.479 million draft oxen in the province in 1942, Zhao Ke’s assessment is substantially correct.⁴³⁹

Although the vast majority of insured bovines pulled plows and did other farm labor, insurers also covered animals employed in industry. In 1945, the Tai’an Insurance Company in the wartime capital of Chongqing set up a program that covered approximately 2,000 bovines.⁴⁴⁰ These animals worked in the production of sugar and salt, which were state monopolies that provided vital revenue while the Japanese army occupied much of the country’s tax base.⁴⁴¹ Because cattle plague frequently struck this

⁴³⁷ Ibid.

⁴³⁸ Zhu Wenguang 朱文广, *Jiangxi gengniu wenti ji guanfang yingdui: 1928-1945 江西耕牛问题及官方应对: 1928-1945*, [“The Jiangxi Draft Ox Problem and Official Response: 1928-1945”] *Nongye Kaogu 农业考古 Agricultural Archaeology*, 2015, Number 1, p. 190.

⁴³⁹ Hollington Kong Tong, ed. *China Handbook, 1937-1945: A Comprehensive Survey of Major Developments in China in Eight Years of War*, New York: Macmillan, 1947, p. 442. The data were from the National Agricultural Research Bureau.

⁴⁴⁰ Tuo Guozhu, Wang Guojun 庾国柱, 王国军, *Zhongguo nongye baoxian yu nongcun shehui baozhang zhidu yanjiu 中国农业保险与农村社会保障制度研究 [Research on China’s agricultural insurance and village social welfare systems]* Beijing: Shoudu Jingji Maoyi Daxue chubanshe 首都经济贸易大学出版社, 2002, p.45.

⁴⁴¹ Hans van de Ven, “The Military in the Republic,” *The China Quarterly*, No. 150, Special Issue: Reappraising Republican China (June 1997), p. 372.

region, insurance would help to stabilize the animal labor pool of the area's famed salt wells. By this time, however, many producers were transitioning from voracious, vulnerable, and costly water buffalo to cheaper human labor and steam power.⁴⁴² This shift had the additional benefit of reducing the "unbearable" stench of manure in towns such as Zigong.⁴⁴³ Soon after the Anti-Japanese War, the insurance company focused on the Shanghai region and abandoned its unprofitable operations in the country's southwest.⁴⁴⁴

After the Japanese surrender, the Nationalist government intensified its veterinary attention to draft animals. When the China Agricultural Insurance Company launched livestock insurance trials in Shanghai, Nanjing, Fuzhou, and Chengdu, annual coverage cost 5% of an animal's market value. A health inspection was mandatory for all insured animals, and part of the insurance premium covered the travel fees of veterinarians. The chronically under-funded Ministry of Agriculture and Forestry (MOAF) was to cover the cost of the vaccines for diseases such as rinderpest and anthrax.⁴⁴⁵

During the first decade of the People's Republic, the country's small and valuable pool of dairy cattle were even more attractive targets for insurance coverage than draft oxen. Insurance, based on the calculation of risk, becomes easier to administer as the number of risk factors and unknowns decreases. A plan for the insurance rollout of 1951

⁴⁴² Madeliene Zelin, *The Merchants of Zigong: Industrial Entrepreneurship in Early Modern China*, New York: Columbia University Press, 2005, p. 129, 173.

⁴⁴³ Madeliene Zelin, *The Merchants of Zigong*, p.173.

⁴⁴⁴ Tuo Guozhu, Wang Guojun, Research, p.45.

⁴⁴⁵ No author. Jianshao nongmin sunshi juban shengchubaoxian Jing-Hu gedi xianjiu niuzhu shiban 減少農民損失舉辦牲畜保險 ["Livestock insurance introduced to reduce farmers' losses"] Xibao 锡报 [*Wuxi Journal*] edition 2, Dec 1, 1946.

in Jiangsu Province explained the many reasons to focus on dairy cows. First, because most dairy cattle belonged to scarce foreign breeds, they were more valuable than cattle raised for labor or beef. Secondly, most dairy cattle were concentrated in cities and owned by institutions such as food companies, making inspection and treatment easier. Additionally, dairy cow diets were “relatively scientific” and the animals did no risky physical labor. Dairy farms also had adequately equipped veterinarians, and their cleanliness was overseen by the local Hygiene Department, which insisted on mandatory vaccination and high standards of cleanliness. As a model, agricultural planners pointed to Shanghai, where 4,145 dairy cattle lived on 115 farms, and the owners were “aware of the need for insurance.” Due to their high price, geographic concentration, well-regulated lifestyles, access to veterinary care, level of government oversight, and savvy owners, the “easy to manage” dairy cattle were therefore prime candidates for insurance.⁴⁴⁶

Yet despite the many arguments in favor of dairy cattle insurance, the program was not widely successful. In Zhejiang Province, another key dairy production site, the local branch of the national insurance company launched a scheme in late 1952 to cover dairy cows and studs. This was supposed to “encourage farmers to raise [dairy cattle] enthusiastically.”⁴⁴⁷ Despite the aforementioned advantages of dairy cow insurance, the

⁴⁴⁶ JPA 7011-002-1587 Renmin baoxian gongsi Huadongqu gongsi, nongye baoxianke chumu baoxian bufen 人民保險公司華東區公司 農業險科畜牧保險部分 [Livestock Insurance division of the agricultural insurance department of the People’s Insurance Company, East China Region] Guanyu nongye yuye chumu baoxian de guiding zhishi—yi jiu wu yi niandu nongye baoxian tuizhan jihua 关于农业渔业畜牧保險的規定指示--一九五一年度農業保險推展計畫 [“Directives on agricultural and aquacultural livestock insurance--Plan for promoting and developing agricultural insurance in 1951”].

⁴⁴⁷ Jin Wenping, ed. 金文平, Wenzhoushi Lucheng quzhi shangce 温州市鹿城区志上册/卷十七 畜牧业-第一章 主要畜禽 [Gazetteer of Wenzhou City’s Lucheng District, Vol. 1, Section 17, Livestock Husbandry, Chapter 1, Main Livestock and Poultry] Zhonghua Publishing 中华书局, 2010, p. 408.

program remained “very small” in scope before its abolition in 1958.⁴⁴⁸ In 1952, by contrast, over 540,000 draft oxen in Zhejiang were insured, orders of magnitude greater than the coverage of dairy cows.⁴⁴⁹

Persuading Hesitant Farmers

Poverty, suspicion of the government, and concerns about Western veterinary techniques hampered the rollout of draft animal insurance during the Republican period. One author observed that farmers treated insurance much as the ancient sage Confucius treated ghosts and spirits: “with respect, but from a distance.”⁴⁵⁰ Some farmers resisted the mandatory vaccination of insured animals because they “[didn’t] believe in Western medicine.”⁴⁵¹ Moreover, vaccination was a state-run program, and “ordinary people’s trust in the government [was] not solid.”⁴⁵² Though vaccination might be free of charge, the insured ox was nevertheless registered with the government, which could one day impose taxes on the animal. This apprehension was reasonable in light of the endlessly creative surcharges and tolls that the wartime KMT levied on farmers.⁴⁵³ Having abused

⁴⁴⁸ Zhejiang Insurance Gazetteer, p. 212.

⁴⁴⁹Ibid., p. 213.

⁴⁵⁰Yu Xiaoguang, Mo Ganlin 于晓光 莫甘霖, Guangxi xianxing gengniu baoxian shiye de jiantao 广西现行耕牛保险事业的检讨 [“A review of the draft ox insurance program underway in Guangxi”] Guangxi nongye tongxun 广西农业通讯 [Guangxi Farm Bulletin], Volume 3, Issues 6-7.

⁴⁵¹ Liu Jieming 刘阶冀, Fangzhi niuwen yu gengniu baoxian—niu he jiqi 防治牛瘟与耕牛保险—牛和机器 [“Cattle plague prevention and draft ox insurance”] Jingji Jianshe 经济建设 [Economic Construction] Volume 3, Issue 5, 1948, p.15-17.

⁴⁵²Ibid.

⁴⁵³ Lloyd E. Eastman, *Seeds of Destruction: Nationalist China in War and Revolution, 1937-1949*, Stanford University Press, 1984, pp. 173-202.

the goodwill of the citizenry to obtain resources for fighting both the Communists and Japanese, the government found farmers suspicious of the very program that had been intended to boost their loyalty to the Nationalist regime.

Some observers depicted farmers as passive dullards whose ineptitude hindered the government's dynamic efforts to help them and their animals. In an essay that mingled sympathy and contempt for farmers, the author Wu Jing acknowledged that "farmers know how important draft oxen are." Yet due to their "meager knowledge," the farmers "do not feed the animals appropriately, they do not know how to keep the stables clean, and do not know about methods for maintaining hygienic air and bedding." Draft oxen therefore often fell ill, and "except for a few old-fashioned medical techniques," the farmers did nothing but "cry bitterly about their sadness and the loss of a large portion of their property."⁴⁵⁴ Having identified the farmers' poverty as the root of their poor treatment of livestock, Wu nevertheless castigated villagers for their stinginess. The "short-sighted" farmers cared only for the present and did not think about future gains or losses. Furthermore, they were "unwilling to clean out their stables, or to spend money on slightly better equipment." In short, sighed Wu, farmers "don't want to spend money, and are always looking to save a few pennies."⁴⁵⁵

Farmers also resisted buying insurance for reasons besides their general reluctance to spend money. First, the idea of agricultural insurance was unfamiliar. Wu lamented that, "Even intellectuals don't totally understand the concept, and farmers are

⁴⁵⁴ Wu Jing 吴景, *Jiangxisheng Diqiqu gengniu baoxian hezuo gaikuang-fubiao* 江西省第七区耕牛保险合作概况-附表 ["Outline of draft ox insurance cooperatives in Jiangxi Province's seventh district"] *Zhongnong Yuekan* 中农月刊 *Chinese Farmers' Monthly*, Volume 1, Issue 6, 1940, p.100-108.

⁴⁵⁵Ibid.

even more baffled.” To many villagers, insuring a healthy ox seemed a pointless waste of money. In addition, farmers worried about shortening their ox’s life by branding its horn when they registered the animal. Even more troubling, Wu blamed “busybodies” for spreading “unfounded nonsense” such as the claim that foreign veterinary medicine (i.e. vaccines) was aimed at killing off the villagers’ draft oxen in hopes of promoting Western cattle breeds.⁴⁵⁶ Technocrats like Wu decried ignorant, credulous, and tight-fisted farmers for their reluctance to participate in a program that would clearly benefit both villages and the nation.

In the face of this popular skepticism, the *baojia* network, a Qing administrative system for levying taxes and troops, connected the government’s capital and public health expertise to millions of disparate households.⁴⁵⁷ Urban *baojia* heads 保長 performed such tasks as organizing lavatory cleaning, inspecting food stalls, collecting trash, and running vaccination programs.⁴⁵⁸ In the countryside, *baojia* heads disseminated knowledge and best practices for veterinary hygiene and disease prevention, explaining “the rights and responsibilities of someone who owns an insured ox.”⁴⁵⁹ When officials in Jiangxi Province’s Linchuan and Pengxi experimental districts launched draft animal insurance in September 1935, they “earnestly implored people to buy insurance, but the

⁴⁵⁶Ibid.

⁴⁵⁷ For the KMT’s use of the *baojia* system in conscription, see Yan Xu, *The Soldier Image and State-Building in Modern China, 1924-1945*, University Press of Kentucky (2019), pp. 56-57. [Accessed at <https://www.jstor.org/stable/j.ctv8pz8h.6>].

⁴⁵⁸ Nicole Elizabeth Barnes, *Intimate Communities: Wartime Healthcare and the Birth of Modern China, 1937-1945*, University of California Press, 2018, p. 43. [Accessed at <https://www.jstor.org/stable/j.ctv941tpp.7>]

⁴⁵⁹ No author. Linchuan shiyanqu gengniu baoxian jinkuang 临川实验区耕牛保险近况 [“Recent developments in draft ox insurance in the Linchuan experimental region”] *Jiangxi Nongxun* 江西农讯 [*Jiangxi Farm Bulletin*], Volume 2, Number 8, 1936, p. 136.

farmers paid no heed.” The local governments therefore “had to use state power 政治力量” to set up insurance offices in each federated bao 保聯, and ordered all ox owners to buy coverage. According to one author, because the people in charge of these local offices were well regarded in the community 素負重望, many farmers did obtain insurance.⁴⁶⁰ By 1936, the Jiangxi Province Agricultural Institute was pleased to report that “each household’s stable is as clean and fresh as never before...by comparison with the time before livestock insurance, the progress has been especially noticeable.”⁴⁶¹

No Cure? Insure!

Before the Communists completed the Nationalist campaign to eradicate cattle plague in the mid-1950s, the threat of this deadly virus drove many farmers away from raising or breeding cattle. The danger was great: in 1948, the Nationalist government estimated that rinderpest killed 5% of the country’s draft ox population each year.⁴⁶² In 1941, the Sichuan Province Committee for Increasing Grain Yields 四川省糧食增產委員會 analyzed the reluctance of farmers to raise the bovines who could provide essential

⁴⁶⁰ Wu Jing, “Outline,” p. 100-108.

⁴⁶¹ “Recent developments,” p. 136.

⁴⁶² Zhongguo Di'er Lishi Dang'anguan bian 中國第二歷史檔案館編 [Second Historical Archives of China, ed.], Guomin zhengfu 1948 nian Zhong-Mei nongye jishu hezuo jihua fang'an fielüe 國民政府 1948 年中美农业技术合作计划方案节略 [“Abridged plan of the national government for Sino-American agricultural technical cooperation in 1948”], in Zhonghua minguo shidang'an ziliao huibian diwuji disanpian caizheng jingji (6) 中華民國史檔案資料匯編第五輯第三篇財政經濟(6) *Collection of Republic of China historical archival material, Volume 5, Section 3, Finance and Economics (6)*, Jiangsu Guji Chubanshe 江蘇古籍出版社, p. 244.

draft labor. Three years earlier, a rinderpest outbreak had killed 46% of the cattle in Guangyuan County, and 56.85% of the bovines in Xiushan. Even in less gravely afflicted counties, the death rate frequently reached 20-30%. The Committee lamented that “due to the heavy death rate 死亡之惨重, farmers believe that raising oxen is extremely risky.”⁴⁶³ Families in Guangyuan no longer wished to raise their customary six or seven bovines due to the “soaring” price of fodder and their “unwillingness to suffer such an enormous loss” if the animals died of plague after consuming these costly foodstuffs.⁴⁶⁴ Landlords in neighboring Guangxi Province felt that buying land was a more stable form of investment than oxen, which could die *en masse* in an outbreak. For this reason, the concentration of cattle ownership in the hands of the wealthy was less severe than the concentration of land ownership.⁴⁶⁵ Without a solution to the problem of cattle plague, farmers made the rational economic choice to avoid raising the essential but fragile bovines.

Shortly after the Japanese invasion drove the Nationalist government up the Yangzi River and into the country’s interior, the author Wang Shiyong connected the

⁴⁶³ SHAC 23-1-1800, Nonglinbu liangshi zengchan weiyuanhui buzhu gesheng jiangli gengniu fanzhi zaxing banfa jihua ji zhongyang nongye shiyansuo ganzhi xueqing gong Sichuan peidu fujin xian fangzhi niuwen de youguan wenshu 農林部糧食增產委員會補助各省獎勵耕牛繁殖暫行辦法計畫及中央農業實驗所趕製血清供四川陪都附近縣防治牛瘟的有關文書 1941 六月—1942 三月 [“Documents related to the MOAF Grain Production Increase Committee’s temporary subsidy plan to reward each province for breeding draft oxen and the Central Agricultural Research Station’s rapid production of plasma to supply counties near the provisional capital in Sichuan for cattle plague prevention, June 1941-March 1942”], p. 50.

⁴⁶⁴ Ibid.

⁴⁶⁵ Shou Min 寿民 Guangxi nongcun jingji xianjieduan de xiezhen 广西农村经济现阶段的写真 [Impressions of the current village economy in Guangxi] Zhongguo Jingji 中国经济 *China’s Economy*, Volume 2, Issue 12, p. 8, December 1934, cited in Zhang Youyi 章有义, ed. Zhongguo jindai nongye shi ziliao disanji 1927-1937 中国近代农业史资料第三辑 1927-1937 [*Historical materials on modern Chinese agriculture, volume 3, 1927-1937*] Beijing: Sanlian, 1957, p. 872.

livestock insurance program to the need to “fight a war and build the nation.” Although the rinderpest virus was endemic in the nation’s border regions, he suggested their environmental conditions 風土 were best suited to raising livestock. These provinces could therefore play a vital role in satisfying the needs for food and clothing among both the military and the general public. Referring to draft animals as “living capital” 有生資本, Wang suggested that livestock insurance would mitigate the loss in case an animal died, so the owners would “have no worries, and [can] work hard to improve the quality of their stock.” Moreover, stretching the KMT’s New Life Movement across species, he suggested that meticulous attention to their animals’ hygiene could even have a positive effect on the hygiene of citizens.⁴⁶⁶

By protecting farmers from a catastrophic economic loss, livestock insurance used the esoteric realm of markets to enhance the welfare of bovines. In the early stages of rinderpest, a farmer could still recover 50-60% of his animal’s value by selling it promptly to an unsuspecting buyer. Hoping to avoid a total loss, farmers thus inadvertently spread the virulent disease.⁴⁶⁷ Most farmers, who could not afford a good veterinarian for a sick ox, did not know if an animal was contagious. If the ox died due to their “shilly-shallying” 稍一躊躇, they might sell its beef and its hide for a few coins, “not realizing that cattle plague can be spread this way, which can affect an entire

⁴⁶⁶ Wang Shiyong 王世穎, Lun shengchu baoxian (fubiao) 論牲畜保險 (附表) [“On livestock insurance—with figures”] Biansheng Yuekan 边声月刊 [*The Voice of the Frontier Monthly*] Volume 1, Issue 3, 1938, p. 8-14.

⁴⁶⁷ Liu Jieming 刘阶冀, Fangzhi niuwen yu gengniu baoxian—niu he jiqi 防治牛瘟与耕牛保险—牛和机器 [“Cattle plague prevention and draft ox insurance”] Jingji Jianshe 经济建设 [*Economic Construction*] Volume 3, Issue 5, 1948, p.15-17.

township, or even a county.”⁴⁶⁸ This phenomenon of individually rational decision-making with socially deleterious consequences has been the subject of extensive analysis.⁴⁶⁹ By guaranteeing compensation for infected cattle, livestock insurance removed the temptation to liquidate a rapidly depreciating asset that could infect healthy animals. This benefitted farmers and bovines, while hampering the movement and reproduction of the virus.

Livestock insurance could counter the effects of disease even more effectively than medical intervention. Noting that rinderpest accounted for 80% of cattle deaths in Guangdong Province, one author explained that a vaccination campaign in June 1948 had reached just thirty thousand of the approximately three million bovines in the province. Although the results were “excellent,” the government’s dire fiscal situation meant that universal vaccination would take ninety years. A well-run insurance program, on the other hand, could cover the bovines of Guangdong within three years.⁴⁷⁰ The virus might persist in the environment, killing hundreds of thousands of bovines per year. But failing a veterinary remedy for rinderpest, livestock insurance gave farmers the confidence both to buy an ox, and to cull it promptly in case of an outbreak.

⁴⁶⁸ Wu Jing 吴景, Jiangxisheng Diqiqu gengniu baoxian hezuo gaikuang-fubiao 江西省第七区耕牛保险合作概况-附表 [“Outline of draft ox insurance cooperatives in Jiangxi Province’s seventh district”] *Zhongnong Yuekan 中农月刊 Chinese Farmers’ Monthly*, Volume 1, Issue 6, 1940, p.100-108.

⁴⁶⁹ Cf. Fabrizio Natale, Armando Giovannini, Lara Savini, et al. “Network analysis of Italian cattle trade patterns and evaluation of risks for potential disease spread,” *Preventive Veterinary Medicine* 92 (2009) 341-350.

⁴⁷⁰ Liu Jieming 刘阶莫, Fangzhi niuwen yu gengniu baoxian—niu he jiqi 防治牛瘟与耕牛保险—牛和机器 [“Cattle plague prevention and draft ox insurance”] *Jingji Jianshe 经济建设 [Economic Construction]* Volume 3, Issue 5, 1948, p.15-17.

A conventional anthropocentric view of livestock insurance would point to the program's success in persuading farmers to assume the risk of raising cattle despite the threat of disease or other calamities. Framed within the contest between micro- and macroparasites, insurance helped the Nationalist government defy the cattle plague virus and build up the bovine labor population that was indispensable to the war against the Japanese army. The program was also a way to turn rural animals into investments for urban capital, improving financial liquidity and countering the appeal of property redistribution or social revolution.

For the rinderpest virus, the best possible outcome would have been livestock insurance without additional veterinary care or vaccination, yielding an endless supply of vulnerable, disposable host bodies. But no government or farm household could waste its investments in bovine life and fodder so casually. In actuality, insurance devastated the virus by constraining the sole interest of this non-living protein entity: reproducing its DNA.⁴⁷¹ Expanding the historical discussion of subjecthood and agency beyond humans, to include both cattle and viruses, raises more questions than it answers. But at least this complicated trilateral relationship offers a provocative starting point.

“Tidying Up” the Labor Pool

⁴⁷¹ The biological status of viruses as abiotic entities is a matter of some scholarly dispute. Cf. Luis P. Villarreal, “Are Viruses Alive?” *Scientific American*, August 8, 2008, [accessed at <https://www.scientificamerican.com/article/are-viruses-alive-2004/>].

Mitigating the risks of disease was not the only benefit of draft animal insurance to the state. On the eve of the Japanese invasion in 1937, the Nationalist veterinarian Fang Ti articulated the difficulty of keeping the bovine labor force young, healthy and strong. He reasoned that as “the useful age of draft oxen is three to nine years,” insurance policies should encourage the slaughter of old, weak beasts.⁴⁷² Insurance coverage was a potent tool for a state eager to trim suboptimal workers from the labor pool.

Alas, many farmers did not take such a dispassionate view of their animals. In Jiangxi Province’s Xingzi County, where Fang established a draft ox insurance program, farmers “boast about being able to keep an old ox, and people praise them for this.”⁴⁷³ The veterinarian suggested that in addition to the social prestige they gave their owners, these superannuated oxen owed their long lives both to “Buddhist notions of compassion,” and excessively strict application of the policy banning the slaughter of draft animals. As a result, fully half of the county’s oxen were above prime working age. Fang grumbled that the county was home to at least one thousand ancient, “useless” bovines, whose upkeep consumed human labor and material resources. Some farmers, for instance, kept an old bovine but needed the strength and stamina of a younger animal. They were thus compelled to share a younger ox or water buffalo with friends or relatives, splitting the costs of feeding and care. But if this partner also kept an old animal, the human duo would need to pool resources with a third or fourth party,

⁴⁷² Fang Ti 方悌, *Cong xingzi banli gengniu baoxian tandao gengniu zhengli ji jiangli yangniu* 从星子办理耕牛保险谈到耕牛整理及奖励养牛, *Jiangxi Nongxun* 江西农讯 [*Jiangxi Farm Bulletin*] Volume 3, Issue 15, 1937. Fang Ti 方悌 was the pen name of Fang Zhongyou 方仲友 (1889-1974). See *Cangnanxian zhi* 苍南县志 [*Gazetteer of Cangnan County*] Zhejiang Renmin Chubanshe 浙江人民出版社 Zhejiang People’s Press, 1997, p. 793.

⁴⁷³ *Ibid.*

consuming ever more resources. Furthermore, Fang argued, old cows produced inferior calves, causing a vicious cycle of deteriorating genetic stock. With “more old, useless oxen by the day” consuming precious fodder and labor, Fang called for “tidying up” the county’s bovines by culling the unfit.⁴⁷⁴

Insurance was only for animals the government deemed worthy. In the event of an epidemic, there would be no compensation for a farmer who lost an elderly animal he had kept for reasons of sentiment, prestige, or religion. Fang’s plan presumed that economic rationality would lead farmers to eliminate unfit animals sooner, rather than risk losing them after years of pointless feeding and care. In an apparent concession to local sensibilities, he set the age limit for culling at thirteen, and proposed making draft oxen insurance mandatory for animals aged twelve and younger. Without such hardheaded policies, “even without disease, the county’s livestock will be left in the dust” 將步畜馬衰敗之後塵埃。⁴⁷⁵ As we have seen, the small scale of livestock insurance during the war prevented a thorough test of Fang’s plans.

Compensation amounts for dead insured oxen show that Communist officials, like their Nationalist predecessors, considered animals most valuable between the ages of five and nine years [Table 4.1]. Due to their inability to perform farm work, oxen below the age of three were ineligible for insurance. Likewise, by banning coverage of animals over twelve years old, the new government sought to encourage farmers to slaughter animals

⁴⁷⁴ Ibid.

⁴⁷⁵ Ibid.

whose fodder gradually equaled or even exceeded the value of their labor.⁴⁷⁶ Although insurance premiums also took into account other factors such as the number of local veterinarians, the frequency of animal disease outbreaks, and general economic conditions, an ox’s market value was determined mainly by its ability to pull a plow.

Table 4.1: Draft Ox Value by Age in Terms of Rice, 1950⁴⁷⁷

Age (years)	Rice value (<i>jin</i>)
3	900
4	1,200
5 – 9	1,500
10	1,300
11	1,100
12	900

Insurers likely restricted coverage too narrowly, excluding animals that were robust and well-socialized. The veterinarian William Ross Cockrill, the world’s pre-eminent expert on water buffalo, noted the animal’s “remarkable” longevity.⁴⁷⁸ In his many years of field research, Cockrill encountered two buffalo who worked until the age of forty, adding, “It is common to find animals of 25 to 30 years still capable of putting in a good day’s

⁴⁷⁶ Ye Junfa 叶骏发, *Shenme shi gengniu baoxian 什么是耕牛保险* [“What is Draft Ox Insurance?”], *Nongye Shengchan 农业生产* [Agricultural Production] Volume 5, Issue 6, 1950, p.14.

⁴⁷⁷ Data source: Ye Junfa, “What is Draft Ox Insurance?” p. 14.

⁴⁷⁸ Nicknamed “Buffalo Bill,” Cockrill was also “an accomplished raconteur, and something of an expert on Italian food and wine.” See Edward Boden, “Obituary: W.Ross Cockrill,” *The Independent*, May 29, 1999.

work.” Moreover, owners and their animals often “grow old together and develop a high degree of responsiveness toward each other.”⁴⁷⁹ While factors such as breed, working conditions, and diet affect the length of a draft animal’s working life, there is reason to believe that farmers who refused to slaughter their elderly beasts were not simply “stubborn” or “superstitious.” Years of experience and a close bond with their human handlers meant that old bovines were more valuable and productive than the rigid insurance guidelines suggested. Yet without the fine-grained longevity statistics that are indispensable to calculating life insurance premiums and coverage ranges, technocrats could only establish crude parameters. It is impossible to know how many farmers made the rational if heart-rending decision to cull their old, healthy bovines to insure a younger animal.

For farmers caught between longstanding affection for their elderly animals and the logic of economic efficiency, these tight age restrictions were coercive and draconian. The cattle themselves might have shared this opinion, were they able to understand their situation. But by the standards of their time and social position, Fang and Ye were not exceptionally ruthless or domineering. This dissertation includes many examples of veterinarians and what we can call “animal public health officials” (such as vaccinators, slaughter inspectors, and insurance agents) who understood themselves to be ultimately responsible to their fellow human citizens and nation, rather than to their four-legged counterparts. They acknowledged the complexity of bovine behavior and emotion, and

⁴⁷⁹ W. Ross Cockrill, “The Working Buffalo,” in W. Ross Cockrill, ed. *The Husbandry and Health of the Domestic Buffalo* [A project sponsored by the Australian Freedom from Hunger Campaign]. UN FAO, Rome, 1974, p. 313.

saved many the lives of many cattle. But they treated the animals as productive assets, not intelligent individuals. For these officials, there was no contradiction between working with nonhuman patients, and recommending the culling of large numbers of potentially unfit or contagious animals. Their ultimate goal was to enhance the productive capacity and economic utility of China's herds.

Putting Prices on Bovine Bodies

From the instrumental perspective of humans, pricing bovines was an essential step in buying, selling, and insuring draft animals. The commercial exchange of these intelligent farm tools was important to the economies of villages and, ultimately, the nation. For the animals themselves, being priced by humans also had significant implications. Reading the external manifestations of bovine genetics and well-being, and linking these indices to monetary values, allowed humans to classify the animals and place them in hierarchies. Pricing necessarily involved grading, which in turn meant that certain animals were more worthy of purchase, of insurance, of medical care, and of reproducing. Fortune tellers had long claimed to divine a person's fate by interpreting his physical features. Livestock brokers, insurance officials, and veterinarians, meanwhile, used new techniques to determine a bovine's value and destiny on the basis of the length of his legs, the curve of his back, and the shape of his teeth.

In the early twentieth century, farmers and cattle brokers used both conventional and idiosyncratic methods to assign monetary value to the complex, organic machines known as draft animals. Dating to the Kangxi reign period of the Qing dynasty (1661-

1722), the Danyang ox market in Jiangsu Province was a bovine bazaar at which thousands of animals could change hands on a single market day.⁴⁸⁰ A history of the market explains that Danyang owed its longstanding position as a hub of bovine commerce both to its access to trade routes over land and water, and to its “fair pricing.”⁴⁸¹ Before 1949, buyers and sellers discerned the health, disposition, and genetics of cattle by examining their visible features and behavior. For instance, they assessed the age of an ox by inspecting its teeth and horns. To estimate the animal’s “labor potential,” they would lead it for a few steps in both a straight line and a circle to observe its ability to plow farmland and mill grain. Buyers pinched the bellies of beef cattle to assess how much meat, bone, and skin they would yield, to an average accuracy of 95%. A local historian contends that decades of real-world practice gradually produced local experts who were “no less professional” than credentialed veterinarians.⁴⁸²

Yet alongside these empirically-based practices, many brokers profited from double-dealing and deception. Some brokers took advantage of unsophisticated sellers by claiming that patterns in an animal’s coat revealed his capacity for work. To lower the price of an ox, they would point out “inauspicious signs” such as the “quadruple vertex” or “white tiger’s mouth” on an ox’s flank. These markings obviously had nothing to do

⁴⁸⁰ Zhu Zhengjia 朱正稼, ‘Yi-liu’ piaofang niushi ‘一六’票房牛市” in *Zhongguo renmin zhengzhi xieshang huiyi Jiangsusheng Danyangxian weiyuanhui wenshi ziliao yanjiuweiuyuanhui bian* 中国人民政治协商会议江苏省丹阳县委员会文史资料研究委员会编, *Danyang wenshi ziliao diyiji* 丹阳文史资料第一辑 [*Danyang Historical and Cultural Materials, Volume 1*], Danyang, 1984, p. 131.

⁴⁸¹ *Ibid.*, p. 133.

⁴⁸² Guo Lian 郭连, *Danyang niushi xing-shuai shi* 丹阳牛市兴衰史 [“The History of the Rise and Fall of the Danyang Ox Market”] in *Zhongguo renmin zhengzhi xieshang huiyi Jiangsusheng Danyangxian weiyuanhui wenshi ziliao yanjiuweiuyuanhui bian* 中国人民政治协商会议江苏省丹阳县委员会文史资料研究委员会编, *Danyang wenshi ziliao diyiji* 丹阳文史资料第一辑 [*Danyang Historical and Cultural Materials, Volume 1*], Danyang, 1984, p. 128.

with a bovine's breed, or ability to work. Merchants could also profit from self-serving interpretations of an animal's physique. In one devious example, a cattle broker would inform a seller that his ox's sunken chest portended grave misfortune. Illustrating the point with the rhyming couplet "Sunken chest, sunken chest, the family goes bankrupt and everyone dies 落膛落膛, 家破人亡," the broker acquired the supposedly accursed animal at a discount. He would then entice potential buyers with another catchy rhyme: "Sunken chest, sunken chest, lots of wealth and heirs 落膛落膛, 丁财两旺." The suitably impressed buyer happily paid a premium for this providential creature.⁴⁸³

Such hornswoggling exemplified the struggle for advantage between ill-informed customers and crafty merchants. Yet these unorthodox appraisals seemed inadequate as the state took a greater interest in evaluating the quality and worth of draft animals by examining their behavior and physiques. In a battle-damaged nation striving to industrialize, the robustness of the draft animal work force was too important to leave in the hands of gullible farmers and imaginative brokers. The problem became particularly acute when the state assumed part of the risk of insuring draft livestock. A more transparent, objective, and empirically-based evaluation system would help to select suitable stock for raising and breeding. These were animals whose bodies and behavior marked them as worthy of the considerable investments of time, labor, and fodder that a working bovine demanded. Moreover, systematic evaluations of draft animals could reveal those individuals most suited to reproduce, while allowing humans to cull or castrate less-deserving bovines. In this way, bovine pricing and insurance integrate the

⁴⁸³ Ibid., p. 129.

three historical lenses I have proposed. When humans closely **observed** draft animals in pursuit of their **instrumental** ends of labor and meat, they inevitably affected the **experiences** of these beasts. For draft animals, the scrutiny that accompanied their integration into national markets and political agendas was a matter of life and death.

As it promoted national livestock insurance, the new Communist government sought more objective, standardized measures of assessing value. Applying state-sanctioned quantitative rigor to the pricing of livestock, the livestock experts Cui Mainong 崔邁農 and Wu Xinfu 吳信法 devised evaluation tables [Appendix 1]. Their instructions explain that these charts were best for assessing the labor potential of animals, rather than their productive capacity, i.e. their ability to yield beef, milk, or leather. Two separate examiners were to assign points based on how closely an ox or water buffalo conformed to certain ideal types of physique and temperament. To emphasize the relative importance of traits, and to facilitate comparisons across categories, Cui and Wu used a weighted point system. At six points, a “straight, vigorous, and flexible” gait was worth three times as much as “large, bright” eyes. A “tame, resolute, mild” disposition counted for the same three points as a “short, broad, straight” back.⁴⁸⁴ Humans who used this system to observe and evaluate the physical traits of bovines could select individuals with a high instrumental value.

The authors explicitly connected the objective evaluation of bovines to the need for selective breeding. People could use the grading system to cull “old, weak, lame, sick,

⁴⁸⁴ Cui Mainong 崔邁農, ed., Wu Xinfu 吳信法, rev.; Gengniu Baohufa 耕牛保護法 [*Methods for Protecting Draft Oxen*], 上海畜牧獸醫出版社, Shanghai Livestock Veterinary Publishing House, 1951, pp. 59-60 [Rare book collection of Shanghai Library]

or incapable 低能 oxen, and to better protect healthy and fertile oxen, to ensure that the number and quality of future draft oxen are in keeping with our ideal.” Only “large-scale breeding of superior cattle,” combined with scientific feeding and management, could satisfy the nation’s needs. Otherwise, suggested the authors, “we waste a great deal of labor and fodder without getting oxen that are good for breeding and plowing, which is not economical.”⁴⁸⁵

The scoring system had both beneficial and harmful implications for farmers. Evaluation tables could bring clarity and objectivity to the pricing of draft animals. Ominous coat markings and misleading proverbs had no place in this system. Only traits that affected the robustness and working ability of the animals appeared on the scorecard. The system thus benefitted farmers, who could get fair prices for hearty cattle. At the same time, the state could be assured that its livestock insurance and loans to farmers for cattle purchases were directed at animals with relevant attributes of strength and good health.

Yet despite its apparently rigorous and scientific assessment of value, the system encouraged farmers and breeders to disregard some hard-earned attributes of bovines. Many observers, remarking on the dizzying variety of bovine subspecies in China, noted that farmers sometimes traded physical robustness for less visible but equally essential traits. These included resistance to endemic disease, the ability to withstand local climates, and the capacity to digest locally available food sources. A scoring system based on ideal, universal body types necessarily overlooked much granular local

⁴⁸⁵ Ibid., p. 44.

knowledge about which animals were best suited for particular regions. By asserting their superior ability to discern the value of bovines, state livestock experts encouraged the breeding of animals who, perversely, were less fit than their smaller, scrappier, more genetically diverse counterparts.

State-guided sexual selection for ideal high-performing or high-yielding types most valuable to humans was exclusive neither to China, nor to bovines, nor even to animals. In the early twentieth century, states including Germany, Italy, and Portugal “materialize[d] fascist ideology” by selectively breeding new varieties of wheat, potatoes, pigs, and sheep.⁴⁸⁶ In Europe and North America, urban market demand and improved knowledge of genetics promoted standardized animals at the expense of “hundreds of native types of livestock...each uniquely appropriate to its people and place.”⁴⁸⁷ Chapter 6 on reproductive practices and artificial selection will examine this phenomenon in greater detail. For now, it is enough to note that the government’s understandable attempts at objectivity and accuracy in assigning value to bovine bodies had potentially harmful effects not only for farmers, brokers, and breeders, but also the animals themselves.

Haste Makes Waste

⁴⁸⁶ Tiago Saraiva, *Fascist Pigs: Technoscientific Organisms and the History of Fascism*, Cambridge, Massachusetts: The MIT Press, 2016, p. 3.

⁴⁸⁷ Janet Vorwald Dohner, *The Encyclopedia of Historic and Endangered Livestock and Poultry Breeds*, New Haven: Yale University Press, 2001, p.3.

In its first two years, the Communist government emulated the KMT's cautious and strategic style of insurance assessment. During the rollout in Hunan Province in 1951, district-level evaluation committees included model workers, primary school principals, and farm association chairmen 农协主席.⁴⁸⁸ In insurance trials in Hebei Province, oxen were assessed by “democratic appraisal,” while two counties in northern Jiangsu Province formed appraisal committees of eleven to thirteen members, including “cattle brokers, old farmers with experience raising oxen, local worthies 地方公正人士, model workers, and township cadres.”⁴⁸⁹ These groups could ground their appraisals in the expertise of their diverse membership. The participation of prominent authority figures also helped to allay the concerns of farmers unfamiliar with livestock insurance. Finally, large committees could provide a measure of oversight by ruling out animals with pre-existing conditions. Otherwise, cadres could satisfy their quotas by uncritically issuing insurance for even the wobbliest oxen, while farmers would benefit by overvaluing sick animals for whose death the government would issue compensation. Local gazetteers suggest that the process worked well. Thanks to livestock insurance, said one farmer in northern Jiangsu, “I don't have to worry about cattle plague, and I can

⁴⁸⁸Zhou Xucai, ed. 周旭才, *Xiangxiang Jinrongzhi* 湘乡金融志 [*Financial Gazetteer of Xiangxiang*] Hunan Sheng Xiangtanshi Xiangxiangshi 湖南省湘潭市湘乡市, 1991 p. 165.

