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Making machines of animals: the international livestock exposition, 1900-1920

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MAKING MACHINES OF ANIMALS:

THE INTERNATIONAL LIVESTOCK EXPOSITION, 1900-1920

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ABSTRACT

This dissertation examines the establishment and influence of the International Livestock Exposition, an annual show that began in Chicago in 1900 and that served as the central hub of the national livestock improvement movement. Industrial meatpacking firms and land-grant university professors worked together to transform the genetic composition and physiology of American meat-producing animals. Packers hosted the Exposition at the Union Stockyards to address market irregularities in quality and supply. University researchers intended to solve a larger set of problems that included rural population decline, the need for more food output to feed a growing population, and diminishing soil fertility. These unlikely partners created the International to eliminate inferior, or "scrub," livestock.

The International played a pivotal role in remaking livestock genotypes and phenotypes. Its organizers and participants favored "improved" animals descended from purebred, British livestock with recorded ancestries—a preference rooted in the reformers' pseudo-scientific belief in eugenics. Purebred animals had standard bodies

with a narrow set of physiological outcomes, which amounted to biotic technology. But genetic homogeneity was only a building block for improvement. The International also employed contests, demonstrations, and advocacy to reconfigure American livestock by making them smaller, more compact, and early-maturing.

This study also analyzes the larger shift in American agriculture toward the Corn Belt model of grain feeding. Treating animals as dynamic historical agents, it suggests that machinery, tractors, seeds, and implements did not alone accomplish the industrialization of agriculture. Meat-producing cattle, sheep, and pigs were a requisite component in an emerging industrial sequence. These grain-fed modern livestock and their farmer caretakers fit into a developing web of mutually dependent agricultural specialists. The International united this movement into a singular body at the end of each year in Chicago, and in the process, shaped American agricultural practices and encouraged farm specialization until the show closed in 1975. Sources consulted include land-grant university research and publications, meatpacker records and propaganda, and newspaper and agricultural journal articles.

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INTRODUCTION

The World's Most Conspicuous Livestock Show

> Organization, concentration and concerted action in the live stock industry will result in wider influence, greater improvement and prosperity for all interests involved…
>
> —J.A. Spoor, 1902[1]

The Union Stockyards in Chicago hosted the first International Livestock Exposition in 1900. When animals arrived for the show, handlers immediately directed them down chutes and through gates to their pens, a "hotel" for livestock.[2] To reach the exhibition halls, exhibitors and spectators entered through the Stockyard's three-arched gate built in 1879 and designed by architects Daniel Burnham and John Root.[3] The gate's middle arch featured a bull's head sculpture named Sherman—a bull that won the grand sweepstakes at the first American Fat Stock Show in 1878. Of course, the slaughter

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[1] J.A. Spoor, "Tells of Great Year," in *"Our Year Book." Telling Tables of the Livestock Trade for the Year 1902* (Chicago: Chicago Daily Drovers Journal, 1903), 11-12. J.A. Spoor worked as the president of the Union Stockyard Company and served as the first president of the International Livestock Exposition. In his remarks following the third annual International, he applauded the increasing demand for quality meat produced by "well-bred" animals, which resulted from "progressive breeding and feeding." Collective action among agriculturalists, he argued, provided the necessary support for producers to make improvements, and Spoor remained committed to further education as it related to progressive husbandry practices.

[2] James Poole, journalist and expert on the livestock trade, labeled the International the "world's most conspicuous livestock show." For more on the International, see James E. Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought Into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World* IV, no. 18 (1919); "International Live Stock Exposition: The Exponent of a Great Movement for Improvement of the Domestic Animals of the United States," *Opportunities of To-Day* 3, no. 6 (1907).

[3] Carl Smith, *The Plan of Chicago: Daniel Burnham and the Remaking of the American City* (Chicago: The University of Chicago Press, 2006), 57; Donald L. Miller, *City of the Century: The Epic of Chicago and the Making of America* (New York: Simon & Schuster Paperbacks, 1996), 199, 318.

animals who entered the Stockyards faced different fates than the International show animals and prize-winning bulls like Sherman.[4]

FIGURE 1. Union Stockyard gate, 1921. *Source: A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1916, 6.