⁴⁸⁹ For Hebei, see Liu Dongdu, ed. 刘东都, *Hebeisheng Baoxian zhi* 河北省保险志 [*Insurance Gazetteer of Hebei Province*], Hebei kexue jishu chubanshe 河北科学技术出版社, 1990, p. 132. For Subei, see Rong Jingyu, Hua Mengyu, eds. 戎敬如; 华梦渔, *Yangzhou Jinrong zhi* 扬州金融志 [*Financial Gazetteer of Yangzhou*], Zhongguo Jinrong Chubanshe 中国金融出版社 1996, p. 362.

produce confidently.”⁴⁹⁰ This cautious, transparent process of evaluating animals’ fitness and worth might have laid a stable foundation for reliable, fair coverage.

Unfortunately for mutually reliant farmers and cattle, this labor-intensive system of insurance assessment was short-lived. In 1952, the People’s Insurance Company of China [hereafter called by its Chinese abbreviation, Renbao 人保] issued a “universal livestock insurance” directive calling for a 25% nationwide increase in coverage, equivalent to 12.5 million animals.⁴⁹¹ This abrupt and apparently arbitrary expansion encouraged cadres to use increasingly coercive methods to make farmers buy insurance. Due to “inadequate propaganda,” explained a Zhejiang gazetteer, some insurance cadres resorted to “commandism.” In such cases, People’s Militia blocked the doors while farmers held “exhaustion meetings,” from which farmers escaped by purchasing insurance.⁴⁹² Accusing reluctant farmers of mistrusting the government, cadres resorted to “extended meetings, posting guards at the door, holding mandatory study sessions, and not allowing people to leave until they purchased insurance.”⁴⁹³ Farmers who refused to buy insurance were condemned as “unpatriotic Taiwanese cattle” 不保险，不爱国，是

⁴⁹⁰ Rong Jingyu, Hua Mengyu, eds. 戎敬如;华梦渔, Yangzhou Jinrong zhi 扬州金融志 [*Financial Gazetteer of Yangzhou*], Zhongguo Jinrong Chubanshe 中国金融出版社 1996, p. 362.

⁴⁹¹ Anhui 农业保险第三章, p123.

⁴⁹² *Zhejiang gazetteer*, Nongye baoxian 农业保险 [“Agricultural Insurance”] p.213.

⁴⁹³ Tuo Guozhu, Wang Guojun 庾国柱, 王国军, Zhongguo nongye baoxian yu nongcun shehui baozhang zhidu yanjiu 中国农业保险与农村社会保障制度研究 [*Research on China’s agricultural insurance and village social welfare systems*] Beijing: Shoudu Jingji Maoyi Daxue chubanshe 首都经济贸易大学出版社, 2002, p.47.

台湾牛。⁴⁹⁴ Many felt that they were being dunned for “ox donations,” and there was a great deal of complaining and quarreling.⁴⁹⁵

In addition to straining the relationship between farmers and government agents, the rapid expansion of livestock insurance imperiled the finances of the program. To satisfy their quotas, insurance cadres frequently sold coverage to insolvent farmers. For instance, in response to Renbao’s 1952 universal coverage directive, the cities of Handan and Shijiazhuang in Hebei Province called for mandatory livestock insurance, and 900,000 cattle were covered by early 1953. But as a local gazetteer explains, farmers were in arrears to the tune of over one million yuan for the years 1951-1952, which “severely affected the accumulation and circulation of the insurance funds.”⁴⁹⁶ In October 1951, farmers in Jiangsu Province’s county of Wujin owed 80% of the premiums on their 13,000 insured cattle.⁴⁹⁷ In the same province, Yangzhou farmers owed more than 70,000 yuan in unpaid insurance fees.⁴⁹⁸

Not only were farmers failing to pay their premiums, but the animals they insured were often of marginal quality. An article explaining the central government’s decision to halt livestock insurance in 1953 noted that “insurance is different from aid, and it comes

⁴⁹⁴ Zhejiang gazetteer, 农业保险 p.213

⁴⁹⁵ Zhejiang gazetteer, 农业保险 p.213

⁴⁹⁶ Liu Dongdu 刘东都, Hebeisheng baoxian zhi 河北省保险志 [*Insurance Gazetteer of Hebei Province*], Hebei kexue jishu chubanshe 河北科学技术出版社, 1990, p. 132

⁴⁹⁷ Yang Ruiying 杨瑞英; Yang Hanlin 杨汉霖, eds., Wujin nongcun jinrong zhi (Jiangsusheng Changzhoushi Wujin qu) 武进农村金融志 (江苏省常州市武进区) [*Wujin Village Finance Gazetteer (Wujin District, Changzhou Municipality, Jiangsu Province)*], 中国农业武进县运行修志领导小组, p.93.

⁴⁹⁸ Rong Jingyu, Hua Mengyu, eds. 戎敬如; 华梦渔, Yangzhou jinrong zhi 扬州金融志 [*Yangzhou Finance Gazetteer*], 中国金融出版社 1996, p. 362.

with conditions.”⁴⁹⁹ Only healthy draft animals were supposed to be insured, but “old, sick, and weak” animals were very common in the countryside. Farmers wanted coverage for such beasts, “but they are precisely the ones that do not meet our standards.”

Nevertheless, due to “bureaucratism and the blind pursuit of quotas,” some areas had expanded coverage to even these animals, which increased the death rate and, hence, the cost of the program.⁵⁰⁰ Several years earlier, observers like Ye Junfa had optimistically predicted that livestock insurance would “guarantee the life and safety” of draft animals, while also increasing their quality and quantity.⁵⁰¹ Clearly the program had fallen far short of its goals.

Much of the difficulty was due to the inability of both farmers and cadres to understand and implement the abstract investment vehicle of insurance, “which cannot be seen or touched.”⁵⁰² As ill-informed cadres peddled insurance to confused and suspicious farmers, mistakes and abuses were inevitable. In many cases, “procedures were messy, accounts were unclear, debts were heavy,” and compensation was excessive, or paid to the wrong party.⁵⁰³ By early 1953, a national finance journal reported that cadres were using “crude methods” to promote livestock insurance. In some places, farmers were even killed, “which has turned something good into something bad.”⁵⁰⁴ A program with

⁴⁹⁹No author. Bixu zuohao nongcun baoxian jieshu gongzuo 必须做好农村保险结束工作 [“Village insurance must be ended well”] *Zhongguo Jinrong* 中国金融 [*China's Finance*] 1953 年 14 期

⁵⁰⁰*Ibid.*

⁵⁰¹Ye Junfa 叶骏发, Shenme shi gengniu baoxian 什么是耕牛保险 [“What is Draft Ox Insurance?”], *Nongye Shengchan* 农业生产 [*Agricultural Production*] Volume 5, Issue 6, 1950, p. 13-14.

⁵⁰²Tuo Guozhu, Wang Guojun, *Research on China's agricultural insurance and village social welfare systems*, p.47.

⁵⁰³Luo Yan 罗艳, Xin Zhongguo nongye baoxian de lishi yanbian 新中国农业保险的历史演变 [“Historical evolution of agricultural insurance in New China”] *Beijing Dangshi* 北京党史 [*Beijing Party History*], April 2008, p.13-16.

⁵⁰⁴No author. Shelun: zai jinrong zhanxian shang zhankai jielu huai ren huaishi de douzheng

potential to improve the wellness of oxen, the financial security of farmers, and the productive foundation of the state instead gave rise to outrage and violence.

Anxious lower-level cadres, eager to satisfy their requirements, “stopped at nothing” in getting farmers to insure their animals. A report from eastern Sichuan Province urged the Ministry of Agriculture and Forestry and insurance companies to overcome “quota-ism and profit-seeking” 任务观点 / 营利观点.⁵⁰⁵ Baxi County had only fifteen thousand bovines, but was assigned an insurance quota of twenty-five thousand. Instead of premiums, some cadres confiscated the chickens and ducks that locals were planning to contribute to the Korean War effort. People therefore felt that they were paying a burdensome “insurance tax.”⁵⁰⁶ Reminiscing about his days selling draft animal insurance in a county near Chongqing, Wang Yonghong recalled that after half a month of propagandizing, some households sold their chickens, ducks, eggs, and grain to get the money for premiums.⁵⁰⁷ Tinted with nostalgia for his youthful adventures, Wang’s account dwells mainly on his idealism and excitement at taking part in an important

社論：在金融战线上展开揭露坏人坏事的斗争 [“Comment: the struggle to expose bad deeds and bad people on the front line of finance”], *Zhongguo Jinrong* 中国金融 [*Chinese Finance*] Issue 5, 1953, p.1.

⁵⁰⁵ Xinanqu sannianlai chumu shouyi gongzuo qingkuang (1952) 西南区三年来畜牧兽医工作情况(1952) G128-3-218 [“Working conditions in livestock veterinary medicine in Southwest China over the past three years (1952) G128-3-218”] in *Zhongguo Shehui Kexueyuan, Zhongyang Dang’anguan* 中国社会科学院, 中央档案馆 [Chinese Academy of Social Sciences, Central Archives] *Zhonghua Renmin Gongheguo jingji dang’an ziliao xuanbian nongye juan 1949-1952*, 中华人民共和国 经济档案资料选编农业卷 1949-1952 [*Selections from the economic archives of the PRC, 1949-1952*], Shehui Kexue Wenxian chubanshe 社会科学文献出版社 Beijing, 1991, pp. 791.

⁵⁰⁶ *Ibid.*

⁵⁰⁷ Wang Yonghong 王永宏, Huiyi 50 niandai de gengniu baoxian 回忆 50 年代的耕牛保险 [“Remembering the Draft Ox Insurance of the 1950s”] *Zhongguo baoxian* 中国保险 [*Chinese Insurance*] Issue 10, 1999, p. 21.

national project. Nevertheless, the browbeating, coercion, and liquidation of farm assets to buy insurance did not endear the program to many farmers.

Disorderly administration reduced the utility of the insurance program for farmers and the state, while also endangering cattle. In one “especially severe” county in northern Sichuan, 1,700 draft cattle died between July 1951 and March 1952. These animals accounted for 68% of the area’s insured cattle, and compensation for their deaths excluded collected premiums by over 1.7 million (old) RMB.⁵⁰⁸ The program was even less sustainable the following year, when 85% of insured cattle died in Sichuan province’s Yingshan county. In just one hundred days, the county paid out over 48 million RMB to compensate owners of insured cattle.⁵⁰⁹ In nearby Guangxi province, the government paid out eleven billion RMB for the deaths of over 40,000 draft animals between 1950-1953.⁵¹⁰ The author of an internal Party report on the problem noted that, having subsidized twenty percent of the compensation, the national government’s losses were equivalent to ten million *jin* [six million kg] of rice.⁵¹¹ In seven regions surveyed by the Guangxi branch of Renbao, the death rates for cattle in areas with insurance was 4.2%, while for uninsured areas it was just 1.7%. Far from lowering draft animal

⁵⁰⁸ Neibu Cankao 內部參考[Internal Reference] No author. Xinan bufen diqu gengniu baoxian gongzuo cunzai chayi, nongmin duiyi biaoqian niu aihu bugou gengniu siwang shenduo 西南部分地區耕牛保險工作存在偏差，農民對已表現牛愛護不夠耕牛死亡甚多 [“Deviations in cattle insurance in some places in the Southwest; Farmers’ inadequate care of insured cattle has led to many draft cattle deaths,”], August 3, 1952, pp. 35-36 [Collection of CUHK]

⁵⁰⁹ Neibu Cankao 內部參考[Internal Reference] No author, Sichuansheng gedi gengniu siwang qingkuang yanzhong 四川省各地耕牛死亡情況嚴重 [“Many draft cattle deaths throughout Sichuan”] April 2, 1953 [Collection of CUHK].

⁵¹⁰ Neibu Cankao 內部參考[Internal Reference] Yuan Xiaowan 袁肖婉 Guangxi baoxian gongsi qiangpo nongmin baoxian gengniu suo zaocheng de eguo 廣西保險公司強迫農民保險耕牛所造成的惡果 [“Unfortunate effects of insurance company’s compulsory insurance of draft cattle in Guangxi], May 11, 1953 [Collection of CUHK].

⁵¹¹ Ibid.

mortality rates, the insurance program seemed to raise them. Furthermore, by underwriting these losses, the state was hemorrhaging cash. Something had gone terribly wrong. But what?

Thousands of oxen were bearing the brunt of a phenomenon known as moral hazard, or “the lack of incentive to avoid risk where there is protection against its consequences, e.g. by insurance.”⁵¹² Before the insurance program, when farmers were wholly responsible for their animals, it was unreasonable to kill or overwork an able-bodied ox. But now, the prospect of a government payout tempted some farmers to push their animals past safe limits. Farmers near the city of Yangzhou in Jiangsu Province “relied excessively on insurance.” In one township, when an old, exhausted ox was unable to keep working, its owner burned its hindquarters with a candle to induce it to plow a field. When the weary animal died, the owner sought compensation from the insurance company.⁵¹³ The author of a confidential report for top leaders explained that many farmers killed or maimed their insured oxen and then sought compensation.⁵¹⁴ In Guangxi’s Liuzhou prefecture, a “backward peasant” seeking fraudulent payouts maimed three insured oxen in a row, and was discovered only after his neighbors turned him in. The author of a confidential report lamented that this tactic was widespread, 層出不窮. Some farmers were muttering that “The insurance company is a piece of candy— whoever eats it will be compensated 保險公司是塊糖，誰吃誰來嘗/償.”⁵¹⁵

⁵¹² “Moral Hazard,” *Oxford English Dictionary*, [Accessed February 5, 2018 at <http://www.oed.com/view/Entry/122086?redirectedFrom=moral+hazard+#eid36035063>]

⁵¹³ Rong Jingyu, Hua Mengyu, eds. 戎敬如; 华梦渔, 扬州金融志, 中国金融出版社 1996, p. 363.

⁵¹⁴ Internal Reference, “Many draft cattle deaths throughout Sichuan,” April 2, 1953.

⁵¹⁵ Internal Reference, Yuan Xiaowan, 袁肖婉, “Unfortunate effects,” May 11, 1953.

Although millions of draft animals nationwide had insurance coverage, the unsustainable finances of the program drove the government to end livestock insurance in early 1953. The retrenchment coincided with the CCP's Three Antis 三反 campaign, an attempt to rectify "bureaucratism, commandism, and violations of law and discipline."⁵¹⁶ Feeling enormous pressure to meet their quotas for introducing new seeds and planting techniques, and for insuring draft animals, "basic-level cadres were encouraged both to use commandism in dealing with the people and to file false reports about accomplishments."⁵¹⁷ This ham-handed approach to public policy harmed all stakeholders: farmers, cattle, and the national government.

Several factors explain the dramatic and ultimately self-defeating urgency of livestock insurance expansion in the early years of the PRC. At the individual level, cadres were demonstrating "metric fixation." This common administrative malfunction involves replacing "judgment, acquired by personal experience and talent, with numerical indicators of comparative performance based upon standardized data (metrics)."⁵¹⁸ Rushing to extend coverage to all draft animals, insurance cadres overlooked the detailed data that make insurance feasible. Assessment committees of experienced farmers, cattle brokers, and trusted community elders gave way to frantic and coercive mass meetings, led by overbearing cadres backed by the People's Militia. Especially considering the paucity of actuarial data for calibrating premiums and payouts, a sustainable insurance program demanded careful evaluation of the animals' age, health, and working capacity,

⁵¹⁶ Harry Harding, *Organizing China: The Problem of Bureaucracy, 1949-1976*. Stanford, CA: Stanford University Press, 1981, p. 55.

⁵¹⁷ Ibid.

⁵¹⁸ Jerry Z. Muller, *The Tyranny of Metrics*, Princeton: Princeton University Press, 2018, p.18.

and of the farmers' ability to pay. Instead, demonstrating their metric fixation by “measuring the most easily measurable” and “measuring inputs rather than outcomes,” the overzealous cadres inflated insurance enrollment numbers and doomed the program to failure.⁵¹⁹

Earmarking collected premiums for other animal husbandry projects lent further urgency to the insurance rollout. The Suzhou branch of Renbao used some of the collected premiums to subsidize “hygienic epidemic prevention stations” to provide draft ox inoculations.⁵²⁰ Starting in 1952, fifteen percent of collected premiums were given to “the competent agricultural authorities 農業主管部門” as subsidies for immunization, and for propaganda to promote “improved feeding, encouraging farmers not to overwork their animals, and telling them to store up fodder for the winter.”⁵²¹ Using premiums to support chronically underfunded livestock management programs was a rational choice. Expanding vaccination coverage and improving farmers' husbandry methods would help reduce the need for insurance payouts in the long term. Still, turning livestock insurance premiums into a revenue stream for other programs put pressure on cadres to keep enrollment numbers rising.

⁵¹⁹ Muller, *The Tyranny of Metrics*, p.23.

⁵²⁰ Suzhou Baoxian zhi (1905-2005) 苏州保险志 (1905-2005) [*Suzhou Insurance Gazetteer (1905-2005)*], p.132.

⁵²¹ Du Zijie 杜子杰 Nongye baoxian de fazhan qingkuang yu wenti 农业保险的发展情况与问题 [“The development and problems of agricultural insurance”] *Zhongguo Jinrong 中國金融 Chinese Finance*, Issue 1, 1953, p.6.

Risk Sharing: Too Much of a Good Thing?

Chastened by the earlier collapse of the program, and spurred by popular demand for coverage, the government re-introduced livestock insurance in late 1956. Zhang Shoushen 张守身 of the Luyi County insurance office in Henan Province explained his successful use of a more cautious and persuasive approach to selling livestock insurance. Because “farmers are always most concerned with increases or decreases in their income,” Zhang suggested that insurance cadres should make their case by showing how the loss of a healthy bovine would affect farm yields. To maintain the fiscal stability of the program, Zhang urged cadres to collect premiums promptly, and not to allow farmers to go into arrears. To keep the quality of insured animals high, Zhang proposed assessment committees of five to seven members, including agricultural co-op heads, livestock feeders and brokers, veterinarians, and insurance workers. Furthermore, the insurers should ask the feeders about the age, health, and “special characteristics” of the livestock in each production brigade, so that the evaluation committee would have a sense of their fitness. Zhang urged cadres not to insure animals under one year of age, or those that were “old, scrawny, weak, ill, or whose value is about the same dead or alive.” In short, animals should be priced at approximately their market value. In addition to frequent public announcements, and large character posters promoting livestock insurance, some of the old high-pressure sales tactics remained in use. Zhang suggested making sales pitches “when coop members are eating or resting...or during idle moments

in mass meetings.”⁵²² Still, by comparison with the early 1950s, this was a more patient and less coercive approach to using collective resources as a bulwark against individual disaster.

Softer sales tactics notwithstanding, the advanced producer cooperatives of the mid-1950s undermined the appeal of livestock insurance by allowing farmers to share assets and risks. Hui Sizong 惠思宗 of the Gansu Province branch of Renbao explained the “contradiction” that arose from cooperativization. At first glance, cooperatives made livestock insurance more affordable and attractive. Because some households had no animals, sharing the cost of premiums reduced the burden on each member household. In Gansu, the premiums accounted for only 3.6-7.7% of a cooperative’s total income, so insurance was financially feasible for most. But in the absence of a major epidemic or natural disaster, livestock insurance held little appeal for large cooperatives with plenty of draft animals and fodder. These large co-ops “do not have many animals that die, but they pay a lot in premiums.” Before cooperatives, explained Hui, an individual farmer might pay 5 yuan to insure a single donkey worth 100 yuan. If the animal died, he would come out ahead. By contrast, it was “highly unlikely” for a prosperous cooperative that paid 500 RMB in premiums on 100 donkeys to lose enough animals to recover its insurance investment. Meanwhile, the cooperative could have used the 500 RMB premium to purchase five more donkeys. Making matters worse, Hui added that “real

⁵²² Zhang Shoushen 张守身, Xizhi shenru de shengchu baoxian gongzuo 细致深入的牲畜保险工作 [“Meticulous and thorough livestock insurance work”] *Caizheng Finance*, Issue 12, 1957, p.24-25.

world experience” showed that areas with few livestock, small cooperatives, and high death rates had the greatest demand for insurance.⁵²³

Although Hui did not use the term, he was describing what economists call adverse selection. Prosperous, well-managed cooperatives with the least need for livestock insurance declined to buy it. Poorer, more precarious cooperatives, on the other hand, had the greatest need for coverage and compensation. Such imbalances can induce the dreaded “death spiral,” familiar to Americans from the heated debates surrounding the Affordable Care Act.⁵²⁴ Unable to collect from low-risk patients, and obliged to pay compensation to those at greatest risk, the insurer’s reserve fund shrinks and premiums rise. For humans and draft animals, the collapse of the insurance system generally reduces aggregate welfare.

Whereas shoddy administration had fatally undermined the livestock insurance of the early 1950s, the program within a few years had become a victim of its own success. Mandatory vaccination for insured animals contributed to the nationwide eradication of rinderpest by 1957, as described in Chapter 2. Yet without the threat of this virulent and lethal disease, which could devastate a county in a few weeks, the cooperatives saw less benefit to insurance. Other bovine diseases, such as brucellosis and anthrax, lingered throughout this period. But government veterinary technicians, teaching farmers to properly feed and house their livestock in order to reduce the need for insurance claims,

⁵²³ Hui Sizong 惠思宗, *Dui dangqian shengchu baoxian de yijian* 對當前牲畜保險的意見 [“Some thoughts on the current state of livestock insurance”] *Caizheng* 財政 *Finance*, Issue 11, 1957, p.21-22.

⁵²⁴ Cf. Scott Horsely, “Senate Republicans Alter Health Care Bill To Avoid ‘Death Spiral,’” *NPR*, June 26, 2017. [Accessed January 29, 2019 at <https://www.npr.org/2017/06/26/534428929/senate-republicans-alter-health-care-bill-to-avoid-so-called-death-spiral>].

had reduced the animals' risk of death from such pathogens. For many cooperatives, the threats simply did not justify spending limited funds on insurance. Hui Sizong observed that "the point of livestock insurance is not to mitigate the damage of a normal-sized disaster, but to compensate for losses due to exceptionally large disasters." With some exasperation, Hui added that although such disasters are infrequent, "this does not mean that they never happen."⁵²⁵ By hesitating to insure their herds, the large cooperatives were leaving themselves vulnerable to a devastating albeit unlikely outbreak, while also depriving the insurance reserve fund of money that could help less affluent cooperatives to survive the loss of much-needed draft animals.

By dispersing risk across an even larger community, the rapid formation of communes during the Great Leap Forward further reduced the appeal of draft animal insurance. By the end of 1958, over 99% of farm households were consolidated into vast People's Communes, each consisting of approximately twenty to thirty advanced producer cooperatives.⁵²⁶ Although commune members had even less appetite for livestock insurance than cooperatives, the national and local governments continued to expand the program. In May 1958, "D" County in Jiangsu Province was hurriedly recruiting minimally-qualified livestock insurance agents for each township. Credentials included "a certain level of education and work ability," a clean political record, and "enthusiasm for the project of national insurance."⁵²⁷ Two months later, the "D" County

⁵²⁵ Hui Sizong, "Some thoughts on the current state of livestock insurance," p.21-22.

⁵²⁶ Alexander Eckstein, *China's Economic Revolution*, Binghamton, NY: Cambridge University Press, 1977, p.72.

⁵²⁷ D- xian renmin weiyuanhui 县人民委员会 [D-County People's Committee] Wei kaiban nongcun shengchu baoxian xishou baoxian fuwuyuan de tongzhi 为开办农村牲畜保险吸收保险服务员的通知 [Notification on launching village livestock insurance and drawing in insurance personnel], File 00446,

CCP committee sighed, “People are not yet accustomed to using livestock insurance, so it will take some leadership and education to persuade them.” Still, popular acquiescence was paramount: to forestall the recurrence of formalism and commandism, cadres should allow those who wanted insurance to buy it, without forcing it on those who declined.⁵²⁸ Oddly, in the same document, the committee claimed that farmers had a “very deep impression of insurance” from the successful rollout of recent years, which would be beneficial for the present promotion.⁵²⁹ What was going on?

Contra the Party committee, it is unlikely that commune farmers were hesitating to purchase livestock insurance simply because they were unaccustomed to it. It is more plausible that farmers and cadres responded to the rapid changes in property ownership of the past decade, the dilution of their financial exposure to the death of an animal, and the eradication of cattle plague by declining to spend funds on livestock insurance. The same “tragedy of the commons” that motivated many farmers to overwork collective draft animals as seen in Chapter 3 also made livestock coverage less urgent. A lame, sick, or dead ox was someone else’s problem.

Even more troubling for the livestock insurance program was widespread draft animal mortality during the early months of the Great Leap. Data from the eastern city of

page 18 in Zhonggong XX xian Shenzao Renmin Gongshe weiyuanhui 中共 XX 县沈灶人民公社委员会 [CCP XX county Shenzao People’s Commune Committee] February 1958, [Zhang Letian collection of Fudan University---anonymized place name].

⁵²⁸ D-xian renmin weiyuanhui D 县人民委员会 [D-County People’s Committee] Guanyu pizhuan baoxian gongsi zai quanxian kaiban shengzhu、耕牛公民财产保险工作计划的通知 [Forwarding the insurance company’s notification about plans to launch insurance for public hog and draft oxen] July 7, 1958, page 43 in Zhonggong XX xian Shenzao Renmin Gongshe weiyuanhui 中共 XX 县沈灶人民公社委员会 [CCP XX county Shenzao People’s Commune Committee] February 1958, [Zhang Letian collection of Fudan University---anonymized place name]

⁵²⁹ Ibid., p. 43.

Ningbo in Zhejiang Province show fluctuations in the local draft animal insurance program's finances [Table 4.2]. Two sharp spikes in the ratio of compensation payments to collected revenues, in 1953 and 1958, illustrate fateful malfunctions. As we have seen, due to maladministration and fraud during the early years of the PRC, the national government ended the program in 1953. After a brief hiatus, coverage resumed in 1956. By the end of that year, over 120,000 bovines, representing 80% of the eligible draft animal population, had coverage.⁵³⁰ But in 1958, nearly three fifths of collected premiums were returned to insurance policy holders in the form of compensation for dead animals. In Zhejiang Province as a whole, compensation payments amounted to 56% of collected premiums by the end of March, 1958.⁵³¹ Data from Suzhou show similar trends [Table 4.3]. Compensation for dead animals reached a hefty 95% of collected premiums in 1957, and 44% in 1958.⁵³² In November 1958, the national government ended this unsustainable program.

⁵³⁰ Ma Jun, Heyifen, Sun Jingde, eds. 马骏, 贺绎奋, 孙景德. *Ningbo Jinrong zhi di'er juan* 宁波金融志 第二卷 [Ningbo Finance Gazetteer, Volume 2], Fangzhi Press 方志出版社 2006, p. 483.

⁵³¹ He Baifan, Yang Shaohai, He Wenjiong, eds. 何柏帆, 杨绍海, 何文炯. *Zhejiangsheng Baoxian Zhi* 浙江省保险志 [Zhejiang Province Insurance Gazetteer] Zhonghua Shuju 中华书局, 1999, p. 215.

⁵³² Xu Linnan 徐林南, *Suzhou baoxian zhi* 苏州保险志 *Suzhou Insurance Gazetteer*, Guangling Press 广陵书社, 2009, p.135.

Table 4.2: Ningbo Draft Ox Premium Income and Payout Expenditures, 1951-1958⁵³³

Year	Premiums collected 保费收入 (万元)	Compensation payments 赔款支出 (万元)	Compensation as percentage of collected premiums
1951	1.23		0%
1952	13.25	2.72	21%
1953	5.33	2.1	39%
1954	--	0.01	--
1955	--	--	--
1956	0.57	0.09	16%
1957	0.21	0.08	38%
1958	0.38	0.22	58%

Note: To facilitate comparison across time despite the currency reforms of the 1950s, I have added the fourth column based on the data in the original chart.

⁵³³ Data source: *Ningbo Finance Gazetteer*, p. 483.

Table 4.3: Suzhou Yearly Voluntary Livestock Insurance Premiums and Compensation, 1950-1958

Year	Premiums collected 保费收入 (元)	Compensation payments 赔款支出 (元)	Compensation as percentage of collected premiums
1950	--	--	--
1951	47036	717	2%
1952	46413	17956	39%
1953	19	2656	13978%
1954	--	--	--
1955	--	--	--
1956	11121	2757	25%
1957	6859	6548	95%
1958	10072	4407	44%

Data source: Xu Linnan 徐林南, *Suzhou Insurance Gazetteer*, 2009, p. 135. To facilitate comparison across time despite the currency reforms of the 1950s, I have added the fourth column based on the data in the original chart. The extremely high ratio in 1953 is a statistical artifact of payouts after the end of new enrollments early in the year.

Official accounts tend to blame the nationwide demise of livestock insurance on the extreme and naïve “leftist” ideology of unnamed officials. A Suzhou gazetteer, for instance, claims that in 1958, Renbao halted all coverage except compulsory travel insurance in the belief that “the rapid development of socialism and the universal establishment of People’s Communes meant that...the domestic insurance industry had

accomplished its historic mission.”⁵³⁴ A slightly more critical author suggests that “some people got carried away 有些人头脑发热” with leftist ideology, and felt that there was no longer any need for insurance.⁵³⁵ Overlooking numerous boondoggles, one comprehensive history of agricultural insurance concludes that the program’s eight-year “glorious period” ended in late 1958, when central government finance officials meeting in Wuhan decided to end domestic insurance operations. The authors characterize the subsequent 22 years as a time of “blankness and regret” in the development of Chinese insurance, before similar programs resumed during the Reform and Opening period.⁵³⁶

Even if the government not cancelled agricultural insurance in 1958, the Great Leap Forward would have wrecked the program within a few years. Ill-advised planting methods, botched construction of dams and irrigation channels, and confiscatory state grain purchases contributed to critical fodder shortages, as Chapter 5 on saliva will show. The country’s finances were inadequate to compensate farmers for large-scale draft animal mortality. Moreover, by simultaneously promoting draft animal insurance and rapid communization, the government put itself into the shaky position of paying compensation for animals whose value would soon collapse on account of the formation of People’s Communes. Economically rational farmers and cooperatives responded to this distorted market by killing many of their draft animals via neglect, overwork, or

⁵³⁴ Xu Linnan 徐林南, Suzhou baoxian zhi 苏州保险志 *Suzhou Insurance Gazetteer*, Guangling Press 广陵书社, 2009, p. 127.

⁵³⁵ Xie Jiazhi 谢家智, Zhongguo nongye baoxian fazhan yanjiu 中国农业保险发展研究 [*Research on the Development of China’s Agricultural Insurance*] Beijing: Kexue Press, 2009, p. 96.

⁵³⁶ Tuo Guozhu, Wang Guojun 庾国柱, 王国军, Zhongguo nongye baoxian yu nongcun shehui baozhang zhidu yanjiu 中国农业保险与农村社会保障制度研究 [*Research on China’s agricultural insurance and village social welfare systems*] Beijing: Shoudu Jingji Maoyi Daxue chubanshe 首都经济贸易大学出版社, 2002, p.47.

slaughter. In another manifestation of the One Health perspective on veterinary public health, large scale bovine death was also disastrous for farmers, and for the nation.

Chapter 5 Saliva: Bovine Consumers in the Energy Economy, 1935-1961

With each bite they took, bovines participated in the energy economy of mid-twentieth century China. Previous chapters have shown how humans extracted milk, meat, leather, and labor from cattle. Yet the animals were not only sources of resources and muscle power for humans. They were also consumers. From farmers to local officials to supreme leaders, the human counterparts of bovines tried to shape and satisfy the dietary needs and preferences of the animals. To produce more and stronger cattle, humans dramatically modified the nation's landscapes and experimented with a variety of feeding systems. These efforts initially helped to increase the bovine population, especially in previously under-grazed hinterlands. Yet while cattle benefitted from an expanding food supply, they suffered and died when officials mismanaged their feeding and diverted food energy to other groups of consumers.

Natural scientists have been quicker than historians to recognize nonhuman economies. The biologist Bernd Heinrich notes that economics, the study of politically- and technologically-mediated exchanges of resources and services, “has traditionally dealt only with the material welfare of mankind.”⁵³⁷ Yet Heinrich demonstrates that social animals such as bumblebees are participants in another economy, based on the collection, storage, and distribution of energy. He quotes the biologist E.O. Wilson's

⁵³⁷ Bernd Heinrich, *Bumblebee Economics*, Cambridge: Harvard University Press, 2004 [First edition 1979], p.2.

description of a social insect colony as “a factory constructed like a fortress,” which turns food energy into “virgin queens and males” while resisting the threats of predators and environmental challenges.⁵³⁸ With his pithy remark that “to bees, time is honey,” Heinrich suggests that this energy-rich food is the “currency” of a bee colony. As an imperishable, transferrable manifestation of sunlight and insect labor, honey “makes specialization possible, which improves colony efficiency.”⁵³⁹ As they collect pollen and produce honey, bumblebees balance costs and benefits in “making decisions that are crucial to their struggle to secure, and survive on, sometimes scarce resources.”⁵⁴⁰ Embedded in hierarchies of production, reproduction, and defense, with specialized roles and networks of exchange, and making decisions to optimize productivity, social animals are not so different from humans. This is not to anthropomorphize insects, but to acknowledge that people display the same kinds of behavior that social animals like bees have practiced since long before the appearance of *Homo sapiens*, to say nothing of our idealized avatar, *Homo economicus*.⁵⁴¹

Bovines, like bees, are social animals who participate in the energy economy alongside plants, people, and bacteria. What does it mean to call bovines “consumers” in the energy economy? Readers may balk at the term on the grounds that cattle do not spend money, or respond to advertising. The verb “to consume” originally connoted destruction, exhaustion, and waste. But in recent decades, “consumer” has largely

⁵³⁸ Heinrich, *Bumblebee Economics*, p.24.

⁵³⁹ Heinrich, *Bumblebee Economics*, p. xxv.

⁵⁴⁰ Heinrich, *Bumblebee Economics*, p. 3.

⁵⁴¹ Joseph Persky, “The Ethology of *Homo Economicus*,” *Journal of Economic Perspectives*, vol. 9, no. 2, Spring 1995, p. 221-231.

replaced “customer” in discussions of “the planning and attempted control of markets which is inherent in large-scale industrial capitalist (and state-capitalist) production.”⁵⁴² Rather than simply satisfying existing needs, economic planners in such systems (including mid-century China) aim to supply consumers with “the kinds and quantities of production which requ[ire] large investment at an early and often predictive stage.”⁵⁴³ This chapter shows how government planners made sizable long-term investments of human talent, capital, and land to meet the dietary needs of present and future bovine consumers.

A skeptic might argue that the true consumers were not bovines, but their human livestock keepers. To be sure, humans had considerable influence over the feeding of their cattle, and husbandry officials interacted directly with these caretakers, not the animals themselves. But bovines are not mindless grazing machines, devouring any plant they find. Palatability is a key attribute of ruminant feeds, and the eating process is not random. Cattle “take a series of decisions that will allow [them] to harvest the food effectively,” balancing factors such as the size and speed of their bites, their position in the pasture, and the type and portion of the plants they consume.⁵⁴⁴ Furthermore, state economic planners worked hard to induce farmers and herders to feed and care for bovines in ways that would yield the strongest, most productive animals. A typical handbook advised farmers to make rice and wheat stalks more nutritious and palatable for

⁵⁴² Raymond Williams, *Keywords: A Vocabulary of Culture and Society, Revised Edition*. New York: Oxford University Press, 1983 [1976].

⁵⁴³ Ibid.

⁵⁴⁴ D.M. Broom and A.F. Fraser, *Domestic Animal Behaviour and Welfare*, 4th edition, p.78. For grazing preferences, see Jack N. Reppert, “Forage Preference and Grazing Habits of Cattle at the Eastern Colorado Range Station” and R. Baumont, “Palatability and feeding behavior in ruminants. A review,” *Ann. Zootech* (1996) 45, p. 385-400 [Accessed at <https://hal.archives-ouvertes.fr/hal-00889572/document>].

animals by “fermenting, boiling, or alkalization.”⁵⁴⁵ Successive national governments imported forage crop seeds, promoted borderland grazing, and experimented with various feeding regimes not to satisfy the needs or wishes of their human subjects, but to meet the dietary requirements and preferences of bovine consumers.

Considering domesticated animals in symbiosis with humans helps to clarify the role of bovine metabolism in the energy economy. Because they constitute a group whose needs and preferences humans strive to satisfy, cattle and water buffalo meet the economic definition of “consumers.” Because they eat photosynthetic plants, bovines also meet the ecological definition of “consumers,” or organisms that feed on energy and nutrients stored in the tissues of other life-forms. Interwoven with human metabolism, domesticated draft animals are not only consumers, but also producers of muscle power and bodily tissues that nourish humans.

Bovine and human consumers often competed for access to the chief source of energy in rural China during the period of this study: sunlight stored in the leaves and stems of plants. **Figure 5.1** presents a working animal as an “energy conversion device.”⁵⁴⁶ Consisting largely of grasses or crop residues, the draft animal’s food “inputs” might otherwise be used as fuel for cooking or heating, or as building material. The animal’s “outputs,” meanwhile, are defined in terms of human agendas. The animal’s excrement was a potential source of fertilizer and fuel. The very notion of waste is not absolute, but specific to time, place, and species. Without humans, after all, an ox’s

⁵⁴⁵ 中华人民共和国农垦部办公厅编《跃进中的国营农牧场》[*Nationally Operated Livestock Farms during the Great Leap Forward*] 农业出版社出版[Agricultural Press], Beijing (May 1958), p.33

⁵⁴⁶ R. J. Fuller, L. Aye “Human and animal power—The forgotten renewables,” *Renewable Energy* 48 (2012), p. 330.

digestion and movement would be directed solely at survival and reproduction. Figure 5.1 depicts the bovine not merely as an isolated organism, but as a symbiote whose metabolism is dependent upon and valuable to another species, namely humanity. Like domesticated vegetables, livestock allow people to “funn[el] sunlight to human advantage.”⁵⁴⁷ But while he or she had real preferences and interests, the draft animal’s nutrition and welfare was instrumental to achieving human aims.

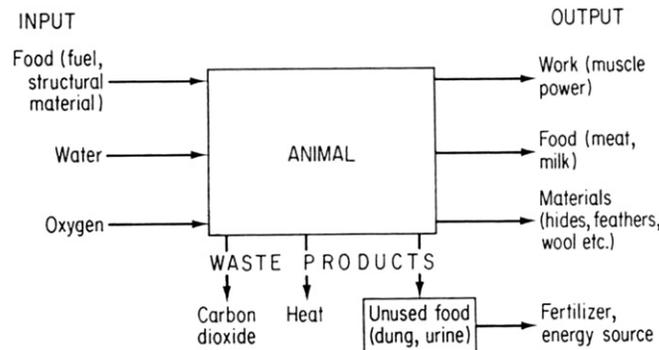


Figure 5.1: Input-output block diagram for working animals.⁵⁴⁸

By treating bovines as sentient, if unwitting, consumers in the energy economy, historians can ask how the Chinese revolution affected the welfare and security of all its participants. Previous chapters of this dissertation have treated bovines as patients and colleagues, two other terms customarily reserved for humans. Stretching the boundaries

⁵⁴⁷ Joe C. Truett, *Grass: In Search of Human Habitat*, University of California Press (2010), p. 113.

[Stable URL: <https://www.jstor.org/stable/10.1525/j.ctt1pngc9.18>]

⁵⁴⁸ R. J. Fuller, L. Aye, “Human and animal power—The forgotten renewables,” *Renewable Energy* 48 (2012), p. 330.

of these analytical categories to include nonhumans advances the argument that bovines were central participants, not passive bystanders, in the events and trends of mid-century China. Like human consumers, bovines have favorite foods and ways of eating, and can experience both the pleasure of satiety and the misery of starvation. Furthermore, the state used its statistical, logistical, and coercive apparatuses to maximize economic productivity by directing food resources to favored groups of human and bovine consumers.⁵⁴⁹ Our understanding of mid-century food availability can no longer omit the contentment of cattle nibbling freshly planted alfalfa on the loess plateau, or the despair of shivering, malnourished cows in People's Communes during the Great Leap Forward.

This chapter has three sections. The first demonstrates the similarities and continuities between Nationalist [Kuomintang, or KMT] and Chinese Communist Party [CCP] plans for expanding and intensifying cattle production on the country's western grasslands during and after the war against Japan. The second section shows how, after 1949, the People's Republic of China struggled to nurture and expand the national bovine population by establishing agricultural cooperatives and introducing new feeding systems. Political campaigns and class tensions during this period affected the welfare of both humans and their nonhuman symbiotes. The final section of the chapter analyzes bovine mortality during the famine of the Great Leap Forward, with particular attention to the roles of breed and location. Each section treats bovines as consumers with dietary preferences and requirements that human planners tried to satisfy, with varying levels of

⁵⁴⁹ For the GLF, see Felix Wemheuer, *Famine Politics in Maoist China and the Soviet Union*, "Chapter Four: Preventing Urban Famine by Starving the Countryside (1959-1962)," Yale University Press, 2014 [<https://www.jstor.org/stable/j.ctt1bhknwh.9>].

success. This human concern with bovine digestion was not altruistic, but pragmatic. Enriching the economy and defending the nation meant making the most of “wastelands” such as the northwest prairies, and “waste products” such as crop stalks and cow manure. This entailed raising more cattle, which in turn required expanding the scale and nutritional value of the country’s fodder and pasture supplies.

The previous chapter on livestock insurance drew attention to the intermingled agency of bovines, humans, and the rinderpest virus. This chapter, while focusing on the relationship between humans and cattle, introduces a new party: the bacteria in the bovine’s rumen, a complex digestive organ. Although microorganisms explicitly compelled neither their bovine hosts nor human owners to take specific actions, the microbes nevertheless encouraged these animals to do a great deal of work on their behalf. Gut bacteria, comprising what one scientist has dubbed “a fermentation factory,”⁵⁵⁰ allowed bovines and other ruminants to metabolize otherwise indigestible plant matter consisting of insoluble but energy-rich fibers such as cellulose. Abundant in manure, these microbes also fertilized the soil by converting atmospheric nitrogen into solid compounds from which plants could produce proteins, the building blocks of life. In short, the burbling stew of microflora in bovine rumens allowed humans to harness energy both from agricultural detritus such as corn stalks and sweet potato leaves, and from the vast grasslands of northern and western China. At the same time, bacterial digestion enriched soil, allowing for the intensification or expansion of farming which

⁵⁵⁰ W. R. Pritchard, “Increasing Protein Foods through Improving Animal Health,” *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 56, No. 2 (Aug. 15, 1966), p. 367.

would yield the next crop of grain. In feeding and promoting bovines, humans were also advancing the interests of the microbes in the animals' guts.

Wartime Grazing in the Western Hinterlands

By the end of 1939, the invading Japanese army had occupied much of the agricultural land of eastern China. Both the KMT and CCP governments-in-exile therefore took an interest in developing livestock husbandry in the hitherto sparsely populated mountains and prairies of the west. The Communists looked to the rolling hills of the Shaanxi-Gansu-Ningxia Border Region, while the Nationalists explored the grassy slopes of Yunnan, Guizhou, and Guangxi Provinces. These territories might support millions of bovines who could ameliorate the deficit of draft labor in other areas, or nourish the hungry workers of the nation's urban centers with their milk and meat. Just as American cattlemen of the previous century had viewed the Great Plains as a virtually unlimited source of "free grass," wartime and postwar Chinese leaders of both major political regimes saw huge, untapped potential in their nation's western hinterlands.⁵⁵¹

To increase their livestock populations, the KMT and CCP governments introduced new pasturage and promoted grazing in the underused periphery. In 1939, KMT officials in Fujian Province reckoned that hills and mountains in the western part of the province could provide materiel for the war against Japan and for national

⁵⁵¹ Ray H. Mattison, "The Hard Winter and the Range Cattle Business," *The Montana Magazine of History*, Volume 1, Number 4 (October 1951), p. 5. [Accessed at <https://www.jstor.org/stable/4515754>].

reconstruction following “ultimate victory.”⁵⁵² Calling the neglect of mountainous and unsettled areas “painfully regrettable,” officials promoted the cultivation of “all kinds of pasture grasses, green manures, grains, trees with special uses [e.g. tung oil] and erosion-preventing plants” in such places to “achieve the benefits of three-dimensional agriculture” 立體農業.⁵⁵³ With proper management and crop selection, areas that lacked the hydraulic infrastructure and flat terrain of two-dimensional farms could still yield valuable livestock and specialty goods. Two years later, from its exile in the wartime capital of Chongqing, the Nationalist Ministry of Agriculture and Forestry (MOAF) called for “raising cattle on fallow or abandoned lands to reduce the costs of production.”⁵⁵⁴ In Guangxi Province, the Department of Agriculture declared that “approximately 7,000,000 acres [2.8M ha] of ideal grazing land is entirely unstocked.”⁵⁵⁵ By 1942, the MOAF had undertaken surveys of livestock numbers in the provinces of Guangxi, Hunan, Guizhou, and Guangdong, while also carrying out experiments in pasture grass cultivation.⁵⁵⁶ The Japanese occupation of eastern China spurred Nationalist

⁵⁵² Fujiansheng nongye gaijin gongzuo baogao: shanhuang zhi liyong 福建省農業改進工作報告：山荒之利用，(福建省政府民國二十八年，中央黨史委員會庫藏油印本)[Report on Progress of Agricultural Improvement in Fujian Province: The usage of deserted mountains], in Qin Xiaoyi, ed. 秦孝儀 (主編者)，抗戰建國史料-農林建設 (一) [Historical Materials from the Anti-Japanese War and Founding of the Nation, volume 1], 裕台公司中華印刷廠 Taipei: Yutai Company, Zhonghua Printing, 1985, p. 147.

⁵⁵³ Ibid.

⁵⁵⁴ Fazhan chumu 發展畜牧 [“Develop husbandry”] Printed July 1941 in Chongqing (民國 30 年七月於陪都，農林部編印，民國三十年十月) in Ibid, p. 61.

⁵⁵⁵ No author, “Brief Outline of the Agricultural Rehabilitation Program—Kwangsi [Guangxi] Province,” UNRRA Archive, File S-0528-0010 UN Relief and Rehabilitation Administration (UNRRA Subject Files) no date, probably 1944.

⁵⁵⁶ Yumu zhidiaocha ji shiyan yanjiu, Xingzheng yuan guanyu nonglin gongzuo zhi baogao 漁牧之調查及實驗研究行政院關於農林工作之報告[Executive Yuan’s report on agriculture and forestry work: Investigation of fishery and animal husbandry and experimental research] in 秦孝儀 (主編者)，抗戰建國史料-農林建設 (一) [Historical Materials from the Anti-Japanese War and Founding of the Nation, volume 1], 裕台公司中華印刷廠 Taipei: Yutai Company, Zhonghua Printing, 1985, p. 84.

officials and scientists to increase the draft animal population of their remaining territories, both by putting ecologically marginal or sparsely populated regions into livestock production, and by breeding and introducing nutritious grasses.

In the Communist border region of northwestern China, no less a figure than Mao Zedong called for increasing pasturage to support more bovines. “The greatest enemies of livestock,” declared the Chairman, “are abundant diseases and insufficient grass.”⁵⁵⁷ Dependent on pack animal labor, salt transport was one of the main sideline businesses of the border region, employing an estimated 4,200 people by 1943.⁵⁵⁸ Grazing mostly on pasture, many pack animals fell ill due to the scarcity and poor quality of the grass. The lack of grass along shipping routes therefore “caused extreme hardship in recent years.”⁵⁵⁹ For this reason, Mao suggested widespread planting of alfalfa, especially along salt shipping routes. This would promote animal husbandry, while also providing a renewable food source for the cattle and donkeys who transported the valuable mineral.

Harsh winters posed a particular challenge to bovines in the Communist border region. In addition to planting alfalfa, cadres in eastern Gansu Province called for cutting mountain grasses and gathering the leaves of beans, melons, and mulberry. This way, animals would not starve when snow kept them from grazing.⁵⁶⁰ Mao himself noted that

⁵⁵⁷ Mao Zedong 毛澤東 *Jingji wenti yu caizheng wenti* 經濟問題與財政問題 [“Economic Problems and Fiscal Problems”] (n.d. but 1942), Mao Zedong Xuanji 毛澤東選集 [Selected Works of Mao Zedong] 東北書店版 Dongbei Shudian Press, p. 778-780, in *Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture*, Changjiang Wenyi Chubanshe 长江文艺出版社 Changjiang Wenyi Press, Wuhan, 2016, p. 71.

⁵⁵⁸ Peter Schran, *Guerilla Economy: The Development of the Shensi-Kansu-Ninghsia Border Region, 1937-1945*, Albany: SUNY Press, 1976, p. 114

⁵⁵⁹ Ibid.

⁵⁶⁰ Bianfu jianshe ting 边府建设厅 [Frontier Construction Office] 1943 nian nongye gongzuo zongjie 1943 年农业工作总结 [Agricultural Work Report for 1943] in *Zhongguo Caizheng Kexue Yanjiuyuan* 中国财

ample reserves of winter fodder helped livestock avoid falling ill by “eating cold grass,” 吃冷草 or grazing in the snow. Reserves also prevented farmers from selling off their livestock due to lack of fodder.⁵⁶¹ When nearly 70% of the 122,914 animals in eastern Gansu died in the winter of 1942, “the masses” regretted that “last year, the government wanted us to harvest grass, and we did not listen, and this year many animals died.”⁵⁶² The losses were “shocking” because the animals that died were adults, while the births “absolutely could not cancel out the deaths.”⁵⁶³ Gathering and storing fodder was troublesome and time-consuming work, yet critical if animals were to survive the unforgiving winters.

The deaths of some 50,000 sheep and 2,000 cattle and horses in northwestern Shaanxi’s Jingbian County 靖邊縣 during the early months of 1941 prompted the CCP to improve its winter grass supplies. Mao noted with approval that after so many animals starved, the “Jingbian comrades” used several methods to increase grass supplies: planting alfalfa, repairing “grass gardens” 草園 and harvesting fodder plants in autumn. In 1942, the locals repaired over 4,000 *mu* [approximately 267 ha] of grass gardens, each

政科学研究院 [Chinese Academy of Fiscal Sciences], Kangrizhan shiqi Shaan-Gan-Ning bianqu caizheng jingji shiliao zhaibian di'er bian nongye, 抗日战争时期陕甘宁边区财政经济史料摘编第二编农业 [Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture], Changjiang Wenyi Chubanshe 长江文艺出版社 Changjiang Wenyi Press, Wuhan, 2016, p. 84.

⁵⁶¹ Mao Zedong 毛澤東 Jingji wenti yu caizheng wenti 經濟問題與財政問題 [“Economic Problems and Fiscal Problems”] (n.d. but 1942), 毛澤東選集 [Selected Works of Mao Zedong] 東北書店版 Dongbei Shudian Press, p. 778-780 in Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture, p. 72.

⁵⁶² Longdong fenqu 1943 nian shangbannian jingji jianshe gongzuo zongjie baogao 陇东分区 1943 年上半年经济建设工作总结报告 [Summary Report of Economic Construction Work in Eastern Gansu During Early 1943] in Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture, p. 80.

⁵⁶³ Ibid.

of which produced over 500 *jin* [approximately 250 kg] of bulrushes 芦苇. These plants, which flourished at the edge of the Mongolian desert, were easy to collect, and provided winter feed for livestock. The nearby mountains also furnished plants that Mao predicted would be “very helpful to livestock” if harvested in the autumn, such as bulrushes, sand bamboo 沙竹 (*P. villosa*) and sand rice 沙蓬 (*A. squarrosus*).⁵⁶⁴

Increasing the livestock population on this ecologically marginal periphery was an understandable wartime expedient, but it entailed environmental risks. Both sand bamboo and sand rice, a “pioneer annual plant endemic to mobile sand dunes,” are grasses that help hold down the fragile topsoil of desert peripheries.⁵⁶⁵ For this reason, Mao’s enthusiasm for digging up grass roots and stripping tree bark to feed livestock seems reckless and myopic. He suggested that during spring planting, men could plow in the morning, dig up grass roots in the afternoon, and feed livestock in the evening, while women and children dug roots all day long, each gathering an average of 100 *jin* [approximately 50 kg] per day.⁵⁶⁶ Mao regretted that peasants often fought over roots, with refugees at a particular disadvantage.⁵⁶⁷ Yet the long-term threat of desertification

⁵⁶⁴ Mao Zedong 毛澤東 *Jingji wenti yu caizheng wenti* 經濟問題與財政問題 [“Economic Problems and Fiscal Problems”], Mao Zedong Xuanji 毛澤東選集 [Selected Works of Mao Zedong] 東北書店版 Dongbei Shudian Press, p. 778-780, in *Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture*, Changjiang Wenyi Chubanshe 长江文艺出版社 Changjiang Wenyi Press, Wuhan, 2016, p.72.

⁵⁶⁵ Chaoju Qian, Hengxia Yin, Yong Shi et al. “Population dynamics of *Agriophyllum squarrosus*, a pioneer annual plant endemic to mobile sand dunes, in response to global climate change,” in *Nature.com/scientificreports* (2016) [DOI: 10.1038/srep26613]

⁵⁶⁶ Mao Zedong 毛澤東 *Jingji wenti yu caizheng wenti* 經濟問題與財政問題 [“Economic Problems and Fiscal Problems”] (n.d. but 1942), Mao Zedong Xuanji 毛澤東選集 [Selected Works of Mao Zedong] 東北書店版 Dongbei Shudian Press, p. 778-780, in *Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture*, Changjiang Wenyi Chubanshe 长江文艺出版社 Changjiang Wenyi Press, Wuhan, 2016, p.72.

⁵⁶⁷ *Ibid.*

seems not to have concerned him. Recognizing the tension between using grass for household fuel and for livestock fodder, Mao also proposed planting trees such as willows. Their leaves could feed camels and sheep, or provide fuel, “which the masses welcome.”⁵⁶⁸ But cadres in eastern Gansu Province reported the following year that in addition to feeding their sheep and cattle with alfalfa, they also “dug grass roots and stripped tree bark” for the animals to eat.⁵⁶⁹

In the harsh climate of the region, such practices seemed necessary and effective. Indeed, the local bovine population grew by half between 1939-1941.⁵⁷⁰ Yet although it falls short of a calculated “war against nature,” intensive livestock production in this marginal landscape contributed to soil erosion and the relentless expansion of the desert. Within a year of the CCP’s victory in the civil war, the grassland expert Zhao Zengrong 趙增榮 was attributing a 50% drop in cattle and camel populations in Ningxia Province to “the retreat of the grasslands and the expansion of the desert.”⁵⁷¹ Zhao recognized that over-exploited pastures harmed both the health of grazing animals and the country’s finances. The surviving “weak and sickly” livestock yielded goods of poor quality, “which has a powerful effect on the national economy.”⁵⁷² To sustain the animals needed

⁵⁶⁸ Ibid.

⁵⁶⁹ Summary Report of Economic Construction Work in Eastern Gansu During Early 1943, Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture, p.78.

⁵⁷⁰ Longdong fenqu 1942 nian nongmuye jianyao zongjie ji 1943nian fazhan jihua 陇东分区 1942 年农业简要总结及 1943 年发展计划[Summary of in agriculture and husbandry work in eastern Gansu in 1942 and plan for 1943] in *Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture*, p.85.

⁵⁷¹ Zhao Zengrong 趙增榮, 《西北草原破壞的原因及其影響》 [Causes and Effects of the Destruction of Northwestern Grasslands] Xibei Nonglin 西北農林 *Agriculture and Forestry of Northwest China* 第二期 第一卷, October 20, 1950, pp. 82-84 [Accessed on dachengdata.com]

⁵⁷² Ibid.

for national reconstruction, the ecologically precarious pastures of the northwest required careful state supervision.

Putting the Grasslands to Work

After the Japanese defeat in 1945, Chinese officials continued to squeeze plant and animal resources from underused landscapes. Citing a 1934 survey finding that just 17% of the country's land was arable, Tsou Ping-wen 鄒秉文 of the MOAF suggested that mountainous regions "should be extensively seeded with grasses and legumes," while "natural grazing land should be improved and properly managed."⁵⁷³ Claiming that the main problem of the Qilian prairies in Gansu province was the low protein content of the local grasses, one author suggested promoting "superior strains of perennial grasses and legumes suited to high altitudes" to better nourish grazing animals.⁵⁷⁴ Likewise, T. H. Shen 潘宗瀚, director of the National Agricultural Research Bureau, argued that "development of forage crops throughout China is urgently needed for better utilization of land and for improvement of livestock production."⁵⁷⁵ He presented data showing that rangelands in the western provinces of Qinghai, Gansu, Ningxia, Xinjiang and Shaanxi could support over twelve million sheep and 66 million other animals including water

⁵⁷³ Ping-wen Tsou 鄒秉文, "Modernization of Chinese Agriculture," *Journal of Farm Economics*, Vol. 28, No. 3 (Aug., 1946), p. 776. [Stable URL: <https://www.jstor.org/stable/1232506>].

⁵⁷⁴ He Ying 何景, 祁連山之牧場 [The Pastures of the Qilian Mountains], 《新甘肅》 [*New Gansu*] Vol 1, Issue 3, 1947 p. 49-57.

⁵⁷⁵ Tsung-han Shen 潘宗瀚 [Shen Zonghan], *Agricultural Resources of China*, Ithaca, New York: Cornell University Press, 1951, p. 153 [N.B. Author's note shows that Shen wrote the book while in government service in China during the 1940s].

buffalo, cattle, and horses.⁵⁷⁶ Furthermore, the “large area of heavily grassed land” in southwest China would be ideal for pasturing, but “the rank grasses of these areas are usually not nutritious.” Shen noted, however, that government experiments with “native and foreign forage crops” in Guangxi Province showed promise.⁵⁷⁷ Many millions of cattle were waiting to be born and raised, if only humans could bestir themselves to put the grasslands to work.

Foreign experts condemned Chinese farmers’ mismanagement or neglect of potential pastures. Among the most prominent was the Canadian UNRRA [United Nations Relief and Rehabilitation Administration] agricultural officer, Dr. O. M. McConkey. Invoking the risk of a cataclysm like the North American Dust Bowl of the 1930s, McConkey decried China’s “soil deterioration, erosion, run-off and disastrous floods...caused by overpopulation and the terrific competition for fuel.”⁵⁷⁸ He criticized the country’s dense population for “denuding...the land of grass, shrub, and forest cover,” and bemoaned “the criminal practice of burning the natural grass cover [for heating and cooking].”⁵⁷⁹ The geographer Pierre Gourou lambasted Chinese farmers for “completely overlooking the most rational use of the uncultivated area—that is, conversion of it into meadows.”⁵⁸⁰ Putting these areas into livestock production would

⁵⁷⁶ Ibid.

⁵⁷⁷ T. H. Shen, *Agricultural Resources of China*, p.290.

⁵⁷⁸ SHAC 23-1-2770 中央畜牧实验所草原改良与饲草作物计划、草原改良与饲草计划、牧草计划 NATIONAL RESEARCH BUREAU OF ANIMAL INDUSTRY, MOAF, C.M. McConkey [sic] “The Importance and Progress of the Development of Forage Crops in Chinese Agriculture,” [c. 1947].

⁵⁷⁹ McConkey, “Importance.”

⁵⁸⁰ Pierre Gourou, “Notes on China's Unused Uplands,” *Pacific Affairs*, Vol. 21, No. 3 (Sep., 1948), p. 231.

entail “eliminat[ing] certain gramineous plants [i.e. grasses],” boosting domestic milk and meat consumption, and “instruct[ing] the people in pastoral methods.”⁵⁸¹

Husbandry experts, meanwhile, criticized both farmers and nomadic herders for their poor use of land. One author struggled to understand “why the Chinese peasants in rugged frontier regions should struggle desperately to plow the slope lands, rather than raise cattle.”⁵⁸² Wang Dong 王棟 of the KMT’s Northwest Agriculture Institute suggested that the vast grasslands could “open up a limitless source of wealth” for the entire nation. Yet the local farmers did not “know how to use naturally-occurring grasslands,” nor did they cultivate pasturage. They did not preserve their “occasional surplus of grass,” instead making their animals graze in the cold and snow. Nomads were no better: “Since high antiquity,” claimed Wang, these benighted people simply moved on after exhausting the local pastures and water.⁵⁸³ Xu Kangzu 許康祖, vice director of the KMT’s Central Livestock Experiment Office 中央畜牧實驗所, claimed that the ignorance of northwestern nomadic pastoralists gravely undermined the region’s potential. The locals “did not know how to dig up toxic and bad” grasses. Instead, they relied on their animals’ ability to distinguish these poisonous weeds from nutritious foliage. In Xu’s eyes, this was “no different from hindering the growth of good plants, and supporting the bad.” On a visit to southern Gansu Province, he noticed that the

⁵⁸¹ Gourou, “Notes,” p. 236.

⁵⁸² Shu-Ching Lee, “Pattern of Land Utilization and Possible Expansion of Cultivated Area in China,” *The Journal of Land & Public Utility Economics*, Vol. 23, No. 2 (May, 1947), pp. 142-152 [Accessed February 20, 2019 on JSTOR]

⁵⁸³ Wang Dong 王棟, Xibei muqu zhi caoyuan wenti 西北牧区之草原问题 [“Pasture Problems of the Northwestern Livestock Areas”] 畜牧兽医月刊 [*Livestock Veterinary Monthly*] Issue 6, 1946, p. 20.

noxious “drunken horse grass” (*A. inebrians*) covered over 40% of some pastures. It was a great pity, concluded Xu, for with proper care, the grasslands of the Northwest would have been “a paradise for herders and livestock.”⁵⁸⁴

Rather than letting farmers and herders eke out a marginal existence, technocrats envisioned applying scientific management to ensure that humans and livestock used marginal lands and their plant life effectively. Wang Dong called for calculating grazing quotas based on the number of castrated or intact cattle that could be sustained on each *mu* of various pasture types.⁵⁸⁵ Shortly after the founding of the PRC, the grassland expert Zhao Zengrong 趙增榮 called for the new government to “vigorously cultivate” over 80 types of plants, including nitraria 白刺 and licorice 甘草, in the northwestern provinces for livestock to eat. Able to secure the top layer of sand while tolerating drought, salt, cold, and wind, these forage crops were ideal for the harsh landscape. Importantly, Zhao argued that simply planting seeds was not enough. He also proposed a full survey of the grass and water in the region. This would allow planners to map out appropriate grazing routes for mobile herds. Such guidance was essential for rotating herds through pastures, because animals can become sick from sudden changes in diet. Zhao cited the case of Mongolian camels that were used to eating alkaline shrubs in one place and became acutely ill when herders moved them to another location with different forage. Planning routes for herders would also reduce the likelihood of excessive grazing,

⁵⁸⁴ Xu Kangzu 許康祖 《论坛-西北畜牧前途之危机》中央畜牧兽医汇报 1946 年 第 4 卷, p. 1-2.

⁵⁸⁵ Wang Dong, “Pasture Problems,” p. 22.

which encouraged desertification and made both drought and floods more likely.⁵⁸⁶ Both KMT and CCP officials believed that the state's vigorous application of scientific expertise was essential for assessing the current forage cover, cultivating more useful plants, and planning the grazing rotations. The French Premier Georges Clemenceau famously remarked that "War is too serious a matter to leave to soldiers."⁵⁸⁷ Wang Dong, Zhao Zengrong and their peers might have added that animal husbandry was too important to be left to herders.

The New Ecology: A Global Exchange of Seeds and Ideology

A shortage of seeds had hindered both KMT and CCP efforts to expand and enhance the nation's pasturage during the Japanese occupation. The Nationalist Agriculture Bureau of Guangdong Province, looking for crops to feed livestock, cleared 25 *mu* of abandoned land to conduct experiments. But due to the "great difficulty of procuring pasture seeds," they were restricted to planting only maize and sweet potatoes.⁵⁸⁸ Similarly, due to a lack of seeds, the CCP had been able to plant only 23,000

⁵⁸⁶ Zhao Zengrong 趙增榮, Xibei caoyuan pohuai de yuanyin ji qi yingxiang 西北草原破壞的原因及其影響 ["Causes and Effects of the Destruction of Northwestern Grasslands"] Xibei nonglin 西北農林 Volume 2, Issue 1, October 20, 1950, pp. 82-84 [Accessed on dachengdata.com]

⁵⁸⁷ J. Hampden Jackson, Clemenceau and the Third Republic, New York: Collier Books, 1962, p. 161 [Accessed May 5, 2019 at <https://archive.org/details/clemenceauthirdr00jack/page/160>]. General Jack D. Ripper misquotes "soldiers" as "generals" in Stanley Kubrick's *Dr. Strangelove*.

⁵⁸⁸ Guangdongsheng zhengfu jiansheting nonglinju 廣東省政府建設廳農林局 [Guangdong provincial government construction office, division of agriculture and forestry] Gaijin chumu 改進畜牧 ["Improve Animal Husbandry"] in Qin Xiaoyi, ed. 秦孝儀 (主編者), Kangzhan jianguo shiliao—nonglin jianshe si (抗戰建國史料-農林建設 (四)) [Historical Materials from the Anti-Japanese War and Founding of the Nation, Agriculture and Forestry Construction, Volume 4], 裕台公司中華印刷廠 Taipei: Yutai Company, Zhonghua Printing, 1985, p. 31.

of a planned 30,000 *mu* in alfalfa in 1942. To remedy the problem, Mao Zedong suggested importing seeds from the Guanzhong plain in central Shaanxi Province.⁵⁸⁹

To compensate for the postwar shortage of suitable Chinese grass and fodder seeds, O.M. McConkey and his UNRRA colleagues imported forage crop seeds from diverse locales. Impressed by Taiwan's agricultural progress during "40 to 50 years of scientific and practical development" under Japanese control, McConkey prevailed upon the Nationalist powerbroker and Governor of Guangdong Province T.V. Soong 宋子文 to send an agricultural mission to the island in 1947.⁵⁹⁰ During their three-week tour of Taiwan, thirteen representatives of four southeastern provinces collected "seeds of all the improved varieties of crops, fruits, etc. and improved breeds of livestock and poultry."⁵⁹¹ In the same year, UNNRA distributed 21 species of grasses and legumes to 74 research stations throughout Nationalist-controlled China. These forage crops, including Bermuda grass, timothy rye grass and a variety of clovers, would both enrich the soil and provide fodder for the country's herds.⁵⁹² The following year, the National Agricultural and Research Bureau reported that the grasses and legumes that McConkey brought from North America were now growing at over 100 experimental stations around the country.⁵⁹³ During this period, McConkey also introduced forage seeds from "Great

⁵⁸⁹ Mao Zedong, "Economic Problems and Fiscal Problems" (n.d. but 1942), in Excerpts of Historical Materials on Economics and Finance in the Shaan-Gan-Ning border region during the Anti-Japanese War, Volume 2, Agriculture, p. 72.

⁵⁹⁰ McConkey, "Importance."

⁵⁹¹ McConkey, "Importance."

⁵⁹² SHAC 23-2770 "Appendix IV: Distribution of UNRRA Seeds, Grasses and Legumes to Experimental Stations—China."

⁵⁹³ SHAC 23-1-2770, National Agricultural Research Bureau, "Forage Crop Program," p. 77 in 中央畜牧研究所草原改良与饲草作物计划、草原改良与饲草计划、牧草计划 NATIONAL RESEARCH BUREAU OF ANIMAL INDUSTRY, MOAF.

Britain, Denmark, Eastern Africa...Australia, and New Zealand” to field stations in Beijing, Yunnan, Guangxi, and Gansu.⁵⁹⁴

These transfers of plant genes were part of a multidirectional global exchange. To help their nations recover from environmental and military devastation, scientists and planners around the world sought to identify, obtain, and promote the plants that were best able to secure topsoil and produce nutrients for grazing animals. McConkey observed that Chinese animal husbandry did not incorporate “many useful legumes & grasses” native to the country. By contrast, America had put Chinese grasses such as “Lespedeza, Kudzu, Burr clover, etc.” to work in soil-building and fodder production.⁵⁹⁵ Unfairly despised by many American gardeners today, kudzu had been introduced in 1935 as a “primary weapon” against soil erosion in the Dust Bowl states.⁵⁹⁶ Into the 1950s, American plant geneticists and range managers looked longingly to Asia for varieties of grass that could rejuvenate the “millions of acres of brush infested and badly depleted range land” of the Great Plains.⁵⁹⁷ In 1970, O. M. McConkey’s obituary noted that he was responsible for most of the fourteen forage species that the Department of Field Husbandry released in Canada after the Second World War, making “a great

⁵⁹⁴ Shing Tsung (Peter) Hu, David B. Hannaway, and Harold W. Youngberg, *Forage Resources of China*, Wageningen, Netherlands: Centre for Agricultural Publishing and Documentation (Pudoc) 1992, p. 8.

⁵⁹⁵ SHAC 23-1-2770 McConkey, “Objectives of China Grassland Survey Teams,” in 中央畜牧实验所草原改良与饲草作物计划、草原改良与饲草计划、牧草计划 NATIONAL RESEARCH BUREAU OF ANIMAL INDUSTRY, MOAF; N.B. Lespedeza appears to have come to America not from China, but from Japan in the early 1850s, shortly after the Perry mission. See Henry F. Graff, “The Early Impact of Japan upon American Agriculture,” *Agricultural History*, vol. 23, no.2 (April 1949), pp. 110-116 [Accessed on JSTOR].

⁵⁹⁶ Bill Finch, “The True Story of Kudzu, the Vine that Never Truly Ate the South,” *Smithsonian Magazine*, September 2015, [Accessed March 24, 2019 at <https://www.smithsonianmag.com/science-nature/true-story-kudzu-vine-ate-south-180956325/>].

⁵⁹⁷ Jack R. Harlan, “New Grasses for Old Ranges,” *Journal of Range Management*, vol. 4, no. 1 (January 1951), p. 16 [Accessed on JSTOR, February 23, 2019].

impact” on the country’s agriculture.⁵⁹⁸ Any concerns about the potentially devastating impact of invasive species yielded to the promise of great rewards from relocating plants and animals to improve ecosystem productivity.

This global exchange of genetic resources and agroecological expertise manifested a burgeoning scientific and managerial ideology. What the environmental historian Donald Worster has called “the New Ecology,” which coalesced between the 1920s-1950s, viewed the natural world through “the forms, processes, and values of the modern economic order as shaped by technology.”⁵⁹⁹ Worster argues that a defining feature of the New Ecology was the “compulsion to improve output, to reorganize the world for the sake of ever higher economic achievements, [which] creates a corollary reliance on social planning, personnel management, and resource engineering.”⁶⁰⁰ While the New Ecology originated in the universities of the United Kingdom and North America, its influence was global. Many Chinese technocrats had trained in American land grant schools: the agronomists P.W. Tsou and T.H. Shen, and husbandry expert Xu Kangzu all completed graduate study at Cornell before applying their expertise to the economic development of their homeland.⁶⁰¹ Western New Ecologists like McConkey, meanwhile, shared their desire to boost China’s productivity. Whether they endorsed UNRRA’s aim of forestalling the spread of communism, or acted from simpler

⁵⁹⁸ “Dr. O.M. McConkey,” *Guelph Alumnus Magazine*, July 1970, p. 18 [Accessed March 15 at https://issuu.com/uofguelph/docs/july_1970_vol_3_no_3]

⁵⁹⁹ Donald Worster, *Nature’s Economy: A History of Ecological Ideas*, Second Ed. New York: Cambridge University Press, 1994, p. 293.

⁶⁰⁰ Worster, *Nature’s Economy*, p. 294.

⁶⁰¹ For a detailed account of T.H. Shen’s life and career, see Randall E. Stross, *The Stubborn Earth: American Agriculturalists on Chinese Soil, 1898-1937*, Berkeley: University of California Press, 1986, pp. 188-199 [Accessed at <http://ark.cdlib.org/ark:/13030/ft2g5004m0/>].

humanitarian motives, these technocrats saw state-backed scientific management of ecosystem resources as essential to a more prosperous China. As their diatribes against the inefficiency of local practice suggest, the New Ecologists saw boosting production as a social problem as well as an ecological one. Condemning longstanding husbandry practices and calling for a stronger government role in regulating grazing, Chinese and Western New Ecologists shared a key concern: “Letting things alone...will lead to stagnation, poverty, idleness, chaos.”⁶⁰²

In one sense, the New Ecology technocrats of the KMT and CCP were merely continuing the project of reshaping landscapes and societies across the biomes of the multi-ethnic Qing empire. Han expansion was a multispecies endeavor, for “Han farmers did not spread throughout Qing borderlands by themselves. They were firmly backed by their close allies the six domesticates and the five grains.”⁶⁰³ Yet both the methods and goals of the New Ecologists represented a change from past practices. Han settlers in Yunnan during the eighteenth and nineteenth centuries made skillful use of their biological resources, but did not dream of using plant genes from dozens of other countries. Their aims were also different: Qing officials had viewed the western territories as barbarian homelands to be pacified, or settlement zones to relieve population pressure on the eastern provinces. During the twentieth century, by contrast, environmental modification was a means of strengthening the economy, and thus the

⁶⁰² Worster, *Nature's Economy*, p. 294.

⁶⁰³ David A. Bello, *Across Forest, Steppe, and Mountain: Environment, Identity, and Empire in Qing China's Borderlands*, Cambridge University Press, p. 273 [Accessed June 13, 2019 at <https://doi.org/10.1017/CBO9781107706095>].

military, of a nation fighting a total war for survival against powerful armies both foreign and domestic.

The economic motivations of the New Ecologists also suggest continuities with the late Qing officials “in search of wealth and power” who adopted Western industrial and scientific practices and worldviews. Many scholars have addressed the exchange of expertise and ideology between China and Western nations since the Self-Strengthening Movement of the late nineteenth century.⁶⁰⁴ Recognizing the allure of the New Ecology worldview to midcentury technocrats enriches our understanding of economic exchange across cultures, nations, and ecosystems. Not only did Chinese experts emulate, adapt, and appropriate Western ideas of productivity and efficiency in factories, mines, and other urban or industrial sites. The New Ecology imperative to do more with less also had profound consequences for the farmers and herders of China’s grasslands and hills, as well as for cattle herds and their symbiotic bacteria -- environments and species beyond the usual scope of economic history.

Processing Plant Matter for Bovine Consumers

State-guided grazing on the underused prairies of the hinterlands could dramatically increase the amount of energy available to cattle. But farmers and officials

⁶⁰⁴ Jonathan D. Spence, *To Change China: Western Advisers in China, 1620-1960*, Boston: Little, Brown, 1969; Shellen Wu, *Empires of Coal: Fueling China’s Entry into the Modern World Order, 1860-1920*, Stanford: Stanford University Press, 2015; Benjamin Schwartz, *In Search of Wealth and Power: Yen Fu and the West*, New York: Harper & Row, 1969 [1964].

also strove to extract the maximum food energy from grasses and crop residues in the more densely settled core provinces. Humans exerted themselves mentally and physically in preparing this food for the bovine consumers. One guide to livestock feeding shared the folk wisdom that “with the same grass and fodder, [oxen] gain different amounts of weight depending on how you feed them.”⁶⁰⁵ The author compared two neighboring cooperatives in the county of Liyang in Jiangsu Province. Members of the first co-op chopped, washed, and trimmed the roots from the grass for their oxen. As a result, the animals “got healthier all the time” and gained one or two *biao* 膘 in weight [a *biao* is a measure of stoutness on a ten-point scale]. Because the second cooperative did not carefully prepare the bovines’ fodder, the animals lost weight, and three died at the end of 1955. Concluding that “feeding cattle is detail-oriented work 细活,” the author urged readers to remember the jingle, “If the grass is chopped three times / The cattle will gain weight even if they have no additional fodder.”⁶⁰⁶ A similar proverb in Hubei Province held that “If the grass is shorter than one *cun* [approximately 3 mm] / Eating it will make cattle vigorous.”⁶⁰⁷

As early as 1937, agricultural trade magazines carried advertisements for hand-powered grass chopping machines [Figure 5.2]. Contemporary records suggest that the machines were not widely used. If they chopped the animals’ grass at all, most farmers

⁶⁰⁵ Zhong Yang, ed. 钟扬 编写, *Weihao gengniu fanzhi gengniu 喂好耕牛 繁殖耕牛 [Feed draft cattle well, breed draft cattle]* Nanjing: Jiangsu People’s Press, July 1956, p. 4.

⁶⁰⁶ *Ibid.*, p.5.