From 1900 to 1975, the International awarded premiums, special prizes, trophies, and badges, and drew over 10,000 animals each year. As the associate editor of *The Breeder's Gazette* exclaimed following the inaugural show, the International dwarfed "all

[4] J'Nell L. Pate, *America's Historic Stockyards: Livestock Hotels* (Fort Worth: TCU Press, 2005), 63-67, 79; "Union Stockyards," *Chicago Daily Tribune*, Oct. 10, 1904; *Review of the First International Live Stock Exposition* (Chicago: The Union Stock Yard & Transit Company, 1900), 75; Swift & Company, *The Meat Packing Industry in America* (Chicago: Swift & Company, 1920).

shows of recent years" and its "wonders... [were] unrivaled in history."[5] Farmers and urban spectators flocked to the International; in 1904, 1905, and 1906, the average attendance per year reached 400,000 during the December show week. Railroad companies advertised reduced fees to encourage people to attend. Not only did attendees fill the Amphitheatre to capacity, Chicago's boardinghouses, hotels, streetcars, and restaurants overflowed with both American and foreign visitors. These guests traveled to the Stockyards to view the many animals and competitions, which included agricultural college exhibits and demonstrations by the federal government.[6]

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[5] *Review of the First International Live Stock Exposition*, 1900. Many agricultural journals advertised the awe-inspiring built structure and livestock witnessed at the International. See J.L. Tormey, "International Just Out of Its Teens: A Running Review of Some of the High Lights in the Greatest Live Stock Show in the World," *The Shorthorn World* IV, no. 18 (1919): 15. Tormey described the International as a "Fairyland for the lover of the best in our country's live stock." The marvel of observing the "physically perfect animals developed by the master hand" provoked Tormey's response. The world-class animals and the newly-built grand facilities left no one uncertain about the magnitude of purpose. The International intended, even in its first years, to become the court of last appeal where the best animals assembled for final judgement. Judging animals, Tormey argued, instilled the "correct ideals of the omega in animal production," which, he added, benefited the market and consumer, even if indirectly.

See also "The International Swine Show," *The Swine World* 1, no. 10 (1913): 3. Per the author, at the International the "visitor finds a feast for the eyes from the time he enters the arched portals." The producer returned home with his ideas and ideals reshaped giving him a better sense of possibility on his own farm. Breeders, breed associations, and people from every agricultural interest converged on the International at the conclusion of every year to participate in and/or witness this great demonstration of progress, the author recalled. Then the observers took with them back home or to their professional institutions the lessons learned at the Exposition.

[6] John O'Brien, *Through the Chicago stock yards; a handy guide to the great packing industry* (Chicago: Rand, McNally & Company, 1907), 26-30. Also see "America to Feed World," *The Duroc Bulletin and Livestock Farmer* 12, no. 305 (1917): 19. The U.S. Food Administration "designated the International Live Stock Exposition a 'food training camp.'" Feeding animals grain, to meet these demands, did not solve all of the problems, the author reminded readers: "Never was it so wasteful to feed high-priced grain to ill-bred stock." As a result, the International taught producers the combined importance of feed economy and the use of improved animals to efficiently provide domestic and foreign consumer markets a reliable and high-quality product. For this reason, the author declared, the U.S. Food Administration recognized "the International as an educational agency."

The International brought together livestock producers, land-grant college researchers, and government officials. But it represented much more to these visitors than an excursion to Chicago and some spectator fun. The International served as the annual meeting place for agricultural reformers and farmers devoted to transforming animal husbandry practices. The cattle, sheep, and pigs unloaded from the trains in Chicago represented works-in-progress. Reconfiguring these animals' genetic makeup and physical shape was the International's central function. In the show ring, judges selected and normalized modern body shapes and types. The Exposition also encouraged changes in farm practices to assist the emergence of industrial meatpacking and modern methods of food production.[7]

By the turn of the century, Chicago had emerged as the industrial center of the agricultural United States.[8] The meatpackers vertically consolidated the industry. They

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[7] "Union Stock Yards," *Chicago Daily Tribune* (1904): 6; O'Brien, *Through the Chicago stock yards*, 32-34. See also "What Farmers of the Middle States Must Do," *The Breeder's Gazette* (1882): 494.

[8] "Chicago Selected," *Wool Markets and Sheep* XI, no. 14 (1901): 17; *Review of the First International Live Stock Exposition*, 1900. See also, W.E. Skinner, "Stock Sales at the International," *Wool Markets and Sheep* XI, no. 24 (1901): 28. Skinner helped run the Stockyards and served as manager of the International. *Wool and Markets* reprinted this letter mailed to livestock breeders and agriculturalists to advertise the central significance of Chicago in the livestock world. Providing the best prices, the most access through a web of railroads, and "concentration of…business," Chicago, he argued, offered the farmer the greatest economic opportunity. The International, he exclaimed, "awakened" the livestock community. In this regard, Skinner believed that this type of awakening prompted the increased production of better, more competitive animals.

In "International Live Stock Exposition," *Wool Markets and Sheep* XI, no. 24 (1901): 18, the journal urged readers to realize and support the educative function of the International for livestock breeders and agricultural colleges. Competition among colleges, in particular, forced them into rivalries. As a result, the unsuccessful institutions in the previous year, as a matter of pride, re