⁶⁰⁷ Daili fazhan gengniu shengzhu 大力发展耕牛生猪 [*Vigorously develop production of draft oxen and hogs*] Zhonggong Hubei shengwei bangongting bian 中共湖北省委办公厅编 CCP Hubei Provincial committee office, ed., *Hubei Renmin Chubanshe 湖北人民出版社 Hubei People’s Press, Wuhan 武汉, 1958, p.15.*

did so with simple hand tools. In 1960, a traditional Chinese medicine veterinarian in Zhejiang Province devised a labor-saving way for cattle to chop their own grass [Figure 5.3]. Combining a modified ox-powered water wheel with a retrofitted rice thresher, the device allowed two humans and one ox to chop grass, vegetable leaves and other plant matter “finely and well,” to a uniform length of one *cun*. Yielding 2,000 *jin* of minced biomass per hour, the machine was ten times more efficient than a person chopping by hand.

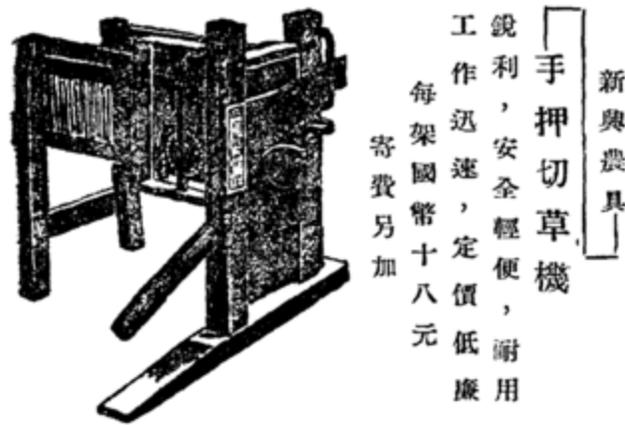


Figure 5.2: Hand-operated grass chopping machine⁶⁰⁸

⁶⁰⁸ Li Nong 力農, Niu de siliao 牛的飼料 [“Ox Fodder”] Nongcun Fuye 农村副业 *Village Sideline Businesses* Volume 2, Issue 8, 1937, p.22.

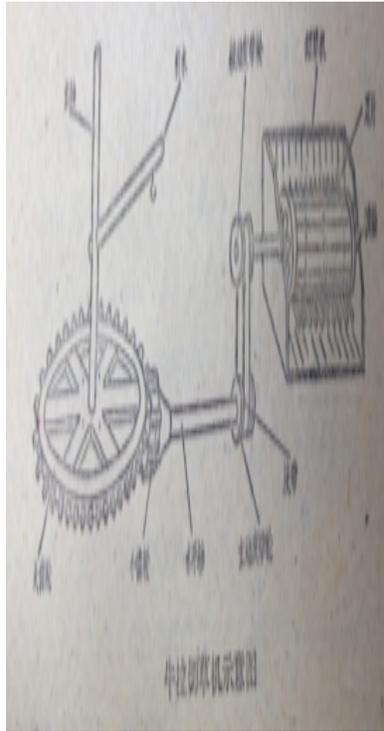


Figure 5.3: Schematic for ox-driven grass chopping machine⁶⁰⁹

A painful death might await cattle whose owners neglected to properly process their fodder. In December 1952, autopsies of cattle in Sichuan Province reported that the animals’ “first and second stomachs” were full of hard, undigested plant matter. To prevent this fatal malady, cadres were to educate farmers about the need to chop up tough plant matter and soak it in water before feeding. If they noticed that a draft ox had a distended stomach and was no longer ruminating, farmers were to administer purgatives 滑藥.⁶¹⁰ Cattle and their bacterial symbiotes performed a valuable service by converting

⁶⁰⁹ 上海科学技术出版社（本社编）《畜牧机械化汇编》上海 May 1960, p. 36 [Courtesy of the rare book collection of Shanghai Library].

⁶¹⁰ Jiangjin renmin zhengfu jianshe ke 江津人民政府建設科 [Jiangjin People’s Government, Office of Construction] Wei jiaqiang zhidao nongmin zhuyi gengniu guzhangbing you 為加強指導農民注意耕牛噉

plant debris into work, meat, and milk. But humans had to uphold their end of the bargain by properly storing and preparing the fodder.

The Internal Anthropocene

Although they consciously worked on behalf of their fellow humans, a fitting slogan for Chinese farmers, scientists, and politicians might have been not “Serve the People” but “Serve the Bacteria.” By modifying landscapes to better serve the needs of their bovines, humans did much to advance the interests of the microbial symbiotes in the animals’ guts. Focusing on the lives of these silent, single-celled life forms reframes the growth of animal husbandry in mid-century China as a bacterial population explosion enabled by humans. Intending to improve the quantity and quality of their cattle, farmers and the state inadvertently invested considerable energy in helping the bacteria to survive and flourish. They collected vast amounts of crop debris and grass to allow bovines (and their bacterial symbiotes) to survive the country’s harsh winters. Laboriously chopping this plant matter into small pieces increased its volume, facilitating digestion by giving bacteria a larger surface area on which to act. Harnessing the process of anaerobic fermentation by making silage, farmers preserved precious nutrients for the winter feeding of bovines while impeding spoilage, i.e. the growth of undesirable aerobic

脹病由[“Directive on strengthening guidance for farmers to pay attention to bloating among draft cattle”] December 3, 1952 in File 9-5-28 川东行署、农业厅、专署关于畜牧、兽医工作的指示、通知、通报 Instructions, notices, and notifications on animal husbandry and veterinary work of the Eastern Sichuan Executive Office Agriculture and Forestry Division [Courtesy of a Chinese university].

bacterial competitors. Furthermore, both the Nationalist and Communist governments sought to make better use of the nation's prairies by introducing forage-friendly grasses and herds of bovines to China's sparsely populated periphery. At the same time, veterinarians vaccinated bovines against the lethal cattle plague, while livestock breeding programs increased the size of the nation's herds. From the perspective of bacteria, each well-fed, vaccinated calf represented a warm, safe home for billions of microbial cells. To be sure, the non-sentient bacteria did not plan or execute any of these processes. They merely digested and divided, over and over again. Still, it is clear that rumen bacteria were a vital, often-overlooked beneficiary of their trilateral symbiosis with humans and bovines.

Yet even referring to rumen bacteria as a stable monolithic entity obscures the endless struggle for survival among a multitude of microbial species. The historian Edmund Russell argues that people have "accidentally shaped the evolution of populations" of bacteria by modifying their environments.⁶¹¹ For example, obesity affects the relative bacterial populations in human digestive tracts. While factors such as consuming alcohol or washing one's hands can affect an individual's bacterial population levels, Russell argues that "social factors" are far more significant drivers of change among gastrointestinal microbes. He suggests that the distribution of political power in the United States Congress encourages subsidies to corn producers, raising caloric consumption and obesity due to "cheap sweeteners" such as corn syrup. In converting the Great Plains from grassland to intensive corn production, and then consuming oceans of

⁶¹¹ Edmund Russell, *Evolutionary History: Uniting History and Biology to Understand Life on Earth*, New York: Cambridge University Press, 2011, p. 43.

corn-based sweeteners, Americans have unintentionally promoted or inhibited the growth of specific species of intestinal bacteria by modifying the living conditions in their intestines. The Roman historian Kyle Harper has similarly encouraged scholars to “take a germ’s eye view of the world and to enter into the evolutionary journey of those microscopic organisms with whom we share the planet.”⁶¹² Harper argues that the trade routes and military occupations of the Roman empire promoted “microbial unification.”⁶¹³ The large-scale movement of Roman subjects permitted many provincial, otherwise-insignificant pathogens to spread far beyond their original range and to share and evolve genetic traits that enhanced their reproductive success, often at the expense of human health. Harper suggests that Roman legions and merchants, “in an unintended conspiracy with nature,” helped bring pathogens such as smallpox from obscurity to infamy.⁶¹⁴ The destructive power and tenacity of such microorganisms can make even grand human achievements seem droll. Noting that bacteria have thrived on Earth for over three billion years, Harper concludes, “It’s a microbe’s world—we’re just living in it.”⁶¹⁵

While we certainly live in the world that microbes created, they also live in environments that we have shaped. Bacteria in the rumens of Chinese bovines offer a new way to think about the present Anthropocene era, in which human action is the defining geological and biomorphic force.⁶¹⁶ Like the Earth itself, a rumen is home to

⁶¹² Kyle Harper, *The Fate of Rome: Climate, Disease, and the End of an Empire*, Princeton University Press, (2017), p. 68 [<https://www.jstor.org/stable/j.ctv9b2txr.5>].

⁶¹³ Kyle Harper, *The Fate of Rome*, p. 73.

⁶¹⁴ Kyle Harper, *The Fate of Rome*, p. 6.

⁶¹⁵ Kyle Harper, *The Fate of Rome*, p. 291.

⁶¹⁶ The locus classicus of the term is Paul J. Crutzen and Eugene F. Stoermer, “The ‘Anthropocene,’ in *The International Geosphere-Biosphere Programme (IGBP) Global Change Newsletter*, May 2000, p. 17.

dynamic and diverse ecosystems. The standard text on ruminant metabolism likens this digestive organ to “a tropical rain forest, where many species of organisms compete and survive.”⁶¹⁷ In terms of size, these miniscule life forms are to the rumen as humans are to the planet. From the perspective of rumen bacteria, an “internal Anthropocene” began when humans modified their environment by adjusting the diets of bovines. Newly introduced grasses and fodders altered the rumen’s water content, energy availability, acidity, and levels of gas, including the methane that drives much global climate change. These human changes further affected the biodiversity and population dynamics of the gut biota, as microorganisms best able to digest the scientifically-formulated diets filled niches created when other species died off. With its chemical composition and biodiversity shifting in response to human economic agendas, the gut of an ox is a microcosm of the planet itself.

The concept of an internal Anthropocene also suggests a tempting line of speculation for historians of animal experiences. Changes in bovine feeding during the 1940s-1950s visibly altered bovines’ wellbeing and emotions. Poorly regulated collective feeding, for instance, pitted the animals against each other and caused malnutrition and stress behaviors. Such interventions had obvious and well-documented effects on animals’ life experiences, but they are almost certainly not the entire story. Although the precise mechanisms are still unclear, the gut biota affect “anxiety, mood, cognition, and pain” in humans.⁶¹⁸ The same is likely true of cattle and other animals. At the

⁶¹⁷ Peter J. Van Soest, *Nutritional Ecology of the Ruminant*, Cornell University Press (1994) p. 255 [Accessed at <https://www.jstor.org/stable/10.7591/j.ctv5rf668.19>].

⁶¹⁸ The phenomenon likely involves the effects of microbial metabolism on “short-chain fatty acids...neurotransmitters...hormones...and immune system modulators.” Cf. Mireia Valles-Colomer,

submicroscopic level, as humans changed the fodders and feeding practices of Chinese bovines, and thus altered their gut microbiota, they may indirectly have been altering the animals' inner lives, and even what we might call their worldview. As humans changed the animals' diets, they may also have changed their minds.

Class Struggle and Bovine Welfare

Oxen were a central but silent party to the class struggles of the early People's Republic. Because ownership of bovines was unevenly distributed across social classes, the challenge of setting fair prices for using and caring for oxen persisted through many economic and political reforms. Several years before the establishment of the PRC, the Communist portion of Shandong Province experimented with alternative ownership and rental systems. In the Binhai region 濱海區 during the early 1940s, poor farmers had exchanged their own labor for the use of a rich peasant's draft ox. But because the exchange rate undervalued the labor of cattle, the rich peasants sold off their oxen "one after another" in the autumn of 1944. Rich peasants were even less able to support draft oxen after a Communist rent reduction program broke up large land holdings, while "poor peasants could not afford to raise oxen on their own." For this reason, joint raising of oxen "naturally arose." A certain Auntie Xue 薛大娘 set up an ox-raising cooperative

Gwen Falony, Youssef Darzi, et al., "The neuroactive potential of the human gut microbiota in quality of life and depression," *Nature Microbiology* (2019) volume 4, p. 623–632 [Stable URL <https://doi.org/10.1038/s41564-018-0337-x>]; J.F. Cryan, T.G. Dinan, "Mind-altering microorganisms: the impact of the gut microbiota on brain and behavior," *Nature Reviews Neuroscience*, October 2012; vol 13(10): 701-712. [DOI: 10.1038/nrn3346].

that exemplified this practice. Farmers pooled funds to buy oxen, hired someone to feed them in exchange for 700 *jin* [420 kg] of grain and a cotton jacket, and elected someone to use the animals to plow the fields. This system became a “fad” after it was promoted at the Second Binhai Model Worker Meeting, and such cooperatives arose in all areas that had previously used labor exchanges.⁶¹⁹

Within half a year, most of the cooperatives had collapsed, including Auntie Xue’s. What went wrong? A CCP analysis identified rigid cadres and inadequate fodder supplies as the key causes of the problem. “Inattentive to the needs of the masses,” the cadres compelled everyone to turn over their donkeys and cattle to the cooperatives. Those who did not were labeled “stubborn.” But in the spring, before the new crop sprouts had come out, the cooperatively owned cattle ran out of fodder and grass. Poor and middle peasants were torn between contributing fodder for the oxen, and buying grain for their families. Unable to do both, they withdrew from the cooperatives, asking to go back to exchanging their labor for the use of an ox.⁶²⁰

Cadres drew insightful conclusions from the failure of the Binhai cooperatives. Future ox-sharing arrangements should “pay attention to the wishes of the people,” and permit single households or small groups to raise cattle. “Two or three households raising an ox is fine; one household raising an ox is also fine; one household raising several oxen is fine, as well.” If some farmers wished to raise cattle jointly but keep their donkeys

⁶¹⁹ Geng Guangbo 耿光波, “山东省农林合作会议总结 (January 1946),” [Summary of Agricultural and Forestry Cooperatives in Shandong Province] 山东革命历史档案资料选编第十六辑 vol 16, Nov. 1945-May 1946, 山东省档案馆、山东社会科学院历史研究所合编, [Shandong Provincial Archives, Historical Research Office of the Shandong Institute of Social Science, eds.] 山东人民出版社 Shandong People’s Press, 1984, 济南 Ji’nan, p. 154.

⁶²⁰ Ibid.

separate, the cadres should “let things progress naturally.” In fact, because donkeys were versatile, relatively cheap, and easy to feed, raising them individually was “generally appropriate.” Furthermore, the “enormous” payment to the ox feeder had “increased the burden on the masses” and lowered their productivity. The cadres therefore endorsed switching from using designated feeders to having “partially-abled people” 半勞力 feed the animals in exchange for work points, which was “more sustainable.” In short, insisting on strict uniformity or “getting mired down in details” was counter-productive.⁶²¹

If the lessons of Binhai had become common practice in the 1950s, the experience of collectivization might have been far less wrenching for millions of bovines and the humans who depended on them. Binhai cadres recognized that the region’s bewildering variety of climates, soil types, sideline industries, and class composition would frustrate top-down attempts to impose rigid modes of draft animal production and use. Coercing or intimidating rich peasants into surrendering their animals or joining cooperatives was short-sighted and self-defeating. To an extent that is surprising in light of the national government’s ferocious enforcement of its grain and livestock policies just one decade later, the Binhai cadres took a flexible, decentralized approach.

Political campaigns and class tensions indirectly harmed oxen far and wide. In 1947, the CCP Standing Committee member Dong Biwu 董必武 observed that although the redistributive program called Land Reform had reduced the rural wealth gap, many formerly landless farmers across the country “lack[ed] the skills and experience” to use

⁶²¹ Ibid., p. 155.

and maintain their newly allocated resources, including draft animals.⁶²² The following year, a Xinhua report on northern China found that social tensions were harming the welfare of oxen and making farmers reluctant to raise them. Middle peasants were compelled to have their draft animals plow the fields of poor peasants before tilling their own lands. In addition, cadres in some places gave priority to lands belonging to the families of Communist soldiers.⁶²³ Such practices understandably reduced people's desire to breed and care for their draft animals. In early summer 1952, shortly after the end of Land Reform, a Xinhua reporter visiting Longchang County 隆昌縣 in Sichuan Province warned that class tensions were imperiling the draft ox population. Whereas middle and rich peasants had plenty of land before the redistribution, they now had much less, and were often unable to make full use of their oxen. Poor peasants, by contrast, had few cattle with which to plow their newly acquired farmland. They wanted to rent oxen from their rich and middle peasant neighbors, but low rental prices meant that ox could not buy enough fodder for their animals. Unable to sell their bovines, the ox owners resorted to feeding the animals cheap, "bad" fodder. As a result, the oxen were "extremely sick and weak." Taking an instrumental view, the Xinhua reporter predicted an "ox famine" 牛荒 in the autumn if present trends continued.⁶²⁴

⁶²² Chen Hansheng, Xue Muqiao, Feng Hefa, eds. 陈翰笙 薛暮桥 冯和法 *Jiefang qian de Zhongguo nongcun* 解放前的中国农村第一辑, [Pre-Liberation Chinese Villages, Volume 1] 中国展望出版社, 北京 1985, p. 298.

⁶²³ Xinhuashe duanping "Baohu gengchu" 新華社短評“保護耕畜” [Xinhua brief comment: "Protect Draft Animals"] September 25, 1948, republished in *Nongye jianshe wenti* 農業建設問題 Problems of Agricultural Reconstruction, 新民主出版社發行 Hong Kong: Xinminzhu chubanshe October 1949.

⁶²⁴ File 9-5-28 川东行署、农业厅、专署关于畜牧、兽医工作的指示、通知、通报 Instructions, notices, and notifications on animal husbandry and veterinary work of the Eastern Sichuan Executive Office Agriculture and Forestry Division] Chuandong renmin xingzheng gongshu nonglingting 川東人民行

A similar situation arose in south-central China during early summer 1953. Here, at least half of the 100,000 draft bovines that had died since the previous winter fell victim to “poor feeding and caretaking.” The chief problem was that “cadres and the masses” used draft cattle that belonged to middle and rich peasants while paying minimal, if any, rental fees. As a result, the owners “felt that there was nothing to gain from keeping cattle, and they did not feed them carefully.” Moreover, the unfair exchange dissuaded people of other classes from raising bovines, because “keeping cattle was both troublesome and unprofitable,” and “they could use them even if they did not raise them.”⁶²⁵

Oxen were starving because social tensions prevented humans from setting fair prices for bovine labor. Bovine rental fees were determined in public meetings at the township 鄉 level. The reporter in Sichuan explained that although middle peasants attended these discussions, they “did not dare to speak up.” Due to their “precarious position” in village society, explained the journalist, the middle peasants were too intimidated to advocate for themselves.⁶²⁶ Their reticence was understandable,

政公署農林廳 [Eastern Sichuan Executive Office Agriculture and Forestry Division] Longchang jie jue gengniu wenti you qinfan zhongnong liyi de xianxiang 隆昌解決耕牛問題有侵犯中農利益的現象 [“Middle peasants’ interests are being harmed in the resolution of the draft ox problem in Longchang”] July 3, 1952. [courtesy of a Chinese University].

⁶²⁵ Neibu cankao 內部參考 [Internal Reference] Zhongnan siwang gengniu shijiwan tou 中南區死亡耕牛十幾萬頭 [Hundreds of Thousands of Draft Animal Deaths in South-central China] June 20, 1953, [Accessed at <http://ccrd.usc.cuhk.edu.hk>].

⁶²⁶ File 9-5-28 川東行署、農業廳、專署關於畜牧、獸醫工作的指示、通知、通報 Instructions, notices, and notifications on animal husbandry and veterinary work of the Eastern Sichuan Executive Office Agriculture and Forestry Division] Chuandong renmin xingzheng gongshu nonglingting 川東人民行政公署農林廳 [Eastern Sichuan Executive Office Agriculture and Forestry Division] Longchang jie jue gengniu wenti you qinfan zhongnong liyi de xianxiang 隆昌解決耕牛問題有侵犯中農利益的現象 [“Middle peasants’ interests are being harmed in the resolution of the draft ox problem in Longchang”] July 3, 1952. [courtesy of a Chinese University].

considering their fresh memories of physical abuse, humiliation, and confiscation of livestock and other property during Land Reform.⁶²⁷ The “political vigilantism called class struggle” had left many disempowered families in the grip of “silent anxiety and nasty gossip, warning their children not to fight with those favored by officials.”⁶²⁸ The local cadres, for their part, sympathized with the poorer peasants, and saw no harm in “slightly taking advantage” of the more prosperous classes. By “infringing on the interests of middle peasants,” concluded the Xinhua reporter, the unreasonably cheap rental fees harmed these farmers’ morale, reducing their sense of solidarity with the poorer peasants, and making them “apprehensive” about increasing their productivity.⁶²⁹ Caught between skittish rich or middle peasants and newly emboldened poor farmers backed by state power, cattle went hungry and neglected.

While class tensions exposed working animals to neglect and overwork, the Land Reform campaign also highlighted the shaky position of bovine consumers in the energy economy. In late 1952, investigators in counties including Wanxian 萬縣, Longchang 隆昌, and Leshan 樂山 in Sichuan Province found an acute lack of fodder for draft cattle. Some of the shortfall was due to heavy autumn rains, which rotted between 30-50% of

⁶²⁷ Luo Pinghan 罗平汉, *Tudi gaige yundong shi 土地改革运动史 [History of the Land Reform Movement]*, 福建人民出版社 Fujian People’s Press, 2005, p. 116-122.

⁶²⁸ Edward Friedman, Paul G. Pickowicz, Mark Selden, with Kay Ann Johnson, *Chinese Village, Socialist State*, New Haven: Yale University Press, 1991, p. 269.

⁶²⁹ File 9-5-28 川东行署、农业厅、专署关于畜牧、兽医工作的指示、通知、通报 Instructions, notices, and notifications on animal husbandry and veterinary work of the Eastern Sichuan Executive Office Agriculture and Forestry Division] Chuandong renmin xingzheng gongshu nonglingting 川東人民行政公署農林廳 [Eastern Sichuan Executive Office Agriculture and Forestry Division] Longchang jiejie gengniu wenti you qinfan zhongnong liyi de xianxiang 隆昌解決耕牛問題有侵犯中農利益的現象 [“Middle peasants’ interests are being harmed in the resolution of the draft ox problem in Longchang”] July 3, 1952. [courtesy of a Chinese University].

the rice stalks that would have become fodder. More importantly, farmers who had recently received land were using their rice stalks to renovate their homes, toilets, and stables. Furthermore, many were burning their rice stalks, and fertilizing their newly acquired fields with the ashes. Inspectors found that these non-bovine uses of plant debris “seriously affected” the supply of fodder and reduced the likelihood that older cattle would survive the winter. To address this crisis, officials proposed several solutions. First, cadres should “mobilize the masses” to dry out soggy rice stalks in sunny areas to prevent further rotting. To help meet the need for fodder, farmers were to collect large amounts of grass and other local plant matter such as corn stalks and the stems and leaves of wheat, rape, and kidney beans. Cadres should also encourage farmers to plant extra vegetables “to ameliorate the shortage of draft ox fodder.” Finally, rather than burning rice stalks or using them for home repairs, cadres were to instruct farmers to use substitutes such as reeds “as much as possible” to relieve the shortage of fodder.⁶³⁰

For historians of modern China, the saga of the Sichuanese rice stalks is significant in several ways. First, the metabolic needs and economic importance of bovines open a new approach to the historiographical debate over the relative powers of “state” and “society.” Left to their own devices, farmers would have used rice stalks to improve their homes, latrines, and soil. But recognizing the vital and irreplaceable role of

⁶³⁰ File 9-5-28 川东行署、农业厅、专署关于畜牧、兽医工作的指示、通知、通报 Instructions, notices, and notifications on animal husbandry and veterinary work of the Eastern Sichuan Executive Office Agriculture and Forestry Division] Sichuansheng renmin zhengfu nonglinting (zhishi) 四川省人民政府農林廳（指示）Sichuan People’s Government Office of Agriculture and Forestry (directive), Renzhen jiejie gengniu wenti, dali zuohao Jindong mingchun de huniu gongzuo 認真解決耕牛問題，大力作好今冬明春的護牛工作 [“Conscientiously resolve the draft ox problem, vigorously do the work of protecting cattle this winter and next spring”]. [courtesy of a Chinese University].

bovine labor in crop production, the government promoted alternative building materials, and encouraged rural people to spend scarce time and energy collecting and producing fodder for their bovines. The state's intervention on behalf of draft cattle suggests that the animals had greater agency than historians have generally recognized. Both farmers and officials had to defer to the imperatives of bovine digestion. Of course, the agendas of farmers and cadres often overrode the needs and preferences of bovines. But portraying the animals merely as inert property dependent on the munificence of humans is untenable. They were also workers and consumers whose needs both farmers and cadres tried to satisfy. Government agents, farmers, and bovines negotiated their relationships using plant debris, much like bumblebees with their honey.

The Sichuanese rice stalks also illustrate the competition between mutually reliant farmers and bovines over the matter and energy stored in plants. Such biomatter was far from abundant in many regions, and a vicious cycle of poverty, environmental degradation, and state neglect caused acute fuel shortages and human suffering during the early twentieth century.⁶³¹ Grass or rice stalks contained fewer calories by mass than fossil fuel sources such as coal, petroleum, and natural gas, which are “reservoirs of stored energy bonds” from plants and algae that lived millions of years ago.⁶³² Soviet scientists had reported in 1939 that burning three kilograms of grass yielded just one kilowatt-hour of electricity, enough to power ten 100-watt lightbulbs for one hour.⁶³³ But

⁶³¹ Kenneth Pomeranz, *The Making of a Hinterland: State, Society, and Economy in Inland North China, 1853-1937*, University of California Press, 2003, pp. 127-128 [Accessed at quod.lib.umich.edu]

⁶³² Paul G. Falkowski, *Life's Engines: How Microbes Made Earth Habitable*, Princeton University Press (2015) p. 154.

⁶³³ No author, 科學新聞：草作燃料[“Science News: Grass as Fuel”] Xin Kexue 新科学[*New Science*] Vol. 1, Issue 5, 1939, p. 884

unlike fossil fuels or wood, both humans and bovines could use the energy stored in crop debris. Humans unlocked this energy through combustion, whereas bovines relied upon their microbial symbiotes to break fibrous plant parts into useful energy and nutrients. In his analysis of Shandong Province, the historian Kenneth Pomeranz has referred to a “discretionary biomass supply” consisting of plant matter “left for use as fuel, fertilizer, or construction material after keeping essential farm animals alive.”⁶³⁴ Yet the situation in Sichuan suggests that hard-pressed farmers sometimes found more urgent uses for plant matter than satisfying the caloric needs of their livestock.

Recognizing the hazard of interspecies competition over plant energy, officials in Jiangsu Province called farmers to burn natural gas to conserve grass and straw for livestock whenever possible.⁶³⁵ Similarly, the Central Committee of the CCP encouraged farmers to save fodder by burning coal instead of grass.⁶³⁶ Even after digestion, plant debris was central to the energy economy. In Sichuan, “the chronic shortage of fuel” during the Anti-Japanese War had induced many farmers to burn their animals’ manure, rather than using it as fertilizer. In response, Farmers Associations set up mills to grind fertilizer out of bones imported from “major centers of meat consumption” such as the

⁶³⁴ Kenneth Pomeranz, *The Making of a Hinterland*, p. 135 [Accessed at quod.lib.umich.edu]

⁶³⁵ JPA 4069-001-0036 Chumu shouyiju 畜牧兽医局 [Livestock Veterinary Division] Bening guanyu Jiangsusheng yijiuwuliunian chumu shouyi gongzuo shangbannian zongjie xiabannian yijian, shengzhu shengchan gongzuo zongjie 本厅关于江苏省一九五六年畜牧兽医工作上半年总结下半年意见, 生猪生产工作总结 [This office’s summary of livestock veterinary work in Jiangsu province during the first half of 1956, and suggestions for the second half of 1956, and summary of hog production work], August 1956.

⁶³⁶ Zhonghua renmin gongheguo guojia nongye weiyuanhui bangongting bian 中华人民共和国国家农业委员会办公厅编 [PRC National Agriculture Committee Office, ed.], *Nongye jitihua zhongyao wenjian huibian (1949-1957) shangce 农业集体化重要文件汇编 (1949-1957) 上册* [Collection of important documents relating to agricultural collectivization (1949-1957) Volume 1] Zhonggong zhongyang guanyu dali baohu gengchu de jinji zhishi [Central Committee’s urgent directive on protecting draft animals], January 15, 1955, p. 281.

city of Chengdu.⁶³⁷ Nearly twenty years later, the *People's Daily* triumphantly announced the opening of a coal mine near the Tibetan capital of Lhasa, which had “used bovine excrement as its fuel for thousands of years.”⁶³⁸ Plant debris (in the form of crop leaves, straw, or manure) was a versatile, renewable, and ubiquitous form of currency in the energy economy, and farmers had “money to burn.” The problem was that burning straw or manure to heat themselves meant withholding nutrition from their cattle and fields.

Deadly Dysfunction in Cooperatives

Beginning in the mid-1950s, cooperative ownership of livestock blurred the lines of accountability for draft animals, and reduced the original owner's exposure to financial loss if his bovine died. Before cooperatives began feeding draft animals collectively, the original owners were responsible for tending the oxen that had once been theirs. Bovine living standards therefore sometimes declined due to moral hazard, or the lack of incentive to guard against risk when others bear the costs of a loss. Official rhetoric portrayed this phenomenon as malicious resistance to the new ownership regime. In Fujian Province, the “law-breaking landlord” Chen Guangyou 陳光友, who joined his local cooperative by “fraudulently pretending to be sincere,” had carefully tended to his

⁶³⁷ “China Carries On: Wenkiang [Wenjiang] Farmers,” *The China Critic*, September 26, 1940, p. 202. [ProQuest Historical Newspapers, Chinese Newspapers Collection].

⁶³⁸ Xizang jianqi meikuang: Lasa ke bushao niufen le 西藏建起煤矿：拉萨可不烧牛粪了 [“Tibet Builds Coal Mine: Lhasa no longer needs to burn bovine feces”] 人民日报 *People's Daily*, October 6, 1958 [accessed on 人民数据]

ox when the animal belonged solely to him. Chen “put a high priority on looking after his draft ox,” and would give the animal wine and porridge whenever it fell ill. But, according to the intermediate district court, Chen secretly resented the rule that landlords and rich peasants could not withdraw their “investments” of draft oxen and farm tools from the cooperative. Chen therefore allegedly “lost interest” in caring for the ox, and allowed its stable to become damp and cold. Making matters worse, in early March 1956, he and other cooperative members went into the mountains to clear farmland. Left in the care of a herder boy, the animal froze to death. Yet the court recommended only that Chen receive a severe warning or probation.⁶³⁹ The lenient treatment of both Chen Guangyou and the herder boy suggest that for all their bluster about devious class enemies, court officials recognized that the death of the ox was an unfortunate loss, but not a case of sabotage. With many demands on their time and energy, farmers would inevitably focus on the best-compensated tasks.

The Beixiao cooperative in Shanxi Province’s Linfen County 山西臨汾 exemplified the administrative malfunctions that caused many bovine deaths. Formed in Autumn 1954, the co-op rented and collectively fed 35 draft animals from its 58 constituent households. Due to their “poor care and feeding,” two horses, three mules, and a donkey died within six months, while eight other animals fell ill “at the peak of the busy plowing season.” The suffering of the animals caused “ideological confusion and instability” among the families who rented their livestock to the cooperative. Fourteen

⁶³⁹ Hoover Institution, Communist Chinese Political Movement Collection, Box 3, Folder 22, "Reports on Spring Farming Sabotage Cases" 1956, (file 保障春耕生產, 福建省閩侯地區中級人民法院).

families whose animals had not yet fallen ill “tearfully” took their animals back from the cooperative, and one member mentioned wanting to withdraw altogether. Grievances and quarrels multiplied, as cadres complained that the government tardily provided poor quality fodder, “so livestock starved.” Using the language of traditional Chinese medicine, cadres argued that the government’s soybean cake fodder was “hot,” and caused animals to fall ill. For their part, cooperative members complained that the “stingy” cadres were “not team players” 不團結, failing to hire veterinarians as needed. The livestock feeders, meanwhile, protested that they had tried to purchase good grass and fodder for the animals, but the cadres did not heed their suggestions.⁶⁴⁰ Similar situations arose elsewhere, as when investigators at a cooperative in Jiangxi found that because cadres were “accustomed to poverty,” they did not dare to purchase fodder once they calculated how much it would cost.⁶⁴¹

The catastrophe in Beixiao illustrated a major rural problem of the mid-1950s: members of a cooperative might not cooperate. Pooling resources and draft labor had the potential to improve farm efficiency and household living standards, but it also caused many disagreements and frustrations. Workers at each level had cross-cutting lines of responsibility: cadres to both the co-op members and to the local government, and feeders to the cadres, the animals, and their owners. Animal owners, meanwhile, balanced their

⁶⁴⁰ ECNU File B 0357-045-027 Zhonggong Linfen Xianwei 中共臨汾縣委 CCP County committee of Linfen, Beixiao nongyeshe shengkou shangwang ji chuli qingkuang baogao 北孝農業社牲口傷亡及處理情況報告 [Report on handling of injury and death of livestock in Beixiao agricultural cooperative] March 1955.

⁶⁴¹ Peng Xiezhong 彭協中, Tang Shuguang 唐曙光, Sheng Hongxuan 盛鴻軒, Guangming gaoji nongye shengchan hezuoshe de kaocha baogao 光明高級農業生產合作社的考察報告 [“Inspection report of the Guangming advanced producers’ cooperative”], Jiangxi Zhengbao 江西政報 April 12, 1956, p. 35 [accessed on cnki.net].

obligations to their livestock, their households, and fellow members of the cooperative. Everyone's putative allegiance to the cooperative project could not always overcome the practical challenges of sharing. Entangled in these disputes, draft animals frequently suffered and died.

When an inspection group learned of the deplorable situation in Beixiao, they held "top to bottom" study and investigation sessions for the cooperative members based on a January 17, 1955 editorial from the *Shanxi Daily* entitled "Take Care of Livestock." Several main reasons emerged for the death and illness of animals in the cooperative. The first was indifferent and careless leadership. One cadre admitted, "We were feeding the animals in a big pile, and they were wildly kicking and biting each other. They often did not get enough to eat---how could they not fall ill?" Modern veterinarians note that in "competitive feeding" of cattle, "the subordinate individual has to attempt to obtain food despite the attacks or threats of other individuals."⁶⁴² Another cadre explained, "I didn't care at all about livestock. Once, when I was told to buy some dried alfalfa [fodder], I thought about quantity instead of quality. As a result, it was full of bird droppings and spiderwebs, which made the animals sick." Furthermore, the cadres "casually" appointed livestock feeders. Two of the three feeders were complete novices, and none had much political awareness. Because feeders did not receive additional work points, they took a lackadaisical attitude and the animals frequently went hungry. Rapid turnover exacerbated their poor motivation and incompetence, as feeders were rotated out three times in less than a year. In winter 1954, they did not clean the livestock pens for two

⁶⁴² D.M. Broom and A.F. Fraser, *Domestic Animal Behaviour and Welfare*, 4th edition, p. 262.

months, and the oxen “were often covered in excrement.” A layer of “filth and mud” accumulated in their trough, their water tank froze over, and the feeders mixed ice cubes with their grass.⁶⁴³

The second cause of draft animal death in Beixiao was the perverse incentive for humans to overwork the animals. Chapter 3 on labor and the tragedy of the commons addressed the fact that cooperative members over-exerted the livestock in hopes of earning more work points for themselves. Said one member, “I often whipped the horse to make it go faster when plowing. I didn’t let it rest, and so its entire body was covered in sweat.” Another member explained, “I was eager to earn work points by hauling cow manure. But the hitching shafts [of the cart] 轅桿 were narrow, and the ox’s stomach was large. I lengthened the waist belt [to be able to carry heavier loads? 大腰放長], and the ox fell ill.”⁶⁴⁴ From the county government’s instrumental point of view, such self-serving decisions were harmful not only because they reduced the cooperative’s productivity, but also because farmers who had not yet joined the cooperative felt that “the co-op’s livestock are worthless.” Draft animals experienced these perverse incentives as excessive work and careless treatment which drove them into an energy deficit.

⁶⁴³ ECNU File B 0357-045-027 Zhonggong Linfen Xianwei 中共臨汾縣委 CCP County committee of Linfen, Beixiao nongyeshe shengkou shangwang ji chuli qingkuang baogao 北孝農業社牲口傷亡及處理情況報告 [Report on handling of injury and death of livestock in Beixiao agricultural cooperative] March 1955.

⁶⁴⁴ ECNU File B 0357-045-027 Zhonggong Linfen Xianwei 中共臨汾縣委 CCP County committee of Linfen, Beixiao nongyeshe shengkou shangwang ji chuli qingkuang baogao 北孝農業社牲口傷亡及處理情況報告 [Report on handling of injury and death of livestock in Beixiao agricultural cooperative] March 1955.

Animals also suffered and died when cooperatives entrusted their care to the most impoverished and incapable members. In Hebei Province's Wugong cooperative, caring for livestock could be a form of "workfare" aimed at "reassur[ing] households with abundant labor power that the weak were not getting a free ride."⁶⁴⁵ One elderly woman, too frail to work in the fields or the collective's pigsty, nevertheless earned forty-six labor days by raising a piglet in her yard.⁶⁴⁶ These charitable arrangements were not always successful. "Naively focused on taking care of the poor," a newly established cooperative in Hubei Province made two struggling families responsible for feeding nine oxen, and two of the animals died.⁶⁴⁷ In the same province, some early cooperatives entrusted cattle to households with "many mouths to feed," regardless of whether they had experience in raising livestock. As a result, one-quarter of their cattle became emaciated.⁶⁴⁸ An urgent provincial directive in Jiangsu Province allowed "old and weak co-op members" to fulfill their work obligations by tending to animals, but insisted that they must not have the main responsibility for feeding. Those who were unequal to the task must be given other assignments.⁶⁴⁹

⁶⁴⁵ Edward Friedman, Paul G. Pickowicz, Mark Selden, with Kay Ann Johnson, *Chinese Village, Socialist State*, New Haven: Yale University Press, 1991, p.184.

⁶⁴⁶ *Ibid.*

⁶⁴⁷ Bao Fuhan 荆门县县长 鲍傅汉 Jingmen county head Bao Fuhan, *Shuangxi nongyeshe fanzhi shuiniu de jingyan 双喜农业社繁殖水牛的经验* ["Shuangxi agricultural cooperative's experiences in breeding water buffalo"] in *Daili fazhan gengniu shengzhu 大力发展耕牛生猪* [Vigorously develop production of draft oxen and hogs] *Zhonggong Hubei shengwei bangongting bian 中共湖北省委办公厅编 CCP Hubei Provincial committee office, ed., Hubei Renmin Chubanshe 湖北人民出版社 Hubei People's Press, Wuhan 武汉, 1958, p.6.*

⁶⁴⁸ *Ibid.*, p.14.

⁶⁴⁹ *Zhonggong Jiangsu shengwei guanyu liji gaishan gengniu siyang gongzuo de zhishi (jielu) 中共江苏省委关于立即改善耕牛饲养工作的指示 (节录)* ["Excerpts from CCP's Jiangsu Province committee's directives on immediately improving feeding of draft oxen"] April 13, 1956, *Jiangsusheng chumu zhi 江苏省畜牧志* [Jiangsu Province Livestock Gazetteer] 2000, p. 466.

These cooperatives surely intended to provide reasonably easy and secure employment to their neediest members. Although many poor peasant households struggled to feed even themselves, they were a rhetorically privileged constituency, especially by contrast to landlords and rich peasants, whose backgrounds made them politically suspect. And in fact, poor or partially-abled people sometimes took good care of livestock, as the Binhai cooperatives had shown. But raising draft animals was both physically and mentally demanding. Tending even a few cattle involved collecting and chopping scores of kilograms of fodder per day, hauling water, shoveling manure from the stables, brushing the animals, inspecting them for signs of disease or discomfort, and sundry other tasks. In some cases, animals suffered when the stable became a convenient holding area for inexperienced or weak farmers unable to do even more grueling work.

When People Feud, Cattle Die

While administrative dysfunction caused many livestock deaths in the cooperatives, some animals also died as a result of commonplace human altercations. In one case that appeared before the Songkou 嵩口 People's Court in Fujian Province in April 1956, an egg-sized rock was found in the stomach of a dead draft ox. The animal's caretaker, a "lazy" seventeen-year-old named Xu Rubao 許如寶, had often been late in putting the cooperative's cattle out to graze. When the cattle owners pressured Xu to be more diligent, he was "not very pleased," and there were frequent recriminations between the adolescent and the owners. Blame for the ox's death centered on Xu because he tended the animal every day, and the "ill-tempered" beast would not have allowed a

stranger to get close enough to put a rock in its mouth. This meant, in the view of the court, that “a conspiracy of bad elements, seeking to do harm by making the ox eat a rock,” was unlikely. For this reason, local cadres suspected that the lad forced the ox to eat the stone as a form of revenge against his overbearing employers. The young man repeatedly denied the accusation. Lacking any “new clues about saboteurs,” the court could only await the findings of another police investigation which would hopefully “get to the bottom of this affair.”⁶⁵⁰

Court officials determined that household discord, not anti-government malice, contributed to the deaths of two calves in Fujian Province’s Songkou County. After Land Reform, the rich peasant Wei Chaoxing 魏朝行 had two water buffalo. His biological son and adopted son each received one animal. When his own buffalo died, the biological son unsuccessfully suggested that he and his brother equally share the surviving cow, who had calved in both 1954 and 1955. Shortly before the formation of the local cooperative later that year, Wei Chaoxing suggested that the family sell off its calves, as he was reluctant to accept the co-op’s low prices for animal rentals. His adopted son demurred, and they kept all three buffalo. Because Wei favored his biological son, there was constant “friction” 小意見 among the three men. The disgruntled brothers shirked their responsibility to look after the surviving cow and her calves, and “no one cared for the animals.” As the elder calf had not been weaned, its younger sibling received insufficient milk and froze to death in December 1955. The elder calf soon followed, after developing

⁶⁵⁰ Hoover Institution, Communist Chinese Political Movement Collection, Box 3, Folder 22, "Reports on Spring Farming Sabotage Cases" 1956, (file 保障春耕生產, 福建省閩侯地區中級人民法院).

a “serious skin disease” which did not respond either to a dusting of DDT powder 滴滴提粉 or to “grasshopper salt” 蚱鹵.⁶⁵¹ The family drama of Wei Chaoxing and his sons was surely not unique. Human relationships, blending love, envy, greed, and pragmatism, made shared ownership of animals a complex and fraught proposition. For bovines, ordinary household squabbles could be a matter of life or death.

The constant refrains of neglect and death can give the impression that feeding cattle was simply an unavoidable, unpleasant nuisance for anxious, resentful farmers. Although feeding bovines is difficult, humans also used food to express their appreciation for the animals’ indispensable labor. When it was too cold for cattle to graze in Hunan Province’s Fenghuang County, farmers cooked them a porridge of finely chopped rice stalks, cornmeal, and buckwheat powder, called “ox rice” 牛饭. To “show their gratitude for the animal’s hard work,” farm families included their bovines in Lunar New Year celebrations by feeding them rice mixed with eggs, or the Hunan specialty of fried glutinous rice patties 油炒粑粑. The eighth day of the fourth month of each lunar year was considered the animal’s birthday. Although this holiday fell during the peak farming season of late spring, cattle got the day off work, and ate corn porridge or cooked rice mixed with an egg, to enhance their sexual prowess 驱阴壮阳.⁶⁵² The level of care and affection that farmers gave their draft animals varied widely by region and household.

⁶⁵¹ Hoover Institution, Communist Chinese Political Movement Collection, Box 3, Folder 22, "Reports on Spring Farming Sabotage Cases" 1956, (file 保障春耕生產, 福建省閩侯地區中級人民法院).

⁶⁵² Fenghuang xian nongye zhi bianzuan weiyuanhui 凤凰县农业志编纂委员会 Fenghuang county agricultural gazetteer compilation committee, Fenghuang xian nongye zhi dibazhang yangzhiye 凤凰县农业志第八章养殖业 [Fenghuang County Agricultural Gazetteer, Volume 8, Animal Husbandry], Hunan People’s Press 湖南人民出版社 (1999), p. 274.

Cattle were not pets, but working animals. Yet, just as among humans, sharing food was not merely a utilitarian act of energy intake, but also a way to demonstrate and strengthen bonds of affection and care.

Confiscatory Taxation and Energetic Bankruptcy

Seeking to feed urbanites, the PRC government undermined two interrelated goals: increasing grain yields, and boosting the draft animal population. Attempting to support industrial workers by subsidizing the price of staple foods, top leaders launched the “unified procurement and sale” of grain in 1953. City residents could enjoy low-priced grains such as wheat and rice, while farmers were compelled to accept artificially low rates for their yield. The procurement policy functioned as a redistributive tax on the nation’s food energy wealth.

Because livestock ate mostly grass and other plant debris inedible by humans, a relatively small portion of their nutrition came from energy-rich grains. Still, the state’s confiscatory quotas for grain also contributed to malnutrition and muscular atrophy among draft cattle. Farmers in Shanxi Province’s Lu’an County could keep just 240 *jin* [144 kg] of grain for an ox, when the animals actually needed 300 *jin*. Furthermore, the state’s harsh requisition policy left some farmers no choice but to eat the grain allotted to their livestock. Eight households in one village consumed 1,200 *jin* of fodder grain. On their reduced diets, oxen lost stamina and their daily plowing capacity plummeted from 5.0 *mu* to 3.8 *mu*. Four of the forty draft animals in one cooperative were unable help plant wheat. Bovine reproduction also declined, as farmers exclaimed, “If we don’t allow

calves to eat fodder, they won't be able to grow up!"⁶⁵³ During Spring 1955, the grain requisition worsened the large-scale famine and social turmoil in northern Shanxi. Farmers not only slaughtered or sold their draft animals but also ate their dogs and cats. Parents got divorced and sold their children, and thousands of people fled the famine zone. Farmers lamented their "extremely limited" production of manure, saying "People and livestock have nothing to eat, so how could we have the energy to take part in production or fertilize the fields?"⁶⁵⁴ Animals outside Shanxi also suffered, as desperate farmers in Anhui Province's Linquan County slaughtered 58.5% of their cattle in 1954.⁶⁵⁵

Having effectively overtaxed the food energy of rural human and bovine populations, the national government made amends by suggesting less energy-dense substitutes, and imposing what amounted to a corvée tax for fodder collection. In early 1955, the CCP's Central Committee acknowledged that in some places, "deviations" in grain procurement had left little or no grain for cattle. To correct the problem, the Grain Ministry was to "conscientiously leave farmers a certain amount of grain for feeding their livestock." Furthermore, in areas where grain procurement had left inadequate fodder supplies, the local government organs should supply miscellaneous grains or sweet potato

⁶⁵³ Zhang Xiaoling 张晓玲, *Zhongnong de richang shenghuo (1953-1956) – Tonggou tongxiao zhiduxia guojia yu nongmin de guanxi* 中农的日常生活 (1953-1956) -- 统购统销制度下国家与农民的关系 ["Everyday Life of Middle Peasants from 1953 to 1956—on the Relation of Nation and Peasants in State Monopoly for Purchasing and Marketing"], *Journal of South China Agricultural University*, Volume 12, Number 1, 2013, p. 154.

⁶⁵⁴ Minzheng ting 民政廳 [Civil affairs office] *Guanyu yanbei diqu chunhuang qingkuang de baogao* 關於雁北地區春荒情況的報告 ["A report on the spring famine in northern Shanxi"], *Shanxi Zhengbao* 山西政报, April 4, 1955, p. 35 [Accessed at oversea.cnki.net]

⁶⁵⁵ Qin Cheng-jie 秦程节, *Liangshi tonggou tongxiao shiyuxia guojia yu nongmin guanxi* 粮食统购统销视域下国家与农民关系 ["Relationship Between the State and Farmers From the Perspective of Grain Purchase and Sale"], *Journal of Beijing University of Technology (Social Sciences Edition)* December 2015, p. 59 [Accessed at wanfangdata.com.cn].

leaves to fill the gap. Supply and marketing cooperatives were to provide crop stalks and residues for fodder. Furthermore, cadres were to “mobilize the masses” and urge them to “proactively seek alternate fodders,” teaching them to “meticulously feed livestock on coarse grasses.”⁶⁵⁶ Farmers had to do extra work to provide less nutritious fodders for their oxen so that the industrially-productive and agriculturally-idle people of the cities could access the concentrated energy stored in grain.

In recent years, scholars have revealed the uneven distribution of human deaths nationwide during the famine that resulted from the Great Leap Forward. Bovine mortality also showed variation by region and breed. With their scientifically formulated diets, valuable genetic stock, and urban concentration, dairy cattle were exceptional bovines. While populations of oxen and water buffaloes often fell precipitously during the Great Leap famine of 1959-1961, dairy cattle numbers remained stable or even rose.

Data from two major sites of dairy production, the city of Chengdu in Sichuan Province, and Jiangsu Province, demonstrate the disparity in mortality across varieties of bovines (**Figures 1 and 2**. Relevant dates 1958-1961 are highlighted). In both locations, the absolute numbers of dairy cattle were only a small fraction of the ox and water buffalo populations. The birth or death of each dairy cow, therefore, had a greater effect on the breed’s percentage change in population relative to the previous year. The anomalous 30% drop in Chengdu’s dairy cattle population in 1950, for instance, reflects a

⁶⁵⁶ Zhonghua renmin gongheguo guojia nongye weiyuanhui bangongting bian 中华人民共和国国家农业委员会办公厅编 [PRC National Agriculture Committee Office, ed.], *Nongye jitihua zhongyao wenjian huibian (1949-1957) shangce* 农业集体化重要文件汇编 (1949-1957) 上册 [*Collection of important documents relating to agricultural collectivization (1949-1957) Volume 1*] 中共中央关于大力保护耕畜的紧急指示 [Central Committee’s urgent directive on protecting draft animals] January 15, 1955, CCP Central Party School Press, 中共中央党校出版社 p. 281.

comparatively small loss of approximately six hundred animals. Nevertheless, the overall pattern is clear. Table 5.1 shows that in Chengdu in 1958, when both cattle and water buffalo populations fell by 5%, the number of dairy cows held steady. The following year, when the ox and water buffalo populations fell by 7% and 5%, respectively, the dairy cattle numbers *increased* by 16%. The effect was even more striking during 1960, when ox and water buffalo populations respectively fell by 12% and 6%, while the dairy cattle numbers rose by 20%. Table 5.2 shows that while the cattle population in Jiangsu fell by 5% in 1960, and water buffalo increased by 2%, the dairy cow population showed a hefty 33% increase.

Table 5.1: Bovine Populations of Chengdu, 1949-1963 (unit: head of cattle)

Year	Cattle (黃牛)	Percentage change relative to previous year (cattle)	Water Buffalo (水牛)	Percentage change relative to previous year (water buffalo)	Dairy Cows (乳牛)	Percentage change relative to previous year (dairy cows)
1949	77854	x	101353	x	1973	x
1950	80060	3%	104890	3%	1381	-30%
1951	86224	8%	111083	6%	1465	6%
1952	92311	7%	117066	5%	1550	6%
1953	95440	3%	121295	4%	1643	6%
1954	93416	-2%	122869	1%	1745	6%
1955	95547	2%	127102	3%	1857	6%
1956	94594	-1%	134545	6%	2682	44%
1957	85957	-9%	142959	6%	3052	14%
1958	81792	-5%	135942	-5%	3060	0%
1959	75898	-7%	132415	-3%	3560	16%
1960	66559	-12%	124111	-6%	4263	20%
1961	60004	-10%	118980	-4%	4230	-1%
1962	60857	1%	122695	3%	4190	-1%
1963	63654	5%	129359	5%	4727	13%

Data Source: *Chengdu Agricultural Gazetteer*, p.544.

Table 5.2: Bovine Populations of Jiangsu Province, 1949-1963 (unit: head of cattle)

Year	Cattle (黃牛)	Percentage change relative to previous year (cattle)	Water Buffalo (水牛)	Percentage change relative to previous year (water buffalo)	Dairy Cows (乳牛)	Percentage change relative to previous year (dairy cows)
1949	711200		482900		1100	
1950	726900	2%	501100	4%	1200	9%
1951	771700	6%	515100	3%	1400	17%
1952	97200	26%	507600	-1%	1600	14%
1953	850900	-12%	510100	0%	1800	13%
1954	96400	13%	531300	4%	2100	17%
1955	1019300	6%	548400	3%	2500	19%
1956	1054400	3%	568500	4%	2800	12%
1957	927500	-12%	549100	-3%	3000	7%
1958	853900	-8%	54600	-1%	3700	23%
1959	77800	-9%	541400	-1%	4300	16%
1960	737500	-5%	551500	2%	5700	33%
1961	685400	-7%	53100	-4%	5600	-2%
1962	682300	0%	53300	0%	6100	9%
1963	646400	-5%	522700	-2%	6500	7%

Data Source: *Jiangsu Livestock Gazetteer* (2000) p.123

These provincial-level data obscure the fact that bovine emaciation and mortality varied widely *within* provinces. This variation resulted from factors including the breed of the animals, local crops, topography, and the severity of local natural disasters. In early 1961, a veterinary inspection team in Jiangsu Province found that: 1) water buffalo were

heavier and thus healthier than cattle 2) bovines in farming regions were heavier than those in cotton-producing regions 3) animals in mountainous areas were heavier than those on flatlands, and 4) bovines in areas with ample harvests were heavier than those in flooded areas.⁶⁵⁷ The data in Table 5.2 tend to support the team's findings about water buffalo, as annual population decreases during the Great Leap Years for this breed ranged from 1%-4%, as compared to 5%-9% for cattle. Furthermore, the inspectors' finding of better health among animals in mountainous areas reflected the availability of alternate food sources in hillside forests and meadows. Heavier animals in non-flooded areas, meanwhile, reflected the challenge of providing adequate fodder to disaster-stricken regions. This uneven distribution of bovine suffering merits the attention of historians. Just as with humans, these intelligent animals' experiences of the Great Leap famine varied substantially due to many factors beyond their control.

⁶⁵⁷ JPA 4069-001-0067 Jiangsusheng nongliting chumu shouyi ju 江苏省农林厅 畜牧兽医局 [Jiangsu province department of agriculture and forestry, veterinary medicine division] Benting chumu shengchan yijiuliuling nian zongjie he yijiuliuyi nian yijian 本厅 畜牧生产一九六〇年总结和一九六一年意见 [This office's summary of livestock production in 1960 and suggestions for 1961].

Table 5.3: National Bovine Population, 1949-1962 (unit: head of cattle)⁶⁵⁸

Year	Bovine Population	Percentage change relative to previous year
1949	43,936,000	x
1950	48,103,000	9.48%
1951	52,088,000	8.28%
1952	56,600,000	8.66%
1953	60,033,000	6.07%
1954	63,623,000	5.98%
1955	65,951,000	3.66%
1956	66,601,000	0.99%
1957	63,612,000	-4.49%
1958	59,069,000	-7.14%
1959	61,094,000	3.43%
1960	57,443,000	-5.98%
1961	55,005,000	-4.24%
1962	55,717,000	1.29%

⁶⁵⁸ Zhongguo tongji nianjian 中国统计年鉴 1981 [*China Statistical Yearbook 1981*] Zhongguo tongji chubanshe 中国统计出版社 (1982) p. 162 [Accessed via 中华数字书苑 China Digital Library].

Several factors complicate statistical analysis of bovine deaths during this period. Most significant are the selective data sets in gazetteers and yearbooks, which frequently omit population numbers for the key years of interest, i.e. 1959-1961. Furthermore, because the data include only population numbers, it is impossible to determine whether mortality was due to illness, slaughter for consumption, or caloric deficit from overwork and undernourishment. Additionally, the nationwide data in Table 5.3 lose some analytical value by aggregating all bovines, regardless of breed. Finally, because the data show cattle populations at year-end, animals who were born and died in the same year are omitted, potentially causing a downward bias in mortality rates. Because calves are particularly vulnerable to illness and starvation, and were generally considered a lesser priority for feeding and care than their laboring peers, the number of uncounted calf deaths is likely non-trivial.

Despite the shortcomings of the data, there is evidence for one important finding. Like human deaths during the famine, bovine fatalities were unevenly distributed across the country. Table 5.3 shows a nationwide *increase* of 3.43% in bovine numbers during 1959, contrasting sharply with the losses of 9% for cattle in Chengdu, 7% in Chengdu and 11% in Shandong Province.⁶⁵⁹ Evidently, increases in some areas more than compensated for sharp losses in others. More research is required to demonstrate the causes of this variation. The historian Anthony Garnaut has shown that during the Leap,

⁶⁵⁹*Shandong Province Agricultural Gazetteer*, p. 583-584.

transport routes were “conduits for famine.”⁶⁶⁰ Due to “the practical difficulty of moving large quantities of grain over long distances,” the most devastated counties were not the most remote, but rather rural areas closest to the rail routes which the state used to extract grain for urban consumption.⁶⁶¹ Although humans and cattle did not usually compete directly for the food energy stored in fine grains such as rice and wheat, desperately hungry people did consume coarse fodders intended for pigs and cattle.⁶⁶² It is therefore plausible that the most cattle starved or were eaten in counties where the most people starved. In addition to the dearth of fodder, severely malnourished people struggle to provide the meticulous and labor-intensive care that cattle require. Regardless of the exact causes and conditions of mass bovine death, the uneven distribution of suffering is itself noteworthy. Rather than a flat, unambiguous narrative of hunger and privation, the suffering of both humans and nonhumans varied along with features of their habitats.

Slow Violence and Communal Death

In early winter 1960, an inspection team visiting the Kongzhai Commune in Shanxi Province produced a vivid account of disastrous livestock husbandry at the height of the Great Leap Forward. Twelve animals, including six oxen, two donkeys, and a mule, had died after a heavy snowfall in late November. Even the surviving animals were “as skinny as firewood, and not a single one [was] plump or strong.” The inspectors

⁶⁶⁰ Anthony Garnaut, “The Geography of the Great Leap Famine,” *Modern China*, Vol. 40, No. 3 (May 2014), p. 338.

⁶⁶¹ Garnaut, “Geography,” p. 332.

⁶⁶² Yang Jisheng, *Tombstone*, p.177.

found that “inadequate fodder, improper feeding management, and excessive labor” were responsible for the deaths.⁶⁶³ The local Party committee redistributed the report to all commune heads in the county, suggesting that Kongzhai’s problems were not unique. With 60,000 human deaths, Shanxi Province was relatively unscathed by the Great Leap famine of 1959-1961, which claimed tens of millions of lives nationwide.⁶⁶⁴ The suffering of both humans and animals in Kongzhai, while acute, thus gives a conservative picture of the horrors of this period.

The first problem in Kongzhai was poor management of the already-inadequate winter fodder. At least one production brigade had consumed all of its fodder grass by mid-November. To ameliorate this shortage, four carts traveled each day to buy grass from a commune 60 kilometers away. A round trip took four days, yielding only enough grass for a single day. The inspectors noted that the commune had “no reserve at all,” and snowstorms cut off the supply. For the Kongzhai livestock keepers to continue these trips despite their length and near-futility, the shortage of grass must have been severe and widespread. Furthermore, human grain and livestock fodder were stored in the same warehouse, which did not use the “three lock” system for accountability. The animals got an average of one *jin* of wheat husks per day, and feeders lamented that “the three *jin* of

⁶⁶³ ECNU File B 0357-053-021, CCP Hongdong County Committee 中共洪洞县委《中共洪洞县委批转驻孔寨公社地委工作组关于牲口病弱死亡情况的报告》 [Forwarding the CCP Hongdong County Committee Report on the Sickness and Deaths of Livestock Produced by the Work Team Stationed in Kongzhai Commune] December 18, 1960.

⁶⁶⁴ Cao Shuji 曹樹基, *Dajihuang: yijiuwujiu-yijiuliuyi nian de Zhongguo renkou* 大饑荒：一九五九—一九六一年的人口 [The Great Famine: Population of China, 1959-1961], 香港：時代國際出版社 Hong Kong: Times International Publishing, p. 278. Cao cites Bi Shilin, ed. 畢士林主編《中國人口：山西分冊》 [China’s Population: Shanxi Province], p. 97.

husks left over when people eat flour are not even as good as a *jin* of grain.” Although grain was in very short supply, it was spilled all over the stables.⁶⁶⁵

In addition to fodder shortages, poor husbandry practices exacerbated the animals’ parlous situation. Without rewards or punishments for any tasks except breeding, the feeders were unable to “express their enthusiasm” for tending to the animals. Water basins and troughs were uncovered, and many were angled so that the animals had “extreme difficulty” eating from them. Poor hygiene was rampant, and the animals could not stand or sit comfortably in their cramped and manure-filled pens, which “seriously affect[ed] their health.” Twelve of the fifty-five cattle had ringworm, but only two were quarantined. When the inspectors suggested feeding the infected animals separately, one caretaker harrumphed, “I’ve raised livestock my whole life, and I’ve never heard that ringworm is contagious among cattle.” The inspectors’ complaint that the feeders “did not understand scientific methods for raising livestock” was true enough.⁶⁶⁶ More to the point, the commune’s concentrated method of feeding was unfamiliar to most farmers. Seasonally sharing and rotating the feeding and use of livestock among farm households had previously been the norm. Even someone with years of experience tending cattle had probably never been responsible for looking after so many animals over so long a time.

Finally, the inspectors found that the animals were working much too hard. As feeding and labor were managed separately, many animals were burning off more energy than they ate. Each of the 27 animals capable of plowing was responsible for 51 of the

⁶⁶⁵ ECNU File B 0357-053-021, CCP Hongdong County Committee.

⁶⁶⁶ *Ibid.*

commune's 1,400 *mu*, well past the upper limit of a reasonable work load. Working "all day long, all year round," the beasts could not rest easy after coming in from the fields. Every day after the autumn harvest and the planting of winter wheat, one "scrawny donkey" was hitched to a mill to grind grain until, one evening, he died.⁶⁶⁷

In short, the inspectors identified a number of serious, specific, interrelated problems whose correction would improve the welfare of the livestock by reversing their caloric deficit. The immune system of a malnourished, overworked ox struggled to repel pathogens such as ringworm. An infected animal steadily lost scarce nutrients to its parasitic hangers-on. Lacking clean straw on which to rest their heavy bodies, the animals burned precious calories standing in their filthy stalls. The biting cold of the Shanxi winter further drained the animals' energy reserves. Poorly motivated and inexperienced feeders, working in isolation from the commune members who put the animals to work, had neither the inclination nor the ability to help the animals recuperate.

Unfortunately for the cattle, the county Party committee blamed the disaster on political saboteurs in the feeding teams. Calling for all communes to "decisively eliminate impure elements," the committee insisted that feeders be "politically reliable poor or lower middle peasants and activists who love livestock and have abundant experience." After establishing teams that were "both red [i.e. loyal to the Party] and expert," communes were not to "casually" disband them.⁶⁶⁸ While also offering vague suggestions to "appropriately reduce the workload of the animals" and "thoroughly confirm that winter preparations are adequate," the county Party committee was chiefly

⁶⁶⁷ Ibid.

⁶⁶⁸ Ibid.

concerned about devious wrongdoers. Focusing blame on shadowy political enemies was easier and safer than taking specific measures to reduce draft animal mortality, or questioning the extravagant waste of labor and resources endemic to the commune system of the Great Leap Forward.

Agriculture officials in Jiangsu Province shared this preference for confronting low-level malfeasance rather than addressing the systemic irrationality of the Great Leap. Between January and April 1960, investigators found that “only” 8% of the nearly 1.5 million draft animals in the province were at the perilous body size of six *biao* 膘, which represented “a large improvement over previous years.” Still, approximately 3,000 animals had died in the Grand Canal irrigation construction campaign of the last half year. Despite the efforts of the Agriculture and Forestry Department to coordinate with the Departments of Irrigation and Grain, these “old and weak draft animals” were carried off by “extreme frost, excessive work quotas, and inadequate grass, fodder, and water.” According to this analysis, the problem was not that national leaders’ plan for rapid infrastructure construction required dragooning thousands of animals and farmers into grueling non-farm tasks during the winter, which was customarily a period of rest and recovery after the demanding work of the autumn. Rather, poor coordination among provincial government organs was at fault. Similarly, the report found that draft animals were dying unnecessarily because “feeding teams are impure and management is poor.” More precisely, “In certain areas, before the rectification of feeding teams, a small number of landlords, rich peasants, counterrevolutionaries, and bad elements sneaked in, and poisoned and killed draft animals.” Bad elements in one county “poisoned animals

and frightened the masses into slaughtering 44 draft animals.”⁶⁶⁹ The scale of emaciation and excess mortality among draft animals province-wide suggests that officials found it convenient to exaggerate the relatively insignificant problem of malevolent class enemies.

Bovine suffering in Jiangsu Province intensified in November and December of 1960, as 13,000 draft animals were culled in the Huayin Special District 淮陰專區. Two-thirds of these animals were culled despite being in good health, while one third were due for culling but died of other causes. Veterinary inspectors noted that this phenomenon “had never been seen in any previous year.”⁶⁷⁰ Because “culling” typically refers to killing old, lame, or otherwise unfit animals, the use of the term here demands scrutiny. Both the Nationalist and Communist governments strictly forbade the culling of healthy working animals, which were a vital source of farm labor. In this case, it is likely that desperately hungry farmers slaughtered and ate healthy animals in the belief that the beasts would only lose weight during the coming winter. With little prospect that the animals would live long enough to plow again, commune members made the rational if ultimately self-defeating choice to cut their losses by eating beef in late autumn and early winter.

The disruption of the intra-provincial ox trade further distorted bovine demographics and increased the animals’ risk of slaughter. Veterinary inspectors explained that farmers near cities such as Suzhou and Wuxi had always procured draft

⁶⁶⁹ JPA 4069-003-061 本厅畜牧生产情况和报告 [Agricultural Office’s Report on Livestock Production and Situation], April 1960.

⁶⁷⁰ JPA 4069-001-0067, “This office’s summary”.

animals from elsewhere, buying oxen in the spring and selling them in the autumn. But because “the external supply lines have been disrupted” and local breeding could not make up the difference, the ratio of old oxen was increasing. As these animals were culled, the total number of draft animals continued to decline.⁶⁷¹ Whereas the ox trade had once offered a way to maintain bovine numbers during winter by reallocating animals to areas with ample energetic resources, the new restrictions on commerce compelled areas with inadequate fodder to thin their herds during the unforgiving winter months.

Because bovine mortality statistics do not specify cause of death, it is difficult to disaggregate bovines who died of starvation or overwork from those who froze. In any case, the animals perished due to an extreme caloric deficit. A report on frequent large-scale deaths among cattle overwintering on the plains of Manitoba, Canada provides empirical evidence about the progression of a fatal energetic deficit. Prolonged starvation reduces cattle to Level 1 on the nine-point Wagner Body Condition Scoring System (BCS). At this “severe” level of emaciation, “all ribs and bone structure [are] easily visible,” a condition that appears frequently in Leap-era reports. The animal has difficulty standing or walking, and “become[s] recumbent to conserve metabolic resources.” This further reduces the animal’s core temperature, “decreasing the efficiency of skeletal muscle making it difficult to regain the standing position.” As the body temperature nears 28 degrees Centigrade [82 degrees Fahrenheit], the animal’s “rumen microflora die *en*

⁶⁷¹ Ibid.

masse.”⁶⁷² In addition to extreme cold, the microbes in the rumen are also vulnerable to malnutrition. As one author explains, “The ruminant is unique in its response to malnutrition because ruminal microorganisms become malnourished just as their host does.”⁶⁷³ Having lost its microbial symbiotes, the ruminant is unable to digest plant matter and “recovery is unlikely” even if caretakers provide adequate fodder and warmth.⁶⁷⁴ After the rumen microflora die of malnutrition or cold, a recumbent animal typically dies of cardiac arrest when its body temperature reaches approximately 20 degrees Centigrade.⁶⁷⁵ Death concludes a vicious cycle: weakness due to emaciation leads to recumbency, which lowers the animal’s core temperature and impairs digestion, causing further emaciation, unto death.

In addition to these physical symptoms, the evidence permits an interpretation of the animals’ mental states as they died. Despite their poor health, animals in BCS 1 are often “bright and alert.” Photos of a “presumed cow-calf pair found *in situ* in a wooded area” show a cream-colored calf and reddish cow [Figure 5.4 and Figure 5.5]. The lack of “fecal build-up behind the calf carcass” indicates that the young animal died shortly after collapsing to the ground. By contrast, “significant evidence of intestinal emptying of the cow” leads experts to conclude that “she initially became recumbent in the lower edge of the photo and over several days crawled into position to die in contact with the carcass of

⁶⁷² Terry L. Whiting, Rosemary C. Postey, et al. “Explanatory model of cattle death by starvation in Manitoba: Forensic evaluation,” *Canadian Veterinary Journal*, Vol. 53, November 2012, pp. 1173-1174. [Accessed at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474572/>].

⁶⁷³ Garrett R. Oetzel, “Protein-Energy Malnutrition in Ruminants,” *Veterinary Clinics of North America: Food Animal Practice*, Volume. 4, Number 2, July 1988, p. 328.

⁶⁷⁴ *Ibid.*

⁶⁷⁵ Whiting, Postey, et al. “Explanatory model,” p. 1173-1174. [Accessed at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474572/>].

her calf.”⁶⁷⁶ Notwithstanding the scientists’ observational mode of analysis, no great interpretive leap is necessary to suggest that the bovine mother’s bond with her calf remains intact despite formidable, ultimately fatal, physical hardship.



Figure 5.3: Presumed cow-calf pair, Manitoba, Canada⁶⁷⁷

⁶⁷⁶ Ibid.

⁶⁷⁷ Whiting, Postey et al. “Explanatory model,” p. 1177.



Figure 5.4: Cow-calf pair with maternal fecal matter trail.⁶⁷⁸

Energetic Bankruptcy: Not Just for Humans

Like the Hydra of Greek myth, bovine mortality during the Great Leap Forward had many fearsome faces that grew from a common root: extreme caloric deficit.

⁶⁷⁸ Ibid.

Whether an animal died of starvation, overwork, or freezing, he or she ultimately reached what we can call “energetic bankruptcy.” Even healthy animals who died swiftly by slaughter can also be considered victims of the energy deficit, as their desperate human symbiotes prematurely culled them to keep from starving. Describing the suffering of colonial subjects of occupied Korea during the Pacific War, the historian David Fedman has used Rob Nixon’s concept of “slow violence.” This “incremental and accretive” process of “attritional lethality” damaged both the people and environment of Korea when the Japanese military regime fueled its wartime aggression by extracting excessive wood and coal from the colony. While Fedman places slow violence in the context of people’s “everyday existence under colonial rule,” the experience of Chinese bovines during the Great Leap Forward shows that this concept also applies to nonhumans in sovereign nations at peace.⁶⁷⁹

To stimulate the energy economy for bovine consumers, both the KMT and CCP governments relied on massive infusions of plant matter from newly opened grasslands, as well as imported forage grasses. At the same time, the New Ecologists called for scientific management of the nation’s prairies and livestock populations, and of the human farmers and herders who maintained them. These policies, as well as political stability and widespread veterinary vaccination, initially helped bovine population numbers recover from their low levels during the Japanese occupation and civil war. These interventions drove the “internal Anthropocene” for bacteria in bovine digestive

⁶⁷⁹ David Fedman, “Wartime Forestry and the ‘Low Temperature Lifestyle’ in Late Colonial Korea, 1937–1945,” *The Journal of Asian Studies*, Vol. 77, No. 2 (May) 2018: p. 335 [doi:10.1017/S0021911817001371]

tracts, much as state-supported fossil fuel consumption over the past two centuries has propelled the planetary Anthropocene.⁶⁸⁰ On the global scale, as well as within a single cow's rumen, humans in pursuit of economic gains inadvertently modified the living environments and biodiversity of complex ecosystems.

Still, the central government did not always direct its financial or biological resources to the benefit of rural populations, whether bovine, bacterial, or human. During the mid-1950s, top CCP leaders pursued economic growth via urban industrialization, extracting vast amounts of food energy from the countryside. By mismanaging the botanical "currency" of grass and crop debris, and by channeling bovine labor into fruitless distractions such as shoddy hydraulic projects during the Great Leap Forward, the state fatally undermined the welfare of humans and their bacterial and bovine symbiotes.

⁶⁸⁰ For government backing and protection of fossil fuels, see among others Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil*, New York: Verso, 2011.

Chapter 6 Blood: Disassembling Cattle to Build a Strong Nation

Breaking Barriers around Bovine Bodies

Taking the perspective of bovines, this chapter challenges human-centered assumptions about the nature and significance of three major, overlapping developments during the mid-20th century. First, it shows how the lives of sentient nonhuman Chinese subjects intersected with the expanding capacity of two key technological innovations: refrigeration and railroads. These devices brought convenience and opportunity to humans. For cattle, they had the effect of demolishing geographical and temporal barriers that had hindered the growth of national and global markets for bovine bodies. By compressing space and time, these inventions gave humans the upper hand in the race against microbial spoilage of meat. Furthermore, although humans usually described them in instrumental language, cattle were not simply passive raw materials, some kind of four-legged coal to be shoveled into the furnace of industrial modernity. Lacking political clout, these sentient animals nevertheless compelled humans to arrange the growing logistical and industrial infrastructure to accommodate their emotions, behaviors, and metabolism. Vehicles, architecture, and tools for transporting, confining, killing, and preserving bovines took into account the unpredictable and dangerous actions of these mighty mammals.

Next, the chapter examines how cattle experienced their changing status in humans' religious and ethical discourses. For centuries, cattle were active participants in the making and maintenance of ethical precepts that forbade their killing. Bovines earned

their privileged position with years of loyalty and toil. Pulling plows through muddy fields, or hauling wagons down dusty roads, these animals were genuine friends and colleagues to their human owners. But when notions of vigorous nationalism combined with the state's efforts to demystify and commodify these sentient nonhumans, the protective bonds of affection and mercy frayed beyond repair, with doleful consequences for the animals' wellbeing.

Finally, we will see how bovines experienced the construction of what the historian Ruth Rogaski has termed "hygienic modernity." Japanese imperialists and Chinese elites of the late 19th and early 20th centuries used the concepts of hygiene and public health to focus "concerns of national sovereignty, institutional discipline, and government administration on the site of the body."⁶⁸¹ Power and legitimacy accrued to experts and officials who created a healthy populace by building sewers, vaccinating citizens, and regulating the slaughter and processing of livestock. Rogaski acknowledges that her own study has "only occasionally hinted at how subalterns intersected with this vision."⁶⁸² This chapter will extend Rogaski's powerful analytical framework beyond the "hypercolony" of Tianjin and into the late 1950s, while showing what hygienic modernity meant for sentient nonhuman subalterns. Once again, these animals were not merely passive objects, acted upon by public health officials and veterinarians. Bovines had emotional and physiological reactions to their new roles in the food and public health systems. Before widespread veterinary inspection of livestock and freezing of their carcasses, the threat of bacterial contagion offered these animals a measure of safety from

⁶⁸¹ Ruth Rogaski, *Hygienic Modernity*, p.300.

⁶⁸² *Ibid.*

humans eager to consume them. By adopting Western methods of killing and preserving cattle, Chinese elites secured a safe source of calories for domestic and foreign consumption. At the same time, they stripped bovines and other livestock of a formidable bulwark against human consumption: the risk of painful or even lethal food poisoning.

Battle with Bacteria

As with so many other aspects of bovine life, changes in slaughter owed much to improvements in humans' understanding and control of microbial threats. Chapter 1 on dairy production showed how condensing or canning protected milk from bacterial infestation. The processed beverage connected grassland herds to urban consumers, facilitating the rise of a national dairy industry. Chapter 2 on disease control showed how, by tailoring its vaccination practices to the challenging environment of wartime and postwar China, the government was finally able to prevent the deaths of millions of precious bovine assets each year. Chapter 7 on reproduction will show how antibiotics contributed to artificial insemination by allowing tubes of genetic material to traverse vast distances, thus permitting state authorities to manipulate the reproduction of herds as never before. Chapter 5 addressed the bacterial digestion of various fodder crops in ruminants' stomachs. In this chapter, railroads and refrigerators allowed the state to circumvent bacteria to feed urban populations with the flesh of faraway herds. Furthermore, the government's concern with preventing outbreaks of foodborne pathogens, and its growing ability to process vast amounts of animal tissue into non-perishable forms, meant that industrial slaughterhouses superseded the non-hygienic,

wasteful butcher shops of earlier times. While microbes do not satisfy most definitions of historical agency, humans expended considerable resources in the struggle with these formidable life forms.

Although humans often blame the decay of foods on spatial and temporal distance from production, bacteria are often at fault. “Microbial spoilage is by far the most common cause of spoilage,” argue scientists.⁶⁸³ As they digest fruits, grains, and meat, microbes’ metabolic processes create compounds that can make these foods unpalatable or toxic to humans. Because many bacteria flourish in warm, wet environments, humans can inhibit the growth of these microorganisms by cooling and drying food. Refrigeration and freezing thus allow humans to overcome apparent spatial or temporal limits on the freshness of food. While fresh cherries may go bad on a trip across a state, frozen cherries are virtually unchanged by shipment from Chile to California. Likewise, by freezing a piece of their wedding cake, a married couple can enjoy (or at least safely ingest) the symbolic slab a full year after taking the vows of matrimony. In both cases, humans protect their precious calories from hungry bacteria by expending energy to cool the foods below the microbes’ optimal level.

The struggle for calories between humans and bacteria shaped the final hours of cattle. Confinement and dietary restrictions prevented bacteria from reducing the value of cattle awaiting slaughter. One authoritative handbook published in 1961 advised that livestock and poultry should rest for at least three days before slaughter. Due to the changes in their environment and “the shocks they endured” during shipping, animals

⁶⁸³ Lone Gram, Lars Ravn, et al., “Food spoilage—interactions between food spoilage bacteria,” *International Journal of Food Microbiology* 78 (2002): 79-97.

became anxious and exhausted. Weary animals' immune systems were "greatly compromised," and they became easy targets for microbes.⁶⁸⁴ Especially if their blood was improperly drained, their carcasses were likely to rot, reducing the quality and shelf life of their meat.⁶⁸⁵ Furthermore, by halting feeding 24 hours before slaughter, butchers could lower the risk of contamination, "preventing the contents of the stomach from spilling out during bloodletting."⁶⁸⁶ This anti-bacterial waiting period was not a time of relaxation for the cattle. The handbook reminded slaughterhouse workers not to strike the confined bovines with bamboo rods or whips, and to keep them from "falling, slipping, colliding, trampling, crushing, crowding, and biting" each other, which would "unnecessarily affect the quality of the food products." Depending on the season, sunstroke and hypothermia were additional hazards. Painful or lethal for the animals, they also "caused difficulties in skinning or plucking."⁶⁸⁷ Having shepherded these animals through years of growth, the government was loath to let microbes sabotage its investment. For cattle on the threshold of death, the state's battle with bacteria meant several days of fear, hunger, and pain.

Because bacteria thrive in carcasses, increasing refrigeration capacity was the linchpin of government efforts to extract additional value from bovines. Earlier chapters on dairy production and rinderpest vaccination have shown how limited China's refrigeration capacity was in the 1950s. This compelled food producers and veterinarians

⁶⁸⁴ Dongbei Nongxueyuan bian 东北农学院编 Dongbei Agricultural Academy, ed. Gaodeng nongye yuanxiao shiyong jiaocai : chuchan jiagongxue 高等农业院校试用教材：畜产品加工学, 沈阳 [*High-level Agricultural Academy Trial Materials: Livestock Product Processing*] Shenyang: June 1961, p.1.

⁶⁸⁵ Ibid.

⁶⁸⁶ Dongbei Nongxueyuan, *High-level Agricultural*, p.2.

⁶⁸⁷ Ibid.,

to use alternate methods of preventing bacterial decay. The process of creating milk powder by evaporating water from dairy yielded a stable, sterile product that could be easily stored and shipped. But powdering was not an option for meat. Curing with salt is one way of dehydrating meats such as pork to create an inhospitable environment for bacteria. Unlike freezing, salting can be done practically anywhere, and cured meat retains its freshness without additional energy inputs. But as one scholar explains, because beef consists of “longer muscles and connective tissue and relatively lean composition,” the curing process tends to leave it “relatively unpalatable.”⁶⁸⁸ More importantly, salting could not preserve the carcasses’ lucrative ancillary products, such as glands and viscera. Freezing produced tastier meat, and allowed the state to capture more value from the animal’s body. Furthermore, due to the nation’s short supply of freezing and refrigeration equipment in during the 1940s-1950s, cooling processes were restricted to cities and industrial sites with abundant supplies of electricity. Cities thus offered not only proximity to large numbers of well-off consumers, as well as rail lines and ports for convenient shipping, but also the industrial capacity to process and keep large volumes of animal tissue safe from voracious microbes. The interplay of geographic, industrial, and biophysical factors meant that increasing numbers of bovines would face their final hours in mechanized, urban abattoirs.

Freezers and Railroads in the Lives of Bovines

⁶⁸⁸ Roger Horowitz, *Putting Meat on the American Table: Taste, Technology, Transformation*. Baltimore: Johns Hopkins University Press, 2006, p.18-19.

The scale of concentrated, industrial slaughter increased in tandem with refrigeration capacity during the period of this study. Official estimates of the country's freezer capacity before 1949 ranged from ten- to twenty-thousand tons. In less than a decade, according to a Xinhua report, the capacity had increased twentyfold, to 400,000 tons.⁶⁸⁹ During the first Five Year Plan, between 1953-1957, nineteen new large-scale meat processing plants were constructed in cities such as Xi'an, Chengdu, and Nanchang.⁶⁹⁰ By late 1961, what one newspaper called "China's largest meat products processing plant" in the Inner Mongolian city of Hailar was killing and processing one ox every two minutes, at a rate of one thousand cattle per day. Its "enormous" freezer could freeze 30 tons of meat at once. In addition to beef, the facility produced over 50 kinds of industrial raw materials and medicines.⁶⁹¹ Artificial cooling was essential for year-round slaughter on this scale.

Freezing also permitted humans to harvest valuable ancillary products from carcasses. As early as 1940, the *North-China Daily News* reported that British government-run slaughterhouses were concocting "drugs of great value" with glands extracted from carcasses. Adrenaline, for instance, was prepared with the "supra-renal gland," and was "invaluable for the prevention of bleeding and the treatment of asthma." The paper emphasized, "Glands have to be frozen immediately so that the vital properties

⁶⁸⁹ Hoover Institution Collection, Box 67, Roulei jiagong gongye 肉类加工工业 ["Meat processing industry"], November 24, 1957 [publication illegible on original, possibly HK Da Gong Bao?].

⁶⁹⁰Ibid.

⁶⁹¹ Hoover Institution Collection, Box 67, Zhongguo zuida roulei gongchang, rizai niuyang wuqian yutou 中國最大肉類工廠，日宰牛羊五千餘頭 ["China's largest meat processing plant slaughters over 5,000 cattle and sheep daily"], November 5, 1961 [publication illegible on original, possibly HK Da Gong Bao?].

shall not be destroyed.”⁶⁹² In more scientific terms, immediate cooling prevented the proteins in these glands from “denaturing,” or losing their shape and function due to excessive heat.⁶⁹³

In late 1948, the Czech émigrés Victor and Eva Saxl, who had lived in Shanghai during the Japanese occupation, described how they made insulin with the “pancreas glands of local cattle and water buffalo.” A news report explained that Eva Saxl, who was a diabetic, “served as a guinea pig for countless experiments that were finally successful in producing insulin that helped 200 diabetics in Shanghai.”⁶⁹⁴ The hormone, which required refrigerated storage, had previously been imported. By producing insulin to circumvent wartime shortages, the Saxls made a life-saving drug. Their technique also helped to reduce China’s reliance on overseas suppliers by demonstrating a way to extract and preserve the valuable hormones of dead bovines.

Metabolic arithmetic also justified expanding freezer capacity. Freezing allowed humans to keep more calories for themselves by circumventing two other energy-hungry organisms: bovines and bacteria. A Beijing newspaper article addressed the question of why the government would spend money on freezers when there were so many other ways to preserve food. The author, Zhang Chunxuan 張純选 explained that in addition to storing food at the highest quality over the longest duration, freezers paid for themselves

⁶⁹² “From Day to Day,” *North-China Morning Post*, March 11, 1940 [accessed on cnbksy.cn].

⁶⁹³ “Denaturation,” in *Encyclopedia Britannica*, [Accessed October 27, 2018, <https://www.britannica.com/science/denaturation>].

⁶⁹⁴ “Manufactured Insulin in Shanghai,” *North-China Morning Post*, December 10, 1948 [accessed on cnbksy.cn].

after just two years.⁶⁹⁵ Zhang computed that feeding a living pig for a month cost 6.0 – 7.5 RMB, whereas the same animal could be stored in a freezer for just 1.5 RMB per month. Frozen animals were also cheaper to ship, because they did not lose weight or die during transit. Zhang estimated that 20 million tons of pigs were shipped around the country in 1956, losing 100 million *jin* through weight loss and death, equal to a write-off of 50 million RMB.⁶⁹⁶ Zhang added that for cattle, “the loss of weight is even more severe,” with each animal typically losing 30 *jin* [about 18 kg] in transit. By Zhang’s calculations, shipping frozen beef rather than living cows was therefore equivalent to “adding 2.4 million *jin* of beef to the food supply.”⁶⁹⁷ By converting livestock from fragile, rapacious consumers of fodder into sturdy, stable blocks of flesh, freezing cut the costs of meat production and allowed processors to handle animal bodies like any other product. Cheap and easy to ship and store, frozen sides of beef, pork, and mutton became interchangeable commodities for humans to consume when and where they pleased.

Railroads connected the bodies of animals and consumers across vast distances, linking the livestock producing regions of the border provinces to coastal cities. Before 1950, “Less than a fifth of the Chinese rail system lay west of the Peking-Canton

⁶⁹⁵ Hoover Institution Chinese Agriculture Collection Box 67, Zhang Chunxuan, 張純選 Duo kuai hao sheng de jianshe lengku 多快好省地建設冷庫 [“Build Freezers: more, faster, better, more economically”], *Beijing Da Gong Bao* 北京大公報, March 20, 1958.

⁶⁹⁶ As the RMB was equal to 0.42USD at this time, this loss was equivalent to 21 million USD, or approximately \$190 million in 2018. RMB-USD conversion at 2.4 RMB to 1USD based on “Historical Official Exchange Rates between the Renminbi and U.S. Dollar, 1955–2008” in Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy*, Cornell University Press (2009); Converted to 2018 dollars with US Bureau of Labor Statistics CPI Inflation Tool, https://www.bls.gov/data/inflation_calculator.htm.

⁶⁹⁷ Hoover Institution Chinese Agriculture Collection Box 67, Zhang Chunxuan, 張純選 Duo kuai hao sheng de jianshe lengku 多快好省地建設冷庫 [Build Freezers: more, faster, better, more economically], *Beijing Da Gong Bao* 北京大公報, March 20, 1958.

[Beijing-Guangzhou] line, and the inland provinces of Sinkiang [Xinjiang], Tsinghai [Qinghai], Ningshia [Ningxia] and Szechwan [Sichuan] had no rail lines at all.”⁶⁹⁸ By the end of the first Five Year Plan in 1957, the nation’s railways had more than doubled in length, with most construction occurring in the inland provinces.⁶⁹⁹ Train tracks passed through the Wuhan Meat Processing plant, connecting the enormous facility to the Beijing-Wuhan railway. A press report explained that after being packed into refrigerated rail cars, the meat could be shipped to the capital as well as to Shanghai, Guangzhou, and other cities.⁷⁰⁰ The Pingdiqian Processing Plant in Inner Mongolia, meanwhile, was strategically positioned at the starting point of the Ji’er Rail Line, which linked Ulan Bataar to Moscow.⁷⁰¹ At an abattoir and processing plant in Hailar, also in Inner Mongolia, workers could fill trains with frozen beef and mutton without leaving the facility. From here, a steady stream of meat-laden rail cars chugged along the Manchurian Railway to Harbin, Shenyang, the Soviet Union, and “the democratic countries of Eastern Europe.”⁷⁰² Thanks to the integration of railways, slaughterhouses, and freezers, consumers in China could enjoy meat from around the country all through the year, while diners in other nations paid for their meat with precious foreign currency.

⁶⁹⁸ Nicholas R. Lardy, “Economic Recovery and the 1st Five-Year Plan,” *The Cambridge History of China, Volume 14: The People’s Republic, Part 1: The Emergence of Revolutionary China, 1949–1965*, eds. Roderick MacFarquhar, John K. Fairbank, Cambridge University Press, 1987, p. 176. [Accessed at <https://doi.org/10.1017/CHOL9780521243360>].

⁶⁹⁹ Lardy, “Economic Recovery,” p. 176.

⁷⁰⁰ Hoover Institution Chinese Agriculture Collection, Box 67, Wuhan rouleichang jiancheng 武漢肉類廠建成 [“Wuhan Meat Processing Plant Completed”] May 24, 1957 [source newspaper illegible].

⁷⁰¹ Hoover Institution Chinese Agriculture Collection Box 67, Pingdiqian xingjian roulei lianhe jiagongchang 平地泉興建肉類聯合加工廠 [“Pingdiqian Integrated Meat Processing Plant Construction Underway”] RMRB, March 21, 1956.

⁷⁰² Hoover Institution Chinese Agriculture Collection Box 67, Gao Yuhai 高玉海, Haila’er dongrou xingxiao guoneiwai 海拉尔冻肉行销国内外 [“Hailar Frozen Meat Sold Domestically and Abroad”] July 24, 1956, Inner Mongolian Daily(?) [Pub. title illegible / incomplete, 内蒙].

By preventing bacteria from digesting calorie-rich carcasses, and conveying these frozen bodies over thousands of kilometers, refrigeration and railroads connected bovine bodies to markets across the nation and around the globe. Just as dairy powder production allowed humans in coastal cities to obtain previously untapped energy from frontier pastures, so did freezers and locomotives allow urban populations to consume the flesh of bovines from the vast grasslands of the nation's border regions.

The increase in refrigeration and rail capacity helped to integrate bovine bodies into domestic and global markets. A press release celebrating the Soviet-designed Chongqing Meat Processing Plant explained, "In the past, because transportation was not well developed," fresh meat was made into products like sausage and pork floss [stringy jerky], and only a small amount was shipped. The new facility, on the other hand, could produce "a large volume of frozen and canned meats that satisfy export standards" which could be exchanged "for the machinery and steel needed for national construction."⁷⁰³ A new slaughterhouse in Anhui Province's Bengbu was slated to export frozen meat worth sixty thousand tons of steel, and intestinal linings equivalent to the value of ninety tractors.⁷⁰⁴ Because one ton of frozen pork could be exchanged for 4.7 tons of steel, workers at the facility "proudly" told reporters, "The meat processing plant is actually a

⁷⁰³ Hoover Institution Chinese Agriculture Collection Box 67, Chongqing roulei lianhe jiagongchang donggong xingjian 重慶肉類聯合加工廠動工興建 [“Chongqing Meat Processing Plant Construction Underway”] November 17, 1955 [Pub. title illegible / incomplete, 北京大公报(?)]

⁷⁰⁴ Hoover Institution Chinese Agriculture Collection Box 67, Bengbu roulei lianhe jiagongchang 蚌埠肉類聯合加工廠投入生產 [“Bengbu Integrated Meat Processing Facility Comes Online”] *RMRB* September 8, 1956.

‘steel mill.’”⁷⁰⁵ While these facilities primarily produced pork, the same principle applied to beef. By the mid 1950s, thanks to large-scale slaughterhouses and freezers, people in major cities or industrial and mining areas could celebrate their holidays with “delicious food products” such as frozen pork, beef, mutton, chicken, fish, and shrimp.⁷⁰⁶ Freezers, explained one author, ameliorated the effects of seasonal fluctuations in demand, while also “adjusting the supply of meat among provinces and cities,” and “stimulating the villages’ sideline industries (such as raising livestock and poultry).”⁷⁰⁷ Before the construction of a 9,000-ton freezer facility in the city of Xining, the sparsely populated western province of Qinghai was unable to send large amounts of beef and mutton to other regions. The new equipment allowed this area, one of China’s main animal husbandry regions, to “rectify this contradiction,” so that Qinghai could “promptly satisfy the domestic and export demand.”⁷⁰⁸

From an anthropocentric, instrumental perspective, railroads and refrigerators yielded additional food resources and economic productivity. For bovines, by contrast, these machines demolished the spatial and temporal barriers that had hindered the growth of a beef industry on the grasslands far from major cities. Neither terrain nor distance could now prevent humans from accessing the energy stored in bovine muscles.

⁷⁰⁵ Hoover Institution Chinese Agriculture Collection Box 67, Yu Ming 于明, Wu Rongjiang 吴荣江 Zai yige zhurou jiagongchang li 在一个猪肉加工厂里 [“Inside a Pork Processing Plant”], *RMRB* September 8, 1956.

⁷⁰⁶ Hoover Institution Chinese Agriculture Collection Box 67, Yu Gan 于干, Roulei jiagong gongye 肉类加工工业 [“The Meat Processing Industry”] November 24, 1957 [Pub title unclear, 北京大公报(?)].

⁷⁰⁷ *Ibid.*

⁷⁰⁸ Hoover Institution Chinese Agriculture Collection Box 67, Xinhua report, Xining zhengzai jianshe yizuo daxing lengcangku 西寧正在建設一座大型冷藏庫 [“Large-scale Freezing Storage Facility Under Construction in Xining”] March 25, 1958 [Pub title unclear, 北京大公报(?)]

Moreover, as international buyers took an interest in Chinese cattle products, and as Chinese farmers seized new opportunities in livestock rearing, the animals were exposed to ever-greater demand for their dead bodies.

Bumpy Roads for Bovines

In an abstract, macroscopic sense, railway construction imperiled bovines by drawing their flesh and organs into commodity markets. But how did cattle experience trains? Rail travel, a hallmark of industrial modernity, held different meanings for bovines and humans. In her analysis of tropes about rail travel in the 1950s, the cultural historian Emma Yu Zhang shows that many films depicted passengers sharing “camaraderie, professional care, domestic warmth, and a communitarian intimacy” as they zoomed across the landscape on their way to take part in “socialist construction.”⁷⁰⁹ She situates such films within a decades-long national project of transporting young, enthusiastic urban experts and workers to the less-developed frontiers of the country, where their services were urgently needed. Zhang shows how this transfer of human talent illustrates a principle in the work of the German historian Wolfgang Schivelbusch, who has argued that railways “blurr[ed] the boundaries between the city and the countryside.”⁷¹⁰ Similarly, the environmental historian William Cronon has demonstrated

⁷⁰⁹ Emma Yu Zhang, “Socialist Builders on the Rails and Road: Industrialization, Social Engineering, and National Imagination in Chinese Socialist Films, 1949–1965,” *Twentieth-Century China*, Volume 42, Number 3, October 2017, p. 257. [I am grateful to Ben Kletzer of UCSD for making me aware of this essay, and for sharing his insights on train travel. Personal communication, October 21, 2018].

⁷¹⁰ Zhang, “Socialist Builders,” p. 258.

that the American railroads of the late 19th century offered “liberation from geography...able to go virtually anyplace where potential demand was great enough.”⁷¹¹ In China as in other nations, rail networks reduced the effects of local climates and terrains on travel time, weaving together ecosystems, populations, and markets as never before. Zhang’s film analysis explains that many people experienced (or at least were meant to experience) this temporal and geographic compression as offering a thrilling opportunity to serve their motherland.

Comparing the human and bovine experiences of long-distance travel provides an alternate way to think about how modern transportation shaped the lives of sentient subjects in China. Although cattle cars are generally considered a form of freight, they are actually passenger carriages for nonhuman riders. As the PRC government concentrated slaughter in cities and rebuilt domestic transportation infrastructure to meet the needs of a growing national economy, bovines’ final days came to include a previously rare experience: lengthy transit from their native village or pasture via some combination of train, boat, and truck. Unlike humans, virtually all of these animals traveled only in one direction: from grasslands and market towns to urban slaughterhouses. While many humans enjoyed their high-speed journeys, such travel was frequently uncomfortable and stressful for the doomed animals.

Films depicted train travelers’ exciting “experience with strangers-turned-intimate-community.”⁷¹² Sensitive and social bovines, by contrast, took little pleasure in

⁷¹¹ William Cronon, *Nature’s Metropolis: Chicago and the Great West*, New York: W.W. Norton and Company, p. 74.

⁷¹² Zhang, “Socialist Builders,” p. 257.

suddenly mixing with dozens of unfamiliar individuals of different breeds and backgrounds aboard boats, trains, or trucks. Veterinary literature suggests that bovines find such abrupt mixing stressful and unpleasant. Both bulls and steers (castrated males) demonstrate “high rates of overt aggressive behavior” for days after mixing with unfamiliar cattle.⁷¹³ Experiments also show that bovines tend to become fearful in novel environments, such as the inside of a cattle car, and in the presence of stressed individuals of the same species (“conspecifics”), whose urine contains hormones that the animals find alarming.⁷¹⁴ And whereas human travelers were mostly young and healthy, the limits on slaughter meant that long-distance travel was mostly for bovines too old or lame to work.

A growing field of research examines the effects of “social stress” on livestock, including cattle. According to veterinarians, “pathogen exposure” and “transmission dynamics” play a role in elevated disease risk among socially stressed animals. Yet there is also evidence that isolation, overcrowding, and “social instability,” or the mixing of unfamiliar individuals and groups, pose physiological challenges for animals. Veterinarians are careful to point out that “the current evidence that social factors contribute to disease risk in farm animals is not as convincing as the human literature” on the same phenomenon. Still, bovines’ turbulent social environment en route to slaughter

⁷¹³ T. Tennessen, M.A. Price, and R.T. Berg, “The social interactions of young bulls and steers after re-grouping,” *Applied Animal Behavior Science* (1985), 14: 37-47.

⁷¹⁴ Alain Boissy, Claudia Terlouw, and Pierre Le Neindre, “Presence of Cues from Stressed Conspecifics Increases Reactivity to Averse Events in Cattle: Evidence for the Existence of Alarm Substances in Urine,” *Physiology & Behavior*, (1998) volume 63, number 4, pp. 489-495.

was not only frightening, but may also have increased the vulnerable animals' risk of illness.⁷¹⁵

No matter the mode of transit, a bovine's journey to the slaughterhouse was crowded and dangerous. When traveling by boat, advised the veterinarian Wang Zhongda, cattle must have ample space to recline and stand up, or approximately 1.5-2.5 square meters per animal.⁷¹⁶ Given the bulk of these animals, the recommended space was far from generous. Wang also reckoned that a three-ton truck could accommodate three to five cattle, if a shipping agent rode with the animals and kept watch to prevent them from fighting.⁷¹⁷ Livestock experts recognize that because four-legged animals do not lean against conspecifics, they "have difficulty in dealing with disturbances such as those caused by swinging around corners or sudden braking."⁷¹⁸ Recognizing the risks of transport and striving to achieve the goals of "no deaths, no foul smells, no wounds, and no emaciation," the Jiangsu Province Department of Commerce worried that animals en route to slaughter might die from "crushing, falling, smothering, poisoning, starvation, or contagious disease."⁷¹⁹

⁷¹⁵ Kathryn Proudfoot, Gregory Habing, "Social stress as a cause of diseases in farm animals: Current knowledge and future directions," *The Veterinary Journal*, 206 (2015), pp. 15-21.

⁷¹⁶ Wang Zhongda 王中達, *Tuchu de shougou yu yunshu 屠畜的收購与運輸* (1958) [Procurement and shipping of livestock for slaughter], p34 [Accessed on CNKI, October 18, 2018].

⁷¹⁷ *Ibid.*

⁷¹⁸ Catherine A. Stockman, Teresa Collins, et al. "Flooring and driving conditions during road transport influence the behavioural expression of cattle," *Applied Animal Behaviour Science*, 143 (2013), pp. 18-30. [<http://dx.doi.org/10.1016/j.applanim.2012.11.003>].

⁷¹⁹ JPA 4061-003-1372 Benting gengongsi guanyu xianhuo shangpin zhu,niu,yang ding'e sunhao ji chuqin yunshu jiangli zanxing banfa tongzhi cao'an 本厅本公司关于鲜活商品猪、牛、羊定额损耗及畜禽运输奖励暂行办法通知草案 [Draft notification from this office on loss limits in live commodity shipping of hogs, cattle, sheep, and livestock and poultry shipping awards] November 9, 1959, page 12.

Attributing losses to “dereliction of duty by the employees,” rather than the inherent difficulty of transporting frightened livestock over long distances, the Department produced guidelines to give shippers a financial incentive to keep the animals alive and unharmed until slaughter. Shippers who kept the cattle death rate below 0.2% en route to slaughter were eligible for a monetary reward. The shippers could also receive a bonus if fewer than 0.5% of the animals arrived at the abattoir so sick or scrawny that they required immediate slaughter 急宰.⁷²⁰ The more generous quota for immediate slaughter reflected the relatively higher potential value of a weak, live animal than of a decaying carcass. I have not seen evidence of the actual rates of death en route, or of immediate slaughter on arrival. But to be effective incentives, the Department’s quotas had to be lower than the status quo.

Many bovines died on the way to being killed. While it must have been traumatic for the animal, suffocating or starving on the way to the slaughterhouse only hastened the inevitable by a few days. Ultimately, the fatality rate was one hundred percent.

Technology in Animal Histories

The entanglement of freezers and railroads in the lives of Chinese bovines offers several lessons for the historiography of animals and technology. First, power hierarchies are responsible for the radical variation in how different species experience human innovations. Technologically speaking, a freezer simply cools its contents, to no fixed

⁷²⁰ Ibid.

political end. But embedded in human hierarchies, freezers affected three kinds of life forms: by impeding bacterial reproduction, they left bovines vulnerable to being killed and eaten in any season, while humans could consume beef year-round. Likewise, for many humans, the spatial and temporal compression that railroads achieved was liberating and empowering. For cattle, locomotives demolished barriers of space and time that had once protected them from the hungry humans of an industrializing state.

Secondly, technologies can affect populations that their designers never considered. In his history of the Great Plains bison, the biologist and rancher Dan O'Brien discusses the Haber-Bosch process for fixing atmospheric nitrogen into a solid, usable form. This industrial technique can yield both the fertilizers that have sustained Earth's unprecedented human population, as well as high explosives that have taken many lives. O'Brien challenges the common anthropocentric analysis of the Haber-Bosch method by focusing on the environmental effects of input-intensive agriculture. He argues that for native flora and fauna, the fertilizer created by the Haber-Bosch process was "more lastingly devastating to the Great Plains than...nitrite bombs were to European cities."⁷²¹ Concerned with feeding hungry humans, the German chemists who devised the nitrogen-fixing process did not foresee its effects on the bison and grasses of the North American plains. As one historian of science has noted, participants in the fertilizer industry had "few incentives or reasons to raise questions about the long-term fate of the nitrogenous compounds in the environment."⁷²²

⁷²¹ Dan O'Brien, *Great Plains Bison*, Lincoln: University of Nebraska Press, 2017, p. 70.

⁷²² Hugh S. Gorman, *The Story of N: A Social History of the Nitrogen Cycle and the Challenge of Sustainability*, Rutgers University Press, 2013, p. 81.

Similarly, Chinese engineers and economic planners did not contemplate how the nation's new network of railways and refrigerators would affect the lives and deaths of millions of cattle. Yet for all the indifference of many human scientists and historians, these technologies had significant effects on the physical and mental lives of bovines. Alternative narratives, such as animal histories, are necessary to challenge what the historian Andrew C. Isenberg has identified as "an old and deeply held concept in Western thought: the dualism of humanity and nature," in which human dynamism contrasts with the passivity of nonhuman life.⁷²³ Animal history encourages its practitioners to look beyond the immediate horizon of a technology's obvious applications and beneficiaries, to ask how it might shape the existence of other living beings.

The Erosion of the Beef Taboo

Chinese people consumed very little beef during the first half of the twentieth century. As shown in Chapter 1 on dairy production, high population density in most parts of the country meant that crop production was a better source of nutrients and energy than pasturing and livestock husbandry. A professor of biochemistry at Yenching [Yanjing] University in Beijing used surveys to estimate that in 1938, meat and eggs accounted for just three percent of the diet of the average Chinese person's diet.⁷²⁴

⁷²³ Andrew C. Isenberg, *The Destruction of the Bison: An Environmental History, 1750-1920*, New York: Cambridge University Press, 2000, p. 194.

⁷²⁴ William H. Adolph, "Vegetarian China," *Scientific American*, volume 159, number 3 (September 1938), pp. 133-135. [Accessed October 23, 2018, <https://www.jstor.org/stable/24955431>].

Bovine draft labor was essential to Chinese agriculture, but beef comprised a negligible part of most people's cuisine.

Many observers traced this miniscule beef consumption not to ecological conditions, but to codes of loyalty or spirituality. The agronomist Shih Tsin Tung attributed the absence of beef eating to "superstition perhaps based on a real mercy [sic] to the poor, hard-working beast."⁷²⁵ Similarly, the livestock expert Ralph W. Phillips suggested that Chinese people felt that "animals that have worked faithfully should not be slaughtered and eaten."⁷²⁶ One American geographer shared the opinion of a "Mr. Lee, Chinese graduate student from the University of Wisconsin," who informed him that, "Buddhist tradition fosters belief that the displeasure of heaven is visited upon people who kill cattle for food."⁷²⁷ Well into the twentieth century, similar opprobrium attached to butchers and meat merchants in numerous Asian countries, including the *eta* of Japan and the *paekchong* of Korea.⁷²⁸ Any particular person's decision to consume or avoid beef likely reflected a combination of factors: scarcity and cost, devotion to a long-toiling colleague, or religious strictures. Whatever the reasons, the social pressure against beef-eating was powerful and ubiquitous. Argues the historian Vincent Goossaert, "One could violate the beef taboo, but not ignore it."⁷²⁹

⁷²⁵ Shih Tsin Tung, "The Food Supply of China," *The Scientific Monthly*, volume 23, number 5 (November 1926), pp. 454-461. [Accessed October 22, 2018, <http://www.jstor.org/stable/7424>].

⁷²⁶ Ralph W. Phillips, "Livestock in the Lives of the Chinese," *The Scientific Monthly*, volume 60, number 4 (April 1945), pp. 269-285 [Accessed October 22, 2018, <http://www.jstor.org/stable/18272>].

⁷²⁷ Earl B. Shaw, "Swine Industry of China," *Economic Geography*, volume 14, number 4 (October 1938), pp. 381-397. [Accessed October 22, 2018, <http://www.jstor.org/stable/141532>].

⁷²⁸ Herbert Passin, "The Paekchong of Korea. A Brief Social History," *Monumenta Nipponica*, Vol. 12, No. 3/4 (Oct., 1956 - Jan., 1957), pp. 195-240. [Accessed August 22, 2018 at <https://www.jstor.org/stable/2382752>].

⁷²⁹ Vincent Goossaert, *L'interdit du boeuf en Chine: agriculture, éthique et sacrifice* [The Beef Taboo in China: Agriculture, Ethics, and Sacrifice]. Paris: Collège de France Institut des hautes études chinoises, 2005, p. 206. [All quotes are my translation.]

In this dietary context, butchers and slaughterhouses occupied a fraught position as both social pariahs and avatars of Western lifestyles. Goossaert has noted that in a broad array of literary genres in the late 19th and early 20th centuries, the butcher was “a reviled figure” [*un personnage honni*]. These hired killers were “represented as loathsome sinners who are often converted and so abandon their profession.”⁷³⁰ Moreover, he adds, many Chinese citizens considered cattle slaughterhouses in the imperial powers’ urban concessions “an extreme source of pollution and an affront to their gods.”⁷³¹ Yet due to the intensity and popularity of the taboo among their compatriots, and the strong connection between beef and foreign ways of life, “Chinese who wanted to radically adopt Western modernity to save China were logically led to renounce the beef taboo.”⁷³² Goossaert likens the situation to the Meiji emperor’s proclamation in 1872 that he had tasted and enjoyed beef, which accompanied the lifting of a Japanese ban on slaughtering bovines. “Although there is no similarly spectacular turning point in China,” he argues, many people probably adopted beef as a “symbolic rupture with traditional culture.”⁷³³

The Meiji emperor’s proclamation on beef-eating is an example of culinary practices changing in one country in emulation of the customs and attitudes of supposedly more advanced lands. One historian has argued that by promoting the consumption of beef, the revitalized ruling house was attempting to “rework the Japanese physique in a way that would be more appealing to the Western gaze,” thus allowing the

⁷³⁰ Goossaert, *L’interdit*, p. 73.

⁷³¹ Goossaert, *L’interdit*, p. 252.

⁷³² Goossaert, *L’interdit*, p.259.

⁷³³ *Ibid.*

upstart empire to take its rightful place among more established peers.⁷³⁴ Another scholar shows that the Japanese military began including beef stew in its field rations, and argues that for Meiji-era civilians, “eating beef became emblematic of civilization itself.”⁷³⁵ The meat also appeared central to the expansion of this arriviste empire. As Chapter 3 showed, Chinese observers were well aware that beef was an important source of nutrients for the hard-charging Japanese military in the early years of the Pacific War.

It is little wonder that Japanese elites viewed cattle consumption as a means of building international prestige. Beef-eating and imperial splendor were clearly linked in the British empire, which was at its greatest expanse in the late 19th century. The historian Harriet Ritvo has shown that during and after the Victorian period, eating meat, and especially beef, “was viewed by observers within the British polity and outside it as an essential component of the national character.”⁷³⁶ Indeed, beef was so central to British identity that diners who forsook this food “could engender patriotic unease, and more forceful and systematic exhortations could trigger patriotic fury.”⁷³⁷ In his list of “British Beatitudes,” the Irish author James Joyce linked the meat to other icons of the Empire: “Beer, beef, business, bibles, bulldogs, battleships, buggery and bishops.”⁷³⁸ And of course, the iconic Yeoman Warders guarding the Tower of London are informally called

⁷³⁴ Hans Martin Krämer, “‘Not Befitting Our Divine Country’: Eating Meat in Japanese Discourses of Self and Other from the Seventeenth Century to the Present,” *Food and Foodways*, 16:1, (2008) p. 41, DOI: 10.1080/07409710701885135

⁷³⁵ Nancy K. Stalker, *Japan: History and Culture from Classical to Cool*, University of California Press, 2018, p. 225. [Accessed at <https://www.jstor.org/stable/10.1525/j.ctv2n7fgm.11>]

⁷³⁶ Harriet Ritvo, *The Platypus and the Mermaid and Other Figments of the Classifying Imagination*, Cambridge, Massachusetts: Harvard University Press, 1997, p. 194.

⁷³⁷ Ritvo, *Platypus*, p. 198.

⁷³⁸ James Joyce, *Ulysses*, (1922) p. xxx [Gutenberg HTML version]

Beefeaters. They are known among tipplers as the corporate image of the eponymous gin, which has been distilled in the capital since 1876.⁷³⁹

While beef-eating was central to British and Japanese ideas of vigorous nationalism, these cultural memes were not solely responsible for Chinese people's abandonment of the beef taboo. Urbanites connected beef and Britishness not by reading Joyce, or by sipping gin and tonics. Their eyes, ears, and noses provided ample evidence that cattle were being led to slaughter in the foreign-run concessions established in the aftermath of the Opium Wars of the mid-19th century. Furthermore, it is impossible to say how many Chinese citizens ate beef in emulation of the Japanese civilians and military personnel occupying northern China in the first decades of the twentieth century. Indeed, one observer in 1930 claimed that Japanese colonists had devised the *sukiyaki* method of cooking beef by "stealing" the Chinese way of eating mutton!⁷⁴⁰ Cultural exchange was a two-way street. Still, the evidence supports Vincent Goossaert's contention that to eat beef was not simply to taste a new kind of flesh. Beef-eating offered a potent way for people to signal their rejection of popular taboos, and their approval of the attitudes and practices that had apparently made the British and Japanese imperialists wealthy and powerful.

Although only humans participated in the discourse about meat and national identity, shifting cultural taboos diminished the welfare of cattle. Many technological and

⁷³⁹ "Our History: Heritage, Quality and London Provenance" [Accessed October 24, 2018 <https://www.beefeatergin.com/en-EN/our-history>].

⁷⁴⁰ No author, Niuguo: Ribenren de chiniufa toule Beipingren de yangrou chifa 牛鍋：日本人的吃牛法偷了北平人的羊肉吃法 [Sukiyaki: Japanese stole their method of eating beef from Beijing residents' method of eating mutton] Tiebao 鐵報 *Railroad News*, March 21, 1937

economic factors contributed to the growth of the Chinese beef industry in the mid-twentieth century. Soviet assistance, improved refrigeration, more efficient slaughter techniques, and the need for foreign currency: all made the large-scale killing of bovines both possible and desirable. But these same changes could have passed the animals by, if earlier taboos on beef consumption had retained their longstanding power. By stripping cattle of their privileged spiritual and ethical status, the decades-long erosion of dietary taboos made these animals still more vulnerable to human appetites.

A thought experiment suggests that the rise of China's beef industry was not simply an inevitable effect of technological improvement and economic growth. In America today, the many thousands of unclaimed pets at animal shelters could be butchered and eaten for the profit and pleasure of citizens here and abroad. The technological and logistical infrastructure exists, and the costs would be minimal. Cats and dogs escape this gloomy fate because popular sentiment would not permit it. Conversely, many Americans are squeamish about eating insects, despite their incontestable economic, nutritional, and ecological advantages as a source of food. Preferences and taboos govern consumer demand for goods, including bovine flesh. The loosening and eventual abandonment of ethical and social strictures on beef-eating in China thus contributed as much as the refrigerator and the cattle car to the death and dismemberment of bovines.

In addition to cultural and ethical shifts, the spatial and technological conditions of slaughter changed during the last decades of the Nationalist government and the first years of the PRC. Cattle bodies increasingly became commodities to be carved into hundreds of useful and valuable byproducts. As slaughter became routinized and

regulated, the social standing of butchers rose and slaughterhouses became sites of national pride. Our discussion of the precipitous decline in bovines' privileged social position will now address these changes.

From “Soup Pots” to Abattoirs

When he was an undergraduate in Central University's agriculture studies program during the early 1930s, future animal husbandry expert Wu Xinfu 吴信法 noted many shortcomings in the newly built municipal slaughterhouse of the national capital of Nanjing. Crude equipment, “wild, unruly, and ignorant” butchers, and an endless stream of blood, excrement, and “the contents of animals' stomachs and wombs” accumulated on the interior walls and drainage channels of the facility. In Wu's opinion, this ghastly abattoir harmed the capital's “prestige” both domestically and internationally: inferior to the slaughterhouses of treaty ports including Shanghai, Qingdao, and Tianjin, Nanjing's facility would also “make our nation's culture seem backward” in the eyes of visiting foreigners.⁷⁴¹

Most alarming of all in Wu's eyes was the failure of the slaughterhouse to fulfill its most vital function: providing clean, disease-free meat. He noted that although slaughterhouses “are not tax collection agencies,” the relevant government authorities were treating hygiene inspection as secondary to revenue collection. Moreover, as

⁷⁴¹ Wu Xinfu 吴信法, *Jingshi tuzaichang jiying gaijin de jidian* 京市屠宰場急應改進的幾點 [“Several things that should be urgently rectified at the Capital City Slaughterhouse”] *Kexue de Zhongguo* 科学的中國 [*Scientific China*] 1933 年第 1 卷第 11 期, pp. 22-23.

butchers felt that careful examinations slowed down their work, they simply marked the meat with a blue “inspected” character. Wu lamented that the butchers had no appreciation for hygiene, and their clothes were so foul smelling that “they make you want to vomit, and you shake your head when you see them.” With his scientific training, Wu understood the hidden peril of microbes. Viewing the butchers’ clothes under a microscope would leave observers speechless: “Who knows how many bacteria live there?” The point of concentrated slaughter was to permit strict inspections, “allowing the masses to eat pure, clean, safe meat.”⁷⁴² The capital city’s abattoir, which should have set a standard for order and sterility, was instead a cesspool of carnage and contagion.

Yet for all its failings, the large municipal slaughterhouse was still superior to the alternative. The state-run facility handled only oxen, horses, donkeys, mules, goats, and sheep. Wu surmised that this was because Muslim Hui customers objected to the processing of these permissible meats alongside the forbidden pig.⁷⁴³ The result was that pigs were slaughtered in dozens of small, private butcher shops that locals called “soup pots” 湯鍋. According to Wu, the “soup pots” were “extremely unhygienic...dark, damp, and foul smelling.” During the summer, their “pestilential” stink was “all-encompassing.” The soup pots’ offenses were not merely aesthetic but also administrative. There were simply not enough veterinary inspectors to visit these scattered facilities, and their butchers used ingenious methods to “falsify and deceive.” Outside the gaze and grasp of the regulatory state, these shady shops were a threat to the health and productivity of the

⁷⁴² Ibid.

⁷⁴³ Ibid.

capital's citizens. In cities without modern slaughterhouses, which were still uncommon in the early 1930s, cattle were also slaughtered in these dingy, unregulated shops.

Butchers did not always welcome government efforts to supervise their work in the name of improved hygiene. In the United Kingdom during the late 19th century, the butchers' trade association "defended butchers against what they saw as unnecessary persecution" by meddling hygiene inspectors.⁷⁴⁴ In China as well, rough-and-tumble manual laborers often clashed with the government personnel in charge of judging, and sometimes rejecting, their work. Wu had noted the butchers' half-hearted compliance with hygiene inspection. More dramatically, Shanghai meat inspector A.N. Philippoff's report to his supervising veterinarian in autumn 1945 depicts danger and disorder in one public slaughterhouse. When Philippoff refused to sign off on the carcass of a dead pig, a butcher named Zung Kong [*sic*] grabbed his shoulder and shouted at him. When Philippoff held firm, Zung fired a gun at him point blank. The inspector's assistants "immediately grappled with Zung Kong but as he is a powerful man they were thrown aside; Zung Kong continued to revile [Philippoff] and use offensive language."⁷⁴⁵ Exacerbated by the stressful work environment, tensions of class and cultural differences between the stubborn foreign inspector and the indignant local butcher exploded into violence. This was no isolated incident. In January 1947, the Shanghai Hygiene Department complained to Mayor Wu Guozhen 吳國禎 that contracted butchers 承包屠

⁷⁴⁴ Wilson J. Warren, *Meat Makes People Powerful: A Global History of the Modern Era*, University of Iowa Press, 2018, p. 70.

⁷⁴⁵ SMA, Q400-1-3173 A.N. Philippoff to Dr. Shu [Shupeì 舒叔培], "Re: Shooting incident at the former French Abattoir on September 17 [1945]."

商 and their employees in Municipal Slaughterhouses Numbers 1 and 2 “frequently engage in rough, unruly behavior....they hurl invective in their faces, and threaten to attack them.” Government employees of the slaughterhouse, feeling unsafe, asked the state to put an end to the turmoil.⁷⁴⁶ The government’s efforts to improve public hygiene meant additional oversight of butchers by meddling overseers and bureaucrats.

Stunning Successes and Failures

Stunning animals before slaughter was a method for making cattle more useful to their human owners. Leaving the animal passive and inert, stunning reduced the amount of physical labor needed for slaughter, guaranteeing “the tranquility of the environment” and the safety of the human workers.⁷⁴⁷ Stunning also improved the quality of meat. As one handbook explained, an animal's “distress, anger, or pain” could cause its blood vessels to contract.⁷⁴⁸ This in turn made it difficult to bleed the carcass completely, reducing its shelf life. Slaughter thus dissolved the barrier between the physical and mental lives of an ox, giving humans a concrete interest in regulating the animals’ state of mind in their final moments. Frantic cattle gave mediocre beef.

Stunning also allowed sophisticated consumers to feel a certain satisfaction in their cultural superiority to less “modern” minority ethnicities. In an article on the

⁷⁴⁶ 沪（三六）字第三号 为据卫生局呈报市立第... 上海市政府公报 1947 年第 6 卷第 5 期, p. 113.

⁷⁴⁷ 畜产品加工学, 高等农业院校试用教材: 畜产品加工学, 东北农学院编, 沈阳 Shenyang June 1961, p.4.

⁷⁴⁸ 畜产品加工学, p4.

Shanghai Number One Municipal Slaughterhouse, animal husbandry expert Wu Xinfu 吳信法 described how “our Hui [Muslim] compatriots” dispatched oxen. With its feet bound together, the animal fell to the ground. The imam, standing behind the ox, “vigorously cuts through its skin, muscle, blood vessels, trachea, and esophagus.” Wu noted that “while some call this method ‘great killing’ 大殺,” the animal was still conscious at the time of death, and the contents of its stomach frequently spilled out with the blood.⁷⁴⁹ The supposedly painless deaths of cattle in modern Chinese slaughterhouses thus not only served the economic agenda, by reducing worker injuries and providing cleaner meat. Stunning also helped to justify the paternalistic impulses of the state toward less “civilized” groups of humans. Even as the government ostentatiously tolerated *halal* slaughter in the name of ethnic diversity and religious pluralism, some consumers were gratified by the knowledge that the animals in their own woks had died with minimal suffering. At once magnanimous toward benighted peoples, and merciful toward doomed animals, consumers could have their beef and eat it, too.

Stunning looks different from the perspective of the cattle. First, the technique sometimes did not work. A handbook about processing livestock noted that stunning an ox by striking it with a hammer between the eyes and horns required considerable “finesse.” If the blow did not stun the beast, its reaction would be dangerous. A hammer blow could also smash the skull, “reducing the value of the brain,” while spattering blood

⁷⁴⁹ Wu Xinfu 吳信法, *Shengchu de tuzai he huazhi 牲畜的屠宰和化製* [“The slaughter and processing of livestock,”] *大眾醫學* 四卷二期, June 1950, pp. 42-44.

would lower the value of the ox-hide.⁷⁵⁰ Yet even this flawed method was superior to stabbing the brainstem with a short knife. [Figure 6.1] Noting that the technique remained common in Inner Mongolia during the early 1960s, the authors of the handbook cautioned that this method of stunning disrupted breathing and circulation, making bloodletting more difficult. Furthermore, an imprecise butcher risked serious injury from an aggravated ox. In areas without electrical stunners, suggested the handbook authors, the hammer method should replace brainstem stabbing.

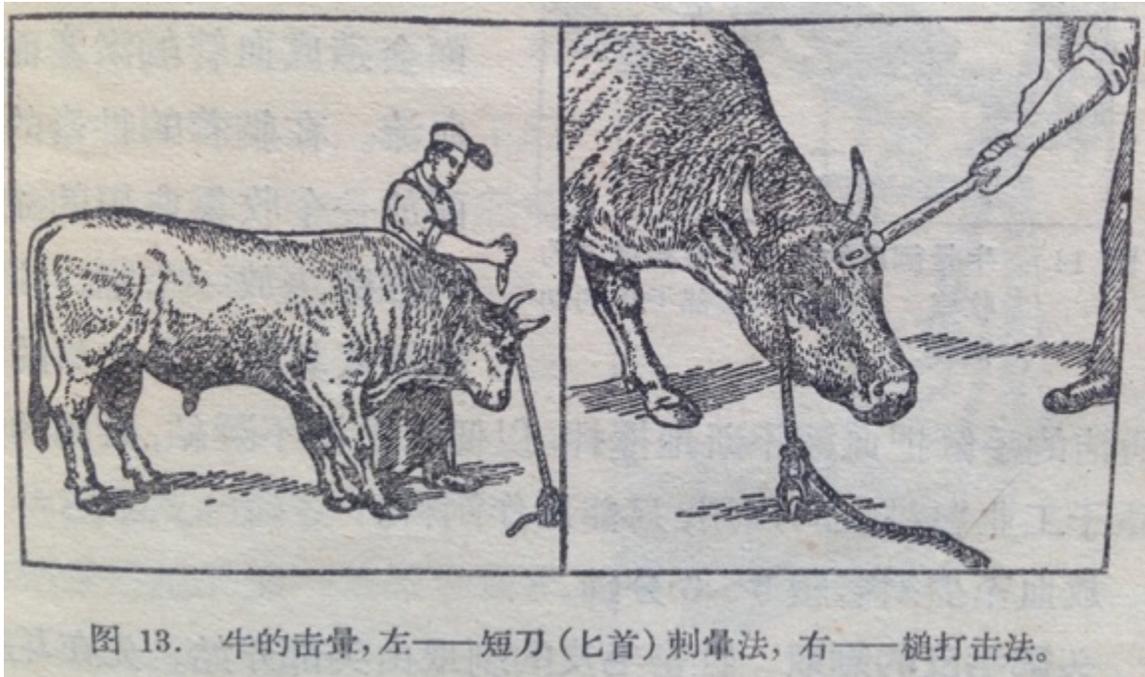


Figure 6.1: Stunning with short knife and hammer⁷⁵¹

⁷⁵⁰ 畜产品加工学, p4.

⁷⁵¹ A. H. Mi-luo-nuo-fu [Russian name] 米罗诺夫 trans. Li Jian 李坚, *Shengchu tuzai he dongti zhijie 牲畜屠宰和胴体支解 [Livestock Slaughter and Carcass Dismemberment]*, Kexue Jishu Chubanshe 科学技术出版社, Shanghai, 1957, p. 37.

Despite its advantages, stunning was not universal: a handbook published in 1961 remarked that animals in “the vast majority of Chinese villages and small-scale slaughterhouses” were not stunned for slaughter. Butchers bound the feet of sheep and cattle, and the animals awaited slaughter in a recumbent position 横卧待宰. The handbook authors argued that for the sake of safer, more efficient meat production, areas with the wherewithal should employ electrical stunning, which was used in “all the major slaughterhouses”⁷⁵² [Figure 6.2].

There is reason to suspect that many electrically-stunned animals endured unnecessarily protracted shocks, and some were at least partially conscious as they died. Officials understood that the duration of the electric shock necessary to desensitize an animal depends on numerous factors including species, size, age, and cleanliness of the contact points.⁷⁵³ Handbooks and directives provide normative guidelines, but it is difficult to know how slaughterhouse personnel actually worked. Still, there is evidence that official stunning protocols were inadequate for thorough desensitization, also known as “electronarcosis.” A directive from the Jiangsu Province Service Department 服务部 suggested an electric current of no greater than 0.5-1.0 amperes, at 70-120 volts.⁷⁵⁴ A translated Soviet text also suggested 70-120 volts, depending on the age and sex of the bovine.⁷⁵⁵ The handbook from which Figure 6.2 was taken suggested a range of voltages

⁷⁵² Ibid.

⁷⁵³ JPA 4063-003-0019, Fuwuting, zhuanfa fuwubu guanyu zaishengchu weisheng jianyan guicheng he jianing zhiyao 服务厅、转发服务部关于宰牲畜卫生检验规程和鉴定指要 (1957)

⁷⁵⁴ Ibid.

⁷⁵⁵ A. H. Mi-luo-nuo-fu [Russian name] 米罗诺夫, trans. Li Jian 李坚 Shengchu tuzai he dongti zhijie 牲畜屠宰和胴体支解 [*Livestock Slaughter and Carcass Dismemberment*], 科学技术出版社, 上海 1957, p. 38.

from 65-150 volts depending on the age of the animal, and noted that a full thirty-second charge might be necessary to stun a bull.⁷⁵⁶ Yet in guidelines published in 2013, the Humane Slaughter Association (HSA) of the United Kingdom noted that stunning systems with outputs under 150 volts “are not considered to be effective at producing an immediate stun.” The HSA therefore urged that “such equipment should be immediately taken out of service and replaced” with systems capable of generating at least 200 volts.⁷⁵⁷ Properly applied, electrical stunning offered the promise of swift, humane death. For an ox who endured a half minute of electrocution only to regain consciousness before dying, this technology was bewildering and painful.

⁷⁵⁶Dongbei nongxueyuan bian 东北农学院编 Dongbei Agricultural Institute, ed. Gaodeng nongye yuanxiao shiyong jiaocai: chumupin jiagongxue 高等农业院校试用教材：畜产品加工学 [High-Level Agricultural Institutes Trial Teaching Materials for Livestock Goods Processing], Shenyang, June 1961, p. 141-142.

⁷⁵⁷ Humane Slaughter Association, “Electrical Stunning of Red Meat Animals,” (2013) hsa.org.uk [accessed August 12, 2017], p. 12.

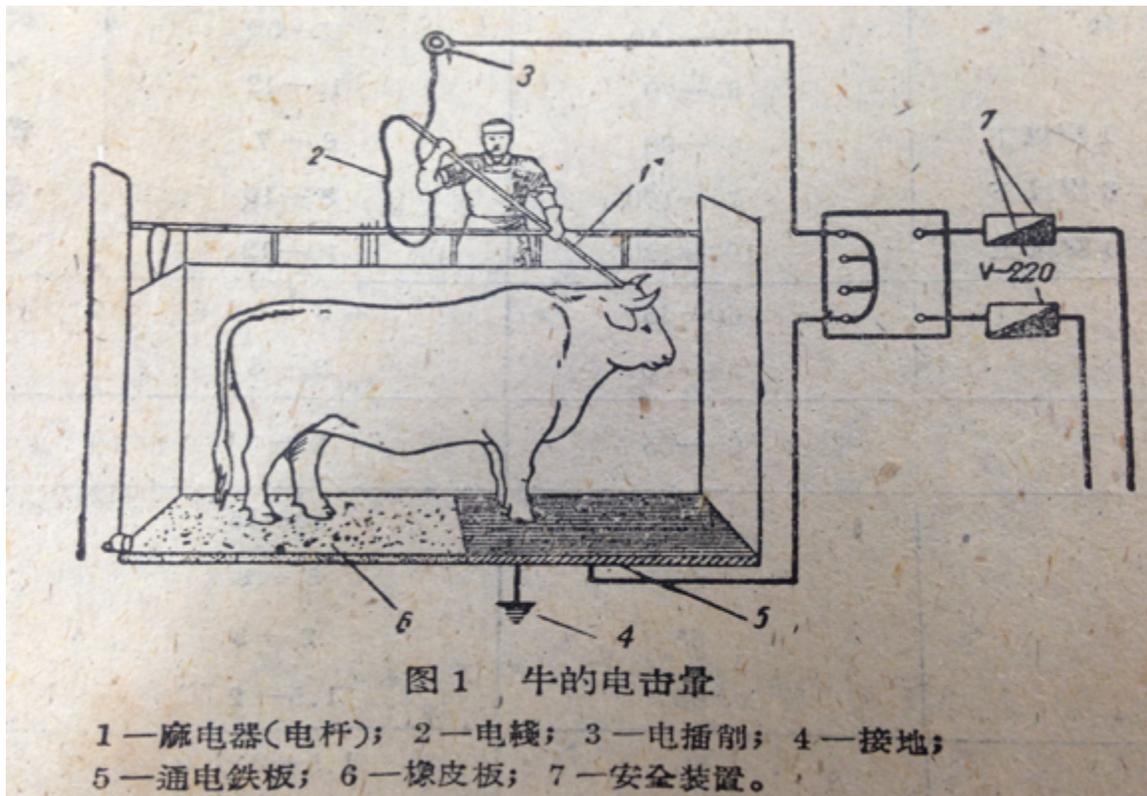


Figure 6.2: Electrical Stunning⁷⁵⁸

Making the Most of Carcasses

Concentrated slaughter was essential for extracting maximum value from the bodies of animals. Both Nationalist and Communist authorities recognized that small, widely dispersed slaughterhouses were unable to collect and process by-products such as bones, bile, and tendons at an economically viable scale. One guide entitled *The Integrated Use of Livestock Bones* averred that although people of past ages had used

⁷⁵⁸ Dongbei Agricultural Institute, *Teaching Materials*, p.6. [Rare book collection of Shanghai Library].

bones in an “extremely narrow and simplistic” way, the rapid development of modern science had turned animal skeletons into valuable resources for farming and industry.⁷⁵⁹ Ox bile, a valuable Chinese medicine, could be collected from the gallbladders of weak, old animals.⁷⁶⁰ The Zhejiang Province Livestock Products Company announced in 1955 that it was purchasing a number of byproducts from oxen and water buffalo, including bladders, horns, intestines, appendixes, and hooves.⁷⁶¹

Although some ancillary products of slaughter required refrigeration, many others did not. In the first decade of the PRC, slaughterhouses continued to find new ways to make use of the “glands, brains, spines, and gall” of pigs and cattle. Even sick animals could be processed into industrial lubricants, as well as blood and bone meal, which made excellent fertilizers and fodder. The slaughterhouses thus earned foreign currency while also serving as key suppliers for farms, factories, and the domestic pharmaceutical industry.⁷⁶²

In ways large and small, the state worked to enlist the body parts of its human citizens and nonhuman subjects to accomplish national economic goals. Most ancillary cattle products were perishable, and so had to be collected at slaughterhouses. But some body parts could be collected without killing the animal. When grooming their animals,

⁷⁵⁹Yang Yaohuan 楊耀寰, ed. *Chugu de zonghe liyong 畜骨的综合利用 Integrated Use of Livestock Bones* 輕工業出版社,北京 Qinggongye Press, Beijing, October 1959, p. 2.

⁷⁶⁰ Zenyang qu ‘niuhuang’? 怎樣取‘牛黃’ [“How can you extract ox bile?”] *Tianjin Da Gong Bao* 天津大公報, April 17, 1956 [Reel D64, HKBU collection].

⁷⁶¹ Cai Hongqing 蔡宏慶, [article title illegible], *Tianjin Da Gong Bao* 天津大公報, August 11, 1955 [Reel D64, HKBU collection].

⁷⁶²Xing Zhaoxi 邢肇熙, *Shanghai dongrou jiagongchang de jieshao 上海冻肉加工厂的介绍* [Introduction to Shanghai's frozen meat processing plant], *Shanghai chumu shouyi tongxun 上海畜牧獸醫通訊* [*Shanghai Livestock Veterinary Bulletin*] (1957) issue 2, pp. 79-81, [Accessed on cnki, October 18, 2018].

farmers dislodged ox hair suitable for making hats, tents, and textiles. One Xinhua newspaper report calculated that if every ox yielded 0.5 *jin* of hair, Jiangsu Province could collect over 600,000 *jin* [approximately 360,000 kg] of hair per year, enough to purchase 4,600 new double-bladed plows.⁷⁶³ Oxen were not the only targets of the state's effort to convert formerly wasted tissues and byproducts into salable goods. Customers at seven barbershops in a cooperative in Shaanxi Province sold their trimmings to the local supply and marketing cooperative, which exchanged the clippings for foreign currency and, ultimately, machinery.⁷⁶⁴

The commodification of practically all of their bodily tissues added to the economic “suction” that drew cattle out of fields and paddies and into slaughterhouses. The fixed costs of killing and dismembering animals remained virtually constant, even as abattoirs extracted ever more value from their carcasses. Ever-greater marginal profits awaited slaughterhouses that could find new ways to collect, process, and sell formerly wasted materials. The value of a carcass, in other words, resided not only in its edible muscles, but also in its hooves, bones, and viscera. While the ability of a living ox to plow remained more or less constant during this period (and ultimately declined with the introduction of heavier metal farm tools and tractors), the value of its dead body increased as butchers and economic planners found ways to monetize the leftover scraps of industrial killing. In this way, oxen became more valuable dead than alive.

⁷⁶³ Qian Feng, Liu Jingchun 前鋒, 劉景春, Niumao sui xi yongtu hen guang 牛毛雖細用途很廣 [“Although oxhairs are narrow, their uses are very broad”] *Xinhua Ribao* (Nanjing) 新華日報 (南京) [Xinhua Daily (Nanjing), July 7, 1956.

⁷⁶⁴ Shougou toufazha, chukou huan jiqi 收購頭髮渣, 出口換機器 [“Procure hair clippings and export them in exchange for machinery”] *Tianjin Da Gong Bao* 天津大公報, August 19, 1955 [Reel D64, HKBU collection]

The Spectacle of Sanitary Slaughter

Although they confined livestock killing behind factory walls, both the Nationalist and Communist governments welcomed observers into their slaughterhouses. Visitors included Chinese students, journalists, and public health officials, as well as meat industry workers from other developing nations. Shanghai's Number One Municipal Slaughterhouse was a particular showpiece. In February 1948, the facility welcomed a press tour to discuss public hygiene, increasing the production of livestock, and the exchange of meat products for foreign currency.⁷⁶⁵ Just over a month later, twelve students from a medical institute in the neighboring province of Jiangsu visited the slaughterhouse as part of a "Shanghai Public Hygiene Tour Group." Their other stops included laboratories, laundromats, hospitals, the water works, and the crematorium in Shanghai's Jing'an Temple.⁷⁶⁶ As a key site for preventing pathogens from endangering public health, the abattoir fit well among these symbols of civic cleanliness.

After 1949, the PRC government continued to promote industrial abattoirs, both domestically and abroad, as icons of scientific competence and utility to the nation. On a tour of the Wuhan Meat Processing Plant in late 1958, hero of the civil war and national

⁷⁶⁵ Diyi zaishengchang mingtian zhaodai jizhe cangan 第一宰牲場明天招待記者參觀 ["Number One Slaughterhouse will host press visit tomorrow"] *Shanghai Da Gong Bao* 上海大公報 February 13, 1948 [HKBU collection].

⁷⁶⁶ Jiangsu yixueyuan xuesheng zi Zhenjiang lai Hu cangan 江蘇醫學院學生自鎮江來滬參觀 [Students from Jiangsu Medical Institute in Zhenjiang visit Shanghai] *Shanghai Da Gong Bao* 上海大公報 March 26, 1948 [HKBU collection].

Vice Chairman Zhu De 朱德 wrote a calligraphic inscription: “Expand the Integrated Meat Processing Plant / Serve the People.”⁷⁶⁷ Like its Nationalist predecessor, the Communist government also showcased its slaughterhouses for domestic and overseas visitors. Between May 1957 and December 1960, the Wuhan facility hosted 72 foreign delegations, an average of over two per month. Observers included representatives of friendly countries, such as the Vietnamese leader Ho Chi Minh, as well as politically sympathetic visitors from unallied nations, such as the Danish Communist Youth League and a Sino-Canadian Friendship delegation.⁷⁶⁸ No further foreign guests arrived until September 1962, presumably due to severe livestock shortages during the height of the Great Leap famine. After that embarrassing interlude, visits continued apace well into the 1980s. The longstanding stigma against butchers, and the humiliating spectacle of Wu Xinfu’s “soup pots,” had yielded to official pride in the grandeur and usefulness of industrial slaughter.

Some visitors observed the facilities with more ambivalence than official accounts suggested. The journalist Chen Qingmei’s account of a tour of the Shanghai Number One Municipal Slaughterhouse in late 1947 provides a clear description of both the facility’s operations, and of observers’ uneasy, complicated responses. Managers explained that the so-called “Cow-Killing Factory” typically slaughtered approximately 350 cattle, 150 sheep, and 700 hogs per day. In response to a recent spike in meat prices, merchants were

⁷⁶⁷ Wuhan Roulianchang xiuzhi bangongshi bian 武汉肉联厂修志办公室编 [Wuhan Integrated Meat Processing Plant Gazetteer Revision Group, ed.], *Wuhan Roulianchang Zhi: 1952-1985* 武汉肉联厂志: 1952-1985 [*Wuhan Integrated Meat Processing Plant Gazetteer, 1952-1985*] Hebeisheng Xinhua yinshuachang 河北省新华印刷厂, 1990, photo insert.

⁷⁶⁸ *Ibid.*, pp. 219, 244.

now procuring draft oxen from nearby provinces. Thanks to this influx of animals, the facility was setting historical records by breaking the ban on slaughtering draft animals, killing as many as 700 cattle and 2000 hogs per day. Cattle were typically slaughtered from 09:00-15:00, and pigs and sheep from 17:00-22:00, but Chen's tour took place during an idle period. Therefore, although he observed the "startling" sight of "clumps of crimson blood on the floor, and rows of bloody cattle carcasses hanging from hooks," he did not hear "the tragic cries of animals approaching their death." Chen's dismay at the physical traces of butchery coexisted uncomfortably with his fascination at the facility's grand scale and efficiency.⁷⁶⁹

This tension increased when the journalists observed a "cruel performance" staged by the facility managers. The onlookers became "extremely anxious" when a water buffalo appeared on the third-storey killing floor to demonstrate the slaughter process. The animal stood in a wooden trough, with its head and back exposed. The butcher attached a high-voltage stunner to the beast's head, which would incapacitate the animal with a two-second electrical charge. With the push of a button, the bottom of the trough would open, depositing the animal in another room where it would be decapitated, gutted, and skinned. "Turning an ox into meat" took approximately fifteen minutes. Although the media visitors did not observe the slaughter of the buffalo in this performance, Chen argued that the killing process was "not as horrifying as you might imagine." Once again, Chen's response mixed empathy for the doomed animals with admiration for the swift and apparently humane method of killing.

⁷⁶⁹ Chen Qingmei 陳慶楣, Canguan Diyi Zaishengchang 參觀第一宰牲場 ["Visiting the Number One Slaughterhouse"] *Shanghai Da Gong Bao* 上海大公報 November 17, 1947 [HKBU collection].

Horrific yet humane, socially necessary yet aesthetically revolting, Chen's description of industrial livestock slaughter exemplifies a shift in popular attitudes about the ethics of large-scale killing. The philosopher Enzo Traverso argues that when French revolutionaries adopted the guillotine, "The terrifying executioner with his royal ax left the stage, and his role was taken over by a machine alongside which he was no more than an attachment, a technician, a manual worker."⁷⁷⁰ Officials in both the Nationalist and Communist governments used similar language to describe new methods of automated, mechanized slaughter. By breaking the task of slaughter into discrete, easily monitored steps, the "disassembly line" relieved individual butchers of the social stigma of killing. No longer disreputable and disgusting, slaughterhouses became factories for disaggregating the bodies of cattle. High-ranking officials, prominent journalists, and overseas delegations paid their respects by visiting these wondrous facilities where workers converted animal bodies into raw materials for strengthening the state.

For some visitors, the spectacle of industrial butchery in Shanghai evoked the largest genocide in human history. Traverso has placed the guillotine of the French Revolution and the Nazi death camps on a continuum of socially acceptable violence. He suggests that between these endpoints came abattoirs, which permitted "mechanized and serialized" killing.⁷⁷¹ At the end of Chen Qingmei's slaughterhouse tour, one foreign journalist remarked that the facility resembled the Nazi concentration camp at Bergen-

⁷⁷⁰ Janet Lloyd, trans., Enzo Traverso, *The Origins of Nazi Violence*, New York: The New Press, 2003, p. 23-24.

⁷⁷¹ Traverso, *Origins*, p.24, 35.

Belsen. Chen agreed, musing that “a slaughterhouse is really just a microcosm of a human killing field” 人間宰場.⁷⁷²

The Changing Status of Butchers and Bovines

During the twentieth century, the status of butchers and oxen moved in opposite directions. Pursuing industrial modernity, the state needed both the disciplined, efficient labor of slaughterhouse workers, as well as the meat and byproducts of large-scale animal processing. Butchers, who began the period as atomized expert craftsmen, yet viewed by their neighbors with a mixture of pity and contempt, became industrial workers, proud to make a contribution to national greatness. They exchanged stinking, back-alley workshops for assembly-line production in hygienic, mechanized abattoirs. The simultaneous decline in the status of cattle was equally stark. For centuries, contributing their muscle power to farm work had assured the animals’ status as cherished workers. The death of an ox, whether by sacrifice or from disease, was a solemn occasion. During the period of this study, by contrast, humans began to view the animals not as ritual offerings, or colleagues, or family members, but as property. Chapter 3 on sweat and labor explained the widespread mortality of cattle when they became assets to be exploited. The animals’ transformation into passive property accelerated as the state

⁷⁷² Chen Qingmei 陳慶楣, Canguan Diyi Zaishengchang 參觀第一宰牲場 [“Visiting the Number One Slaughterhouse”] *Shanghai Da Gong Bao* 上海大公報 November 17, 1947 [HKBU collection].

realized that their carcasses could yield a plethora of raw materials for export and industrial production.

After the founding of the People's Republic, the Communist authorities continued the Nationalists' efforts to make slaughter more efficient and economical. In 1952, according to an official in the China Food Products Company, the Shanghai Municipal Slaughterhouse rejected the dangerous, wasteful, labor-intensive, and "conservative" techniques of the previous regime. Previously able to slaughter only 500 pigs and 100 cattle per day, the abattoir began using "pioneering methods" introduced by hygiene experts from the Soviet Union. Assembly lines with over thirty discrete steps including inspection, stunning, bleeding, weighing, and freezing, each supervised by a dedicated employee, allowed "a marked increase in production." The author of a celebratory article explained that a new accountability system spurred each worker to check the quality of the previous step, giving everyone "a sense of accomplishment" and preventing a single-minded focus on quantity at the expense of quality.⁷⁷³ Recalling his service in the enormous Wuhan Meat Processing Plant in the 1950s, former Plant Head Li Biao took pride in his role in the "slaughter revolution," in which hand-killing methods used for millennia gave way to assembly-lines.⁷⁷⁴ A press release promoting the Wuhan facility

⁷⁷³ Xing Zhaoxi 邢肇熙, Shanghai dongrou jiagongchang de jieshao 上海冻肉加工厂的介绍 ["Introduction to Shanghai's frozen meat processing plant"], Shanghai chumu shouyi tongxun 上海畜牧獸醫通訊 [*Shanghai Journal of Livestock Husbandry and Veterinary Medicine*] (1957) issue 2, p. 79-81, [Accessed October 18, 2018 on cnki].

⁷⁷⁴ Zhang Xinxiong 张新雄, Wuhan ceng jueqi zuida roulianchang sulian yuanjian 210 duopi waibin cangan 武汉曾崛起最大肉联厂 苏联援建 210 多批外宾参观 ["With Soviet assistance, Wuhan once constructed the largest integrated meat processing plant, and over 210 delegations of foreign visitors came to see it"] Chutian Jinbao Xun 楚天金报讯, January 27, 2013, [Accessed August 8, 2018 at http://news.cnhubei.com/xw/jj/201301/t2436872_1.shtml].

celebrated its “ingenious” assembly lines, adding that its human workers needed only to stay in position and operate the machines.⁷⁷⁵

Before slaughterhouses concealed the act of killing livestock from public view and stripped it of individual mastery, public butchery was both a horrific spectacle and a demonstration of expertise. Reminiscing about the New Year’s slaughter of his youth, the memoirist Luo Dengyi recalled that several strong men would press a pig firmly to the killing table. The butcher 屠夫, also known as the “pig killing craftsman” 殺豬匠, would use a foot-long knife to cut into the pig’s chest. Blood “gushed” from the wound, demonstrating that the animal’s heart was still beating. Only when all four of the pig’s legs stuck out straight could the men loosen their grasp. Sometimes a dying pig would moan in pain 呻吟, and so required another stabbing. Luo recalled thinking each time he saw this “cruel” process that it would be better to use another method to kill the New Year’s pig.⁷⁷⁶

Although Luo described the killing of a pig, his anecdote illustrates several physical and ethical aspects of slaughter that apply as well to oxen before the rise of the slaughterhouses. Slaughter took place in plain sight, carried out by a fixed crew of workers who followed the animal throughout its final minutes. The use of the term “craftsman” 匠 suggests that this style of butchery involved individual expertise and

⁷⁷⁵ Hoover Institution, Chinese Agriculture Collection Box 67, Roulei lianhe jiagongchang Wuhan ji shigong jianshe 肉類聯合加工廠武漢即施工建設 [Construction will soon commence on Wuhan’s integrated meat processing plant], Xinhua 新华, February 3, 1955.

⁷⁷⁶ Luo Dengyi 罗登宜, Wo jiyi zhong de Guizhou roulianchang 我记忆中的贵州肉联厂 [“The Guizhou Meat Processing Plant as I Remember It”] *Yougu Chanming* 幽谷蝉鸣 2011, p. 77. [accessed August 10, 2018 on Wanfang]

judgment, rather than the routine, highly-specialized tasks of slaughterhouse workers. Slaughterhouses, by contrast, concealed the killing of animals, and used the division of labor so that each worker specialized in a single step of the process. The author and activist Carol J. Adams has noted that in slaughterhouses, “an animal proceeds down a ‘disassembly line,’ losing body parts at every stop.”⁷⁷⁷ Adams argues that this process of “fragmentation” strips the animals of their individuality and so allows diners to “move from objectified being to consumable food.”⁷⁷⁸

The commodification of cattle bodies drove the changes in status of both butchers and bovines. Slaughterhouses employed hundreds of “workers,” who used machines to slay dozens of animals per hour. No longer was the butcher a pariah, regarded with suspicion for his role in “cruelly” ending the life of a sensitive, hardworking nonhuman colleague. In giving up much of their professional autonomy and yielding to the state’s pesky hygiene inspectors, these “reviled” artisans also surrendered their individual mastery of the art of dismemberment that had placed the ethical burden of killing squarely on their shoulders. Bovines, meanwhile, lost their protected status as hardworking colleagues, cherished by farmers, and protected by religious scruples. Cut into pieces for human consumption the animals became material resources to be processed by and for the state.

⁷⁷⁷ Carol J. Adams, *The Sexual Politics of Meat: A Feminist-Vegetarian Critical Theory (20th Anniversary Edition)*, New York: Continuum, 2010 [1990], p. 74.

⁷⁷⁸ Adams, *The Sexual Politics of Meat*, p.76.

Destroying the Bacterial Bulwark

A discourse of comparative hygiene highlighted citizens' woeful lack of attention to the cleanliness of their food during the early twentieth century. "We Chinese people have historically not been picky about the quality of our meat," lamented an inspector at Shanghai's largest municipal slaughterhouse. This carelessness exposed humans to pathogens such as parasites, tuberculosis, anthrax, and tetanus.⁷⁷⁹ Another author noted that while China had never undertaken a comprehensive survey of food poisoning incidents, a study in Japan between 1886-1937 had found 86,267 cases, of which 9,289 were fatal. In terms of caring about food hygiene, sighed the author, "the Japanese people...are so much better than us!" Furthermore, the availability of medical care and awareness of science in Japan were "many times greater" than in China. If even the Japanese suffered so many cases of food poisoning, then the Chinese people needed to be still more cautious about ensuring the cleanliness of their cuisine. Although the naked eye could not detect them, bacteria in rotting meat would make people sick immediately.⁷⁸⁰ Chinese people's supposedly heedless way of eating meat became yet another example of their lack of sophistication compared to Imperial Japan, and another justification for expanding the reach of state-sponsored medical surveillance.

By portraying the threat of food poisoning from contaminated meat, media accounts also encouraged consumers to be wary of small, unregulated sellers, and to

⁷⁷⁹ Xu Shili 許士璫, Huang Daqi 黃大器, Roupin jianyan de renshi 肉品檢驗的認識 ["Learning about meat inspection"] *Shanghai Da Gong Bao* 上海大公報 February 18, 1947 [HKBU collection]

⁷⁸⁰ Zu Xi 祖習, Shipin zhongdu 食品中毒 ["Food Poisoning"], Sanliujiu Huabao 三六九画报 [369 Pictorial] Volume 4, Number 15, 1940, p. 13.

place their trust in medical science. A typical article, “Three Travelers Get Food Poisoning by Eating Unclean Beef,” told of an unlucky trio who bought “a bag of beef” from a Shanghai street vendor. Having finished their meal and gotten drunk, the men were about to fall asleep. Suddenly, their guts were painful, “as if being twisted,” and they began vomiting profusely. They hailed a cab and sped off to the hospital, where they were recovering as the article went to press.⁷⁸¹ Appearing in at least four publications less than a week before the well-publicized fifteenth anniversary of the opening of the Shanghai Municipal Slaughterhouse in 1948, this story encouraged readers to be skeptical of unfamiliar butchers whose wares had not passed inspection.⁷⁸² If dodgy meat made them sick, however, citizens could seek treatment in hospitals. Either way, the government was working hard to guard citizens against invisible pathogens.

The state’s concern about the welfare of its human citizens drove its bovine subjects into industrial slaughterhouses. Breathless media coverage of mundane incidents does not mean that the risk of food poisoning was a myth. Many people did fall ill after eating unclean foods, including beef. And for everyone who made it to a hospital, or into the pages of a newspaper, there must have been many more who simply drank plenty of hot water and rode out the storm. Nevertheless, the invisible threat of bacterial contagion was a potent rationale for expanding the slaughter surveillance apparatus. Moreover, improved hygiene was a persuasive reason to move slaughter away from disreputable private butchers and into large, carefully monitored government abattoirs.

⁷⁸¹ Chi bujie niurou san lüke zhongdu 吃不潔牛肉三旅客中毒 [“Three Travelers Get Food Poisoning by Eating Unclean Beef”] *Jinrong Ribao* 金融日報 Finance Daily, October 25, 1948.

⁷⁸² Variants of this story also appeared on October 25, 1948 in *Zhenbao* 真報; *Heping Ribao* 和平日報 and *Libao* 力報 [CNBKSJ.com, Accessed November 9, 2018].

Communist authorities continued the Nationalists' campaign against unlicensed butchers and unclean meat. The Jiangsu Province Departments of Commerce and Hygiene issued a warning in summer 1956 about the need to “take hygiene inspection very seriously to avoid an outbreak of intestinal disease that harms public health and the national economy.”⁷⁸³ Veterinarians' imprimatur was a reassuring guarantee that the meat would not sicken consumers or their families.

Preventing food borne illness was not solely a top-down effort by the state to ensure a healthy work force. It also involved the most intimate relations of families and neighbors. A didactic opera from the first year of the People's Republic celebrates the displacement of old-fashioned culinary and medical practices in favor of state-backed, scientific expertise. Wang Xinyou's “Rotten Beef” depicts the new state's efforts to replace familiar but unreliable members of the community with competent, selfless agents of the modern state.⁷⁸⁴ In the opera, a bargain-hunting mother purchases some questionable beef from a local merchant. She muses, “People say it's dead, rotten beef, and they don't dare to eat it. Ha! We're not afraid: we farmers don't worry about whether something is hygienic. We have a saying: ‘Even if it's unclean, you won't fall sick if you eat it.’” When her school-aged son unexpectedly falls ill after eating the rotten beef, the mother hires a witch doctor 神婆 to treat him. The unlicensed healer demands some of

⁷⁸³ JPA 4061-003-0379, Jiangsusheng weishengting 江蘇省衛生廳 Jiangsu Province Hygiene Department, Guanyu tongyi lingdao tuzaichang ji changnei weisheng he shouyi gongzuo de guiding he youguan yijiao wenti de laiwang wenshu 关于统一领导屠宰场及场内卫生和兽医工作的规定和有关移交问题的来往文书 [Correspondence pertaining to uniform slaughterhouse hygiene and veterinary work rules and other matters relating to the problems of the hand-off] July 13, 1956.

⁷⁸⁴ Wang Xinyou 王辛酉, Lan Niurou 烂牛肉 [“Rotten Beef”] *Pingyuan* 平原 [The Plains], Issue 7, 1949: p.8-10.

the beef, as well as tea and cigarettes, but is unable to cure the boy. In fact, she also falls ill, and rolls around on the ground in pain. The boy's father, meanwhile, has taken time from hoeing the fields with his mutual aid group to hire a medical doctor. This expert praises the "Serve the People" ethos of the health care system in New China, makes the witch doctor confess that she is a fraud, and provides laxatives and medicine to her and the sick boy. He also explains that the merchant who "deceived the government and the people" with parasite-infested rotten beef has been banned from selling.

This melodrama reveals nothing about the behavior or feelings of cattle at their moment of death. Yet such cultural productions have a substantial indirect effect on the experiences of animals. By shaping how humans perceive the risk, prestige, and pleasure of consuming animal foods, cultural texts such as plays and advertisements affect consumer demand for these goods. Republican-era newspaper articles and PRC dramas such as "Rotten Beef" simultaneously warned readers that beef might contain invisible pathogens, while also assuring them that state-backed medical science existed to serve and protect citizens. The audience was therefore encouraged to put its faith in neither the hearty constitutions of farm folk, nor the pointless tricks of quack healers, but in the competence and benevolence of government hygiene inspectors and doctors. Wang's play depicts a transition from a world in which consumers bought meat from local merchants, seeking help when necessary from neighbors who communed with invisible spirits, to one in which people consumed the flesh of anonymous cattle from distant slaughterhouses, safe in the knowledge that state experts had inspected the meat and could cure food poisoning.

By emphasizing the cleanliness of food from government slaughterhouses, and the dubious quality of local butchers' meat, the state laid a foundation of trust and security for nationwide supply lines. Carefully inspected beef from faraway slaughterhouses was actually safer than unmonitored meat from a local vendor. For cattle, the effect of this shift was profound. The newly built slaughterhouses depended on consumers' trust in their government to protect them and their loved ones from microbial danger. State acumen and public trust were necessary preconditions for the new methods of industrial, concentrated slaughter. Stories like "Rotten Meat" thus encouraged the growth of huge state-run abattoirs, exposing more animals to this way of death.

Animals in the Archives

On October 30, 1948, some of the most illustrious figures in Chinese animal husbandry convened at Shanghai's Number One Municipal Slaughterhouse to commemorate its fifteen years of state-sponsored livestock killing. Their calligraphic couplets show how some of the Republican government's most elite politicians and public health officials understood the symbolic and practical accomplishments of the massive abattoir. Now stored in the Shanghai Municipal Archive, these inscriptions explain a great deal about the state ideology of industrial slaughter. Their near-total silence on the destruction of animal life is also revealing. The disjuncture between the documentary record of human and animal interests provides a space for a new historical perspective that challenges the self-congratulatory narrative of the state.

Many of the attendees focused on the slaughterhouse's contributions to hygiene. Cheng Shaojong 程紹迺, the American-trained veterinarian and director of the Central Livestock Research Bureau who led the rinderpest eradication campaign described in Chapter 2, inscribed four characters meaning "guarantee of health."⁷⁸⁵ Yang Mingding 楊銘鼎, Shanghai Municipality's Director of Environmental Hygiene, situated the Number One Slaughterhouse in the grand sweep of human history. "In high antiquity," Yang averred, "people swallowed fur, drank blood, ate meat, and wrapped themselves in hides." But as "times changed and living standards progressed," the consumption of meat necessarily became more hygienic to prevent disease. The slaughterhouse, with its "scientific butchery, meat products inspection, and cold storage and processing," thus played a vital role in hygienic meat consumption.⁷⁸⁶

Having made his name by halting the spread of cholera after the Yangtze River's 1931 flood, Yang's interest in disease control was unsurprising.⁷⁸⁷ Less predictably, he also approved of the slaughterhouse's contribution to economic growth. In addition to meat, he explained, the facility provided raw materials such as leather, bone meal, intestines [for sausage casings], lard, and fertilizers for domestic and foreign markets. While Yang had suggested that the primitive people of earlier ages also tried to make the

⁷⁸⁵ SMA Q230-1-2, Shanghai shi shili diyi zaishengchang shiwu zhounian jinian 上海市市立第一宰牲場十五週年紀念 ["Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse"] (1948). I am grateful to Lin Yang of UCSD for helping me to decipher this phrase.

⁷⁸⁶ SMA Q230-1-2, Shanghai shi shili diyi zaishengchang shiwu zhounian jinian 上海市市立第一宰牲場十五週年紀念 ["Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse"]

⁷⁸⁷ Ding Qin 丁沁, "Yang Mingding" 楊銘鼎, *Zhongguo kexue jishu zhuanjia zhuanlüe yixuebian yufang yixue juan 1* 中國科学技术专家传略医学编預防医学卷 1 [*Brief biographies of Chinese technical experts: Medical Chapter, Prevention Section*], Beijing: Zhongguo kexue jishu chubanshe, 1993, p.85.

most of each carcass, only the modern government-backed slaughterhouse was able to fully commodify the dead bodies of livestock, and profit from selling their components. The fates of the slaughterhouse and the state were thus intertwined: while “meat eaters have great expectations” for the slaughterhouse, “the national economy and people’s livelihood truly depend on it.”⁷⁸⁸

Government hygiene inspection served as a “seal of approval,” allowing customers to purchase meat from distant slaughterhouses without fear of food poisoning or death. The veterinarian Cai Wuji 蔡無忌, who in Chapter 2 worried about the shortage of professional animal doctors in China, explained the role of veterinary inspection in bolstering consumers’ trust. In a lengthy essay celebrating the Shanghai Municipal Slaughterhouse’s fifteenth anniversary, Cai blamed “merchants’ repeated adulteration and fakery” for giving Chinese goods a poor reputation among foreign consumers, harming the country’s international image and driving down sales. The country’s formerly secure seat on the “throne of unprocessed silk” 生絲寶座 had been “usurped” by the Japanese, while Japan and India had superseded China’s “world-famous” tea.⁷⁸⁹ Cai argued that with few exceptions (such as tung oil), only his country’s livestock products had maintained their standing in global markets. In his view, “modernized” government slaughterhouses were the key to the sterling reputation of Chinese animal products. With its “pre- and post-slaughter livestock inspections” by veterinarians toiling

⁷⁸⁸ SMA Q230-1-2, *Shanghaishi shili diyi zaishengchang shiwu zhounian jinian* 上海市市立第一宰牲場十五週年紀念 [“Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse”]

⁷⁸⁹ SMA Q230-1-1 Cai Wuji 蔡無忌, *Woguo chuchanpin yu duiwai maoyi* 我國畜產品與對外貿易 [“China’s animal products and foreign trade”] (1948).

“day and night,” the Shanghai facility had allowed animal products to make valuable contributions to the export trade.⁷⁹⁰

Cai Wuji’s concerns about Republican China’s diminishing credibility in foreign trade exemplified a discourse about the relative quality of domestic and imported goods. The historian Karl Gerth has shown how in 1928, the Nationalist government, anxious about economic sovereignty, promulgated product standards to encourage patriotic consumption. As a result of these guidelines, which reflected the state’s growing interest in distinguishing authentic Chinese goods from disguised imports, “the line separating pure nationalized commodities from their profane foreign counterparts grew increasingly explicit.”⁷⁹¹ Cai’s contribution to the discourse about national consumption was his recognition that scientific food inspection, like packaging and labels, was a useful certification of home-grown quality. Disease-free meat was a key part of China’s “brand.”

Only modern, standardized slaughterhouses overseen by state-employed veterinary inspectors could provide a level of quality suitable for sale in the competitive global marketplace. Humans’ desire for uniform livestock products therefore necessitated that the animals die on mechanized assembly lines. Cai’s essay boosted the standing of veterinarians like himself by highlighting their invaluable contributions to China’s foreign trade. More importantly for the animals, he provided an economic rationale for prying the slaughter business from the hands of fly-by-night meat merchants, and placing

⁷⁹⁰ Ibid.

⁷⁹¹ Karl Gerth, *China Made: Consumer Culture and the Creation of the Nation*, Harvard University Asia Center (2003), p. 194 [Accessed at <https://www.jstor.org/stable/j.ctt1tg5k14.8>].

it under the purview of large, government-operated abattoirs. Earlier chapters have shown how the Chinese governments of the early- to mid-twentieth century had begun to monitor and manipulate the physiology of bovines: sexuality, disease immunity, and diets. To ensure that the animals' bodies retained maximum export value, the government turned its attention to their death.

Some participants at the commemoration blurred the line between the hard-won expertise of artisans, and the exactitude of the industrial disassembly line. Inverting a line from the Qing dynasty scholar-official Wei Yuan, Shanghai Mayor Wu Guozhen 吳國禎 wrote “The Way [Dao] approaches technical proficiency” 道進乎技.⁷⁹² In its original formulation, the phrase evokes a level of technical mastery nearly equal to the sublime perfection of the Dao 技進乎道. In Wu's version, the precision and sophistication of the mechanized slaughterhouse has surpassed the timeless cosmic machinery of the Dao. An inscription by the renowned engineer Zhao Zukang 趙祖康 also invoked Daoist lore with the story of Cook Ding 庖丁, a royal butcher whose familiarity with the Way allowed him to dismember oxen without striking a single bone with his blade.⁷⁹³ These erudite calligraphers celebrated the awesome skill of ancient butchers who were guided by a personal connection to the obscure workings of the Dao. Yet by breaking the process of

⁷⁹² SMA Q230-1-2, Shanghaishi shili diyi zaishengchang shiwu zhounian jinian 上海市市立第一宰牲場十五週年紀念 [“Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse”].

⁷⁹³ SMA Q230-1-2, Shanghaishi shili diyi zaishengchang shiwu zhounian jinian 上海市市立第一宰牲場十五週年紀念 [“Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse”]. For the story of Cook Ding [Ting], cf. Burton Watson, trans. *Chuang Tzu [Zhuangzi]: Basic Writings*, New York: Columbia University Press, 1964, pp. 46-47.

killing and dismembering animals into discrete steps, each the responsibility of heavily supervised, low-skilled specialists, the industrial slaughterhouse generated economies of scale by rendering such individual mastery obsolete.

Earlier concepts of safeguarding health 衛生 [*weisheng*] retained rhetorical power, even as they yielded to the new *weisheng*, “an official discourse on health, one that brought the body and its conditions directly under the knowing regimes of science and the state.”⁷⁹⁴ Ruth Rogaski traces *weisheng* from its longstanding association with Daoist practices of eating, breathing and sex, and through the radical changes of Tianjin’s colonial period. She notes that by the early years of the PRC, “the term *weisheng* would no longer be associated with quotations from *Zhuangzi*, methods of circulating *qi*, or herbal medicines that bolstered vitality.”⁷⁹⁵ The technocrats in the Shanghai slaughterhouse bridged these concepts of *weisheng*. They celebrated the wonders of the regimented, depersonalized abattoir, even as they paid homage to the mystical Cook Ding.

Only by eliding the interests and experiences of nonhuman beings could humans justify and celebrate the large-scale butchery of animals. As members of the species *Homo sapiens*, the commemoration attendees viewed the slaughterhouse through an understandably human and instrumental perspective. Yet this apparently simple point had political significance. An official named Zheng Tianmu 鄭天牧 observed that the facility

⁷⁹⁴ Rogaski, *Hygienic Modernity*, p.304.

⁷⁹⁵ Rogaski, *Hygienic Modernity*, p.304.

was “Beneficial to the mouths of the masses.”⁷⁹⁶ On the benefits to the beasts themselves, Zheng made no comment. A guilty note crept into an inscription by the newspaper editor and KMT official Pan Gongzhan 潘公展. “Hearing [the animals’] cries,” mused Pan, “one cannot bear to eat their flesh.”⁷⁹⁷ Thankfully, by confining the clamor of doomed animals within its concrete walls, the slaughterhouse allowed diners to think past the suffering of pitiable nonhumans. Segregating the killing of animals from the surrounding environment, the slaughterhouse embodied an aspect of Rogaski’s “hygienic modernity,” which “called for the separation of functions in the urban landscape, the creation of things seen and unseen.”⁷⁹⁸ While devotees of scientific slaughter proclaimed its ability to eradicate invisible microbial life, they artfully concealed the killing of large, familiar beasts.

Perhaps no one better expressed the tensions between human and animal experiences of hygienic modernity than the electrical engineer Zhao Zengjue 趙曾珏. His commemorative remarks at the Shanghai Municipal Slaughterhouse read:

Enemy of bacteria,
Gateway to happiness.
Precise identification,
Diligent inspection.
Facilitating the people’s dining,

⁷⁹⁶ SMA Q230-1-2, Shanghai shi shili diyi zaishengchang shiwu zhounian jinian 上海市市立第一宰牲場十五週年紀念 [“Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse”]. I am grateful to Lin Yang of UCSD for helping me to decipher this phrase.

⁷⁹⁷ SMA Q230-1-2, Shanghai shi shili diyi zaishengchang shiwu zhounian jinian 上海市市立第一宰牲場十五週年紀念 [“Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse”]. For background on Pan Gongzhan, see Him Mark Lai, *Chinese American Transnational Politics*, University of Illinois Press, 2010, p. 164, fn. 36.

⁷⁹⁸ Ruth Rogaski, *Hygienic Modernity*, p. 193.

Focusing on hygiene.⁷⁹⁹

By rigorously inspecting living animals and their carcasses for the dreaded microbes, the slaughterhouse served the people and opened the “gateway to happiness.” From Zeng’s technocratic, anthropocentric point of view, the merits of the slaughterhouse were substantial. But from the perspective of animals trudging through the massive concrete structure to certain death, Zhao’s assessment was ironic and macabre. For cattle, sheep, and other livestock, a more fitting inscription might have been the warning that the Italian poet Dante Alighieri imagined at the gates of Hell: *Lasciate ogne speranza, voi ch’ intrate* – “Abandon all hope, you who enter here.”⁸⁰⁰

Enmeshed in hierarchies of power, the concepts of “technology” and “benefits” are more complex than the attendees made them appear. The vaunted technical precision of the slaughterhouse’s killing apparatus did not exist in a vacuum; its traces were evident in the bodies of disassembled animals. Similarly, the human consumers who benefited from eating clean, safe meat did so at the expense of nonhuman beings capable of affection, learning, and fear. The attendees’ perspective was unsurprising: they were technocratic administrators committed to efficient public service. To note that animal suffering and loss of life were integral to the abattoir’s celebrated technical excellence and public benefits is not to condemn these experts as cruel or hypocritical. Rather, it is to acknowledge that one man’s meat is someone else’s muscle.

⁷⁹⁹ SMA Q230-1-2, *Shanghaishi shili diyi zaishengchang shiwu zhounian jinian* 上海市市立第一宰牲場十五週年紀念 [“Commemoration of the fifteenth anniversary of the Shanghai Number One Municipal Slaughterhouse”].

⁸⁰⁰ Robert Pinsky trans., *The Inferno of Dante: A New Verse Translation*, Bilingual Edition, New York: Noonday Press, 1996, p. 25.

The ideologies of industrial slaughter and hygienic modernity proved durable amid sweeping political changes. Barely six months after the 1948 slaughterhouse ceremony, the People's Liberation Army entered Shanghai. Some participants in the commemoration, such as Mayor Wu Guozhen and Pan Gongzhan, fled overseas to escape the Communist authorities. Others, such as Yang Mingding and veterinarian Cheng Shaojiong, assumed prominent positions in the government of the new People's Republic.⁸⁰¹ Meanwhile, between January and June of 1949, the city's slaughterhouses killed 20,643 bovines.⁸⁰² Under new management, Shanghai's enormous municipal slaughterhouses served the meat eaters and national economy of the Chinese state.

Studying the intersections of human events and the lives of animals can encourage historians to challenge customary "watersheds," like the transfer of power in 1949, that are supposed to delineate profound social or political change. The historian Prasenjit Duara has urged scholars to consider the periodization of official history as a "rhetorical strateg[y] to conceal the aporias and repressions necessitated by the imposition of a master narrative."⁸⁰³ The standard periodizations of human history can obscure not only the oppression of one group of people by another, but also of one species by another. The Chinese Communist Party continued and expanded upon the Nationalists' efforts to

⁸⁰¹ As Vice Director of the Patriotic Hygiene Committee of Shanghai No. 1 Hospital during the Campaign to Eliminate the Four Pests in the late 1950s, Yang Mingding again used the large-scale killing of animals to strengthen the nation and defend the people. By conducting experiments with various foods, he determined that fried dough 油条 was the best bait for rats. Yang used poisoned fried dough to completely eradicate the hospital's rat population. See Ding Qin, "Yang Mingding," p. 90.

⁸⁰² Table 17: Shanghaishi weishengju shengchu tuzai baifenbi shubiao 上海市衛生局牲畜屠宰百分比數表 [*Shanghai Municipality Hygiene Department Livestock Slaughter Percentages*], Shanghai shi tongji yuebao 上海市統計月報 [*Shanghai Monthly Statistical Reports*] 1949 年第一卷第一期, p.67. [Accessed on Dacheng laokan, August 8, 2018.]

⁸⁰³ Duara, *Rescuing History*, p33

increase the nation's bovine populations while also extracting ever-greater value from the bodies of dead cattle. Notwithstanding the Parties' real differences, and their vehement mutual recriminations, the 1949 handover of power meant no sweeping changes in bovine experiences of industrial slaughter.

Both before and after 1949, Chinese scientists and technocrats worked to ensure a cleaner, larger, and more profitable meat supply. Many aspects of the relationship between humans and bovines changed during the decades of this study. Technological and logistical innovations made frontier beef accessible to urban consumers, longstanding taboos against beef consumption withered away, and successive governments pursued hygienic modernity by moving slaughter into huge industrial abattoirs. Domestic peace after decades of war, as well as the influx of Soviet expertise and materiel, contributed to the rapid expansion of the slaughter industry in the PRC. Yet the general direction and aims of this process were clear well before the much-ballyhooed year 1949.

By highlighting the effects of human interventions on the lives of nonhuman subalterns, animal history provides a corrective to the sanitized official narratives that Duara calls "History." These accounts serve state agendas by implying sudden and total change at the crossing of temporal or spatial boundaries as a result of the agency of some new government or leader. For livestock in their final hours, the effects of the 1949 handover were negligible. The five stars of the Communist Party replaced the Nationalist sun on flags flapping over Shanghai's historic Bund waterfront. And just as before, the blood of thousands of dying cattle ran thick and red.

Conclusion: Did Bovines have a Chinese Revolution?

The central question of this Conclusion, and of this dissertation, seems impossibly broad.⁸⁰⁴ It is more manageable when rephrased as “How and why did the lives of bovines in China change during the mid-twentieth century?” Yet even this wording still threatens to overwhelm any attempt at analysis. Therefore, I have found it helpful to narrow the inquiry still further by focusing each chapter on a bodily fluid that represents some of some aspect of bovine life. This method of disaggregating the animals’ lives into clusters of activities such as nursing, working, and slaughter permits a nuanced understanding of how these animals experienced profound changes in their multispecies society. In some regards, such industrial slaughter, the shift toward industrial, urban killing of bovines runs through the period of the study. By contrast, nationwide cattle plague eradication was perhaps the most significant change in bovine experiences during these eventful decades. This virus, which meant a painful death for at least one million bovines per year in China during the early twentieth century, was no longer a threat by the late 1950s. The title of the dissertation encapsulates my argument: vaccination, dairy production, livestock insurance, and industrial slaughter variously helped or harmed bovine welfare. But their ultimate aim was to make these animals more useful servants to humans and by extension, to the Chinese nation-state.

⁸⁰⁴ I owe an obvious debt to the social historian Joan Kelly-Gadol’s pathbreaking article, “Did Women Have a Renaissance?” in Renate Bridenthal and Claudia Koonz, eds. *Becoming Visible: Women in European History*, Boston: Houghton Mifflin, 1977, p. 175.

This has not been the first study to show how human activities and societal changes affected animals. But it is the first attempt to show how animals *experienced* these changes in their relations to humans. The historian Robert B. Marks coined the term “tigricide” to refer to the calamitous drop in Southern Chinese tiger populations during the eighteenth and nineteenth centuries. These animal deaths resulted both from human hunting, and from habitat fragmentation as settlers claimed wild land for farming.⁸⁰⁵ Marks’ superb study was a major contribution to the fields of environmental and social history, but he was silent on the perceptions and experiences of the sensitive big cats. This dissertation has been my attempt to build on earlier scholarship by bringing nonhuman experiences into our understanding of the past.

Chapter Findings

Chapter One of this dissertation showed that women’s entry into the compensated workforce relied in part on the physical and emotional labor of “dams,” or bovine mothers. For human mothers, the mid- to late-1950s were a period of “liberation” from childcare in exchange for intense toil in the paid economy. Their real gains from political reforms such as the Marriage Law of 1950 notwithstanding, many women experienced this period as a time of longer working hours and separation from their loved

⁸⁰⁵ Robert B. Marks, *Tigers, Rice, Silt, and Silk: Environment and Economy in Late Imperial South China*, New York: Cambridge University Press, 1998, p. 344.

ones.⁸⁰⁶ Meanwhile, separated from their calves, and given special foddors to increase their milk yields, many thousands of bovine mothers provided the dairy products that replaced breast milk in the diets of nursing babies whose mothers had gone to work. To accomplish the central government's imperative of industrialization, both human and bovine parents underwent separation from their youngsters, who received scientifically formulated analogues of breast milk, sometimes to the detriment of their health.

The physical and sexual characteristics of nonhuman beings shaped their experiences. Unlike female cows, bulls contributed little reproductive labor after providing the initial supply of semen. The stress of undergoing involuntary artificial insemination or mating, the emotional hardship of separation from the calf, and the physical burden of producing maximal milk yields were for female cows alone to bear.⁸⁰⁷ Therefore, historians who examine the suite of physical and cultural capacities that constitute gender may find that an anthropocentric vantage point is inadequate. A multi-species approach yields a fuller picture of gendered experiences, while also providing powerful tools for assessing and critiquing power relations among the sexes. Some human mothers in Chapter 1 were pleased to earn additional work points, and were grateful to daycare centers for teaching their children good manners and social skills. A gendered history of this period should include these positive developments. Yet it should also acknowledge the considerable discomfort and anxiety of the bovine mothers whose

⁸⁰⁶ For the bumpy implementation of the Marriage Law, see Gail Hershatter, *The Gender of Memory: Rural Women and China's Collective Past*, Berkeley, California: University of California Press, 2011, p. 108-116.

⁸⁰⁷ During the upcoming year, I will use my fellowship at the Fairbank Center at Harvard University to complete a chapter on artificial insemination and reproduction.

physical and emotional labor made kindergartens possible. A multispecies approach to gender, then, gives standing and agency not only to humans, but also to the nonhumans whose labor is mostly invisible yet completely real. This perspective permits a critique of political economy in terms of how relations among the sexes affect the experiences of both humans and sentient nonhumans.

As **Chapter Two** argues, bovine public health improved during the period of this study despite the tumult of the Japanese invasion, Chinese civil war, and subsequent economic reforms. The Communists largely continued the Nationalists' cattle plague vaccination program, albeit on a far more ambitious scale. The nationwide eradication of rinderpest by 1957 was due to three major developments. The first was the Communists' adaptation of the lapinized rinderpest vaccine, which Imperial Japanese scientists had developed in occupied Manchuria during the 1930s-1940s. Less risky for the indigenous bovine breeds, and less perishable during lengthy expeditions into the countryside, this vaccine was superior to both the avianized and caprinized variants favored by the Nationalists and their Anglophone allies. The second development was the end of widespread violence after the Communists assumed power. During the decades before 1949, conflicts including warlord battles, the Japanese invasion, and especially the civil war between the CCP and KMT had grievously impaired the vaccination program. Inaccessible to veterinarians, pockets of unvaccinated animals in contested regions could serve as viral reservoirs where the disease awaited its next opportunity to burst forth. The advent of peace was therefore a relief not only for the nation's beleaguered humans, but for its bovines as well. Finally, the Communists were more successful than the

Nationalists at traveling into the hinterlands, winning the trust of skeptical people of minority ethnicities, and eliminating the virus in its remote strongholds.

To be sure, the KMT and CCP vaccinated bovines against rinderpest to accomplish their common instrumental goal of protecting precious draft labor. They were not sentimental animal lovers, aghast at the necrotic lesions and emaciation of sick cattle. Yet by reading the record through both the observational and interpretive lenses, historians can also appreciate how this campaign enhanced bovine living standards. After 1957, Chinese bovines still confronted diseases such as anthrax and brucellosis. But they did not die *en masse* from the explosive diarrhea and painful emaciation symptomatic of cattle plague. Rinderpest eradication counts not only as an economic success for humans, but as a public health improvement for cattle.

Chapter Three on sweat and **Chapter Four** on ink showed that as workers and as property, bovines took part in the nationwide economic revolution. During the war years and subsequent decade of reconstruction during the 1950s, bovine working hours increased. This trend was a response to widespread bovine mortality during the fighting, which left a heavy burden on surviving animals. Furthermore, as the animals changed hands from private or shared ownership among a few families, to cooperative and then communal ownership, their working conditions deteriorated as their bonds with their human colleagues frayed. While it helped to expand the reach of veterinary care and vaccination, livestock insurance also accelerated the commodification of these animals, leading some farmers to mistreat or kill them in hopes of obtaining compensation. As workers and as assets, cattle were as deeply affected as their human counterparts by the redistributive economic policies of this time.

Chapter Five on saliva showed that bovine diets were another area in which the Communist authorities continued and expanded the earlier Nationalist wartime interventions in the energy economy. Novel forage grasses and crops modified the ecological conditions of pastures from Xinjiang to Guizhou. These plants made solar energy edible for livestock in the form of leaves and stems. They also contributed to what I have called the “internal Anthropocene,” a change in the energy balance, biodiversity, and chemical composition of ruminants’ digestive tracts that affected the living conditions of countless symbiotic microbes. Seeking healthier and more productive animals, humans have manipulated both natural landscapes and the diets of animals since even before the start of animal domestication. The “internal Anthropocene” is nothing new. But focusing on the microbial life forms most affected by this phenomenon reveals that while an anthropocentric environmental history of China is unsatisfying, so is an account that considers only humans and their livestock. The bacteria, protists, and fungi in bovine rumens are an inevitable waystation for solar energy on its journey from plant matter to animal flesh. In seeking to nourish their bovines, humans could not but nourish the plethora of life forms in the animals’ guts. By planting more forage crops, by preparing silage to keep herds alive through the barren winter months, and by encouraging citizens to conserve fodder by using non-plant energy sources for cooking and heating, the KMT and CCP authorities intervened, unintentionally but unmistakably, on behalf of bovine microbiota.

Not all of the physical and mental changes in bovine experiences resulted from the set of political, economic, and cultural transformations that we customarily call “the Chinese civil war and revolution.” **Chapter Six** showed that the Communist government

expanded and intensified the development of a large-scale, industrial slaughter and meat processing industry. These processes had been underway for decades before the conventional watershed of the founding of the People's Republic in 1949. The number of cattle killed each year rose sharply as PRC authorities expanded the national logistical infrastructure of abattoirs, railways, and refrigerators. Yet the Nationalists' full-throated support for industrial meat processing suggests that had the civil war ended differently, this aspect of bovine experience would have changed little, if at all. At the grassroots as well, the widespread taboo against slaughtering and consuming the hard-working draft ox had been withering away for decades before 1949. In its place came a new appreciation for regimented, specialized slaughterhouse workers whose rational and scientific approach to "disassembling" cattle yielded meat and ancillary commodities, free of bacterial contaminants, for domestic diners and overseas buyers. Both the KMT and CCP shared an appreciation for hygiene as a hallmark of modernity, and for the industrial slaughter apparatus that was a cornerstone of a safe and efficient food system. But for oxen taking their final steps toward death, it mattered little whether the flag fluttering above the Shanghai Municipal Slaughterhouse featured the Nationalist sun, or the Communist stars.

Governments, concerned with the security and prosperity of *people* in China, viewed livestock as a crucial means for securing their political aims. The Nationalist and Communist authorities did not set out to improve or worsen the lives of animals within their domains. Likewise, today's merchant mariners and ivory aficionados probably think little about the whales and elephants whose behaviors and cultures they alter. Nevertheless, state policies and popular practices substantially affect the mental and

physical wellbeing of animals. Some programs, such as veterinary campaigns, increased the security and health of bovines in China. Others, such as the production of animal protein via concentrated husbandry, brought them considerable stress and suffering. Whether helpful or harmful to the animals themselves, these efforts were intended to make bovines better serve the people.

Possibilities for Future Research

In closing, I wish to suggest some possible avenues for the historians of the future. The first is a **transnational comparative history of multispecies societies** along the lines of Kenneth Pomeranz' *The Great Divergence* or R. Bin Wong's *China Transformed*⁸⁰⁸. These authors debunk the notion of teleology in social or technological change, in which nations pass through well-defined stages that happily coincide with the historical experience of Western Europe. Instead, they highlight the variability and contingency in socio-economic trends, showing that there is no Universal Truth of historical change. The same insight must apply even when the scope of analysis expands to cover societies that consist not only of humans, but also their nonhuman counterparts.

The present study has tracked the wellbeing of bovines through several decades within a single nation. By contrast, a comparative approach could examine the living conditions of animals in different societies at the same time. Such an approach would

⁸⁰⁸ Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy*, Princeton, New Jersey: Princeton University Press, 2000; R. Bin Wong, *China Transformed: Historical Change and the Limits of European Experience*, Cornell University Press, 1999.

yield new perspectives on transnational phenomena, while also acknowledging regional peculiarities. Where did pigs suffer most (and least) during the global economic depression of the 1930s? How did chickens around the world experience the numerous conflicts that comprised the Cold War? And what do these differences reveal about their respective multispecies societies? Such questions encourage scholars to shift from an incomplete, anthropocentric perspective on world events, toward a vision of global history that incorporates other forms of life. Furthermore, beyond simply comparing countries, multispecies historians might be wise to compare sub- or trans-national regions. As Pomeranz remarked, except for studies of national-level policy, “the nation is not a unit that travels very well.”⁸⁰⁹ This dissertation shows that although some aspects of bovine life in China were consistent nationwide, there were also substantial local variations. Preserving nuance and avoiding a dull, flattened narrative will require acknowledging that the experiences of intelligent beings in any society are not uniform or fixed.

While this dissertation has primarily used textual evidence, other sources such as **material culture and biometric data will also provide valuable clues about the inner lives of historical nonhumans.** In his recent Presidential Address to the American Historical Association, John R. McNeill suggested that scholars may be nearing “peak document,” a period in which the most significant gains in understanding the past will come from applying the natural sciences to physical evidence such as glacial deposits and

⁸⁰⁹ Kenneth Pomeranz, *The Great Divergence*, p. 7.

genomes, instead of deciphering records on “paper, parchment, or papyrus.”⁸¹⁰ For example, by examining the hooves on lifelike statues of victorious race horses, a pioneering classicist has revealed much about the diets, diseases, and training of equines in ancient Greece.⁸¹¹ Interpreting this evidence in conjunction with contemporary texts can reveal much about what it was like to pull a chariot in ancient Athens. Today, the biometric surveillance of domesticated animals is yielding mountains of data for the historians of the future. In the grip of a devastating swine epidemic, for instance, many Chinese farms are deploying software that recognizes individual pig faces, tracks their ovulation, and scans for signs of disease or abnormal behavior.⁸¹² Meanwhile, wifi-enabled devices with cameras and treat dispensers allow anxious bourgeois “pet parents” to remotely monitor their “fur babies” and indulge the animals with delicacies.⁸¹³ While innovative historians will always find ways to squeeze meaning from textual records, the video, audio, and physiological data from new biometric devices are orders of magnitude

⁸¹⁰ John R. McNeill, “Peak Document and the Future of Historical Research,” Presidential Address at the 134th Annual Meeting of the American Historical Association, New York City, January 4, 2020. [Accessed April 21, 2020 at <https://www.historians.org/about-aha-and-membership/aha-history-and-archives/presidential-addresses/john-r-mcneill>]

⁸¹¹ Rosie Mack, “The equine foot in ancient Greece from the Classical to the Hellenistic period,” unpublished paper presented at the Animal History Group conference, King’s College London, June 2019.

⁸¹² Sui-Lee Wee and Elsie Chen, “China’s Tech Firms are Mapping Pig Faces,” *The New York Times*, February 24, 2019 [<https://www.nytimes.com/2019/02/24/business/china-pig-technology-facial-recognition.html>, accessed June 28, 2019].

⁸¹³ Some models include the Petzi Treat Cam and the Furbo Dog Nanny, which allows absent owners to dispense a treat in response to a “dog selfie.” [Accessed April 24, 2020 at <https://shopus.furbo.com/> and <https://www.wagz.com/petzi/>. Since I began writing this conclusion, Petzi was “adopted by the Wagz™ family of smart pet products.”]

more detailed than the documents that have formed the basis of the present study. They will keep multispecies historians busy for many years to come.

I hope as well that my **three analytical lenses—the instrumental, observational, and interpretive perspectives**—were useful to readers, and perhaps to future historians. My goal in employing these lenses was to dissolve the boundaries between materialist and theoretical approaches to multispecies history. Cattle had instrumental value, which affected their relationships to humans. They also had inner lives, whose contours were shaped by their material circumstances. The instrumental and observational lenses provide empirical rigor, while the interpretive lens helps to transform these animals from economic abstractions into living, feeling beings. There are other valid ways to integrate evidence and analysis. I look forward to seeing how future scholars bridge the gulf between physical and textual evidence, and the ephemeral experiences of sentient nonhumans.

Multispecies history is an invitation for all of us, specialists and laypeople, to incorporate nonhumans into the narratives we construct about the past. Whereas “animal history” connotes an exclusive attention to the physical and mental lives of species such as cattle or tigers, “multispecies history” conveys the interconnectedness of life on Earth. Few of us identify as “animal historians,” and even fewer as “bovine historians.” Yet all of our stories involve more than one species, whether or not we choose to see them.

APPENDIX 1: Cattle Appraisal Chart (1951)

1. Overview	Total points: 22	Max score
Height and weight	At least 3 chi tall, bodyweight at least 650 jin	10
Body shape	Broad, deep, thick, low- hanging, evenly distributed	5
Body quality	Firm, joints clearly defined, coat soft and fine	5
Disposition	Tame, resolute, mild temper	3
2. Head and Neck	Total points: 10	

Head	Size, symmetry, delicate, jaw angle	2
Nose	broad; clean, even lips, large nostrils	1
Eyes	Large and bright	2
Forehead	Broad and ample	1
Ears	Medium- sized, appropriately placed, delicate	1
Neck	Appropriately long, ample but not fat, slightly arched, well defined	2

	throat, large trachea	
Horns	Appropriate size, well arranged, intact and lustrous	1
3. Forequarters	Total points: 20	
Shoulders	Well- developed muscles, full figured, smooth shoulder blades	4
Forelimbs	Short, muscular	1
Leg	Broad, long, muscular	2

Knees	Broad, deep, straight, prominent	2
Shins	Short, broad, level	2
Ball joints	Broad, straight, strong	1
Fetlocks (?) 繫	Appropriately angled, correct length, strong and healthy	1
Hooves	Large, round, straight, inclination same as fetlock, delicate quality of horn; black	5

	and free of fractures	
Limb posture	Straight, even, well-spaced	2
4. Abdomen	Total points: 13	
Chest	Deep, broad, low-hanging, large circumference	3
Back	Short, broad, straight	3
Waist	Short, broad, strong and healthy	3
Ribs	Long, closely spaced, supple	3
Flanks	Ample, low hanging	1

5. Hindquarters	Total points: 29	
Hips	Broad, ample, muscular	1
Buttocks	Long, broad, not slanted, well-defined, muscular	4
Tail	Clean and intact, with long, fine hair	1
Thighs	Deep, muscular, strong-boned	4
Calves	Broad, muscular	3
Joints	Straight, deep, broad, ball and socket well- defined	5
Shins	Short, level	2

Balls (球) ?	Broad, straight, strong	1
Fetlocks (繫)	Appropriately angled, correct length, strong and healthy	1
Hooves	Large, round, straight, inclination same as fetlock, delicate quality of horn; black and free of fractures	5
Limb posture	Straight, even, well- spaced	2

6. Motion	Total points: 6	
Gait	Straight, vigorous, yet flexible	6
Point total:		

Source: Cui Mainong 崔邁農, ed., Wu Xinfu 吳信法, rev.; *Gengniu baohufa 耕牛保護法* [Methods for Protecting Draft Oxen], 上海畜牧獸醫出版社, Shanghai Livestock Veterinary Publishing House, 1951, pp. 59-60 [Rare book collection of Shanghai Library]

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ECNU	East China Normal University (Shanghai)
HI	Hoover Institution (Palo Alto)
HKBU	Hong Kong Baptist University
JPA	Jiangsu Province Archives (Nanjing)
NML	Nanjing Municipal Library
SHAC	Second Historical Archives of China (Nanjing)
SMA	Shanghai Municipal Archives
SL	Shanghai Library
UNRRA	United Nations Relief and Rehabilitation Administration Archive (New York City)
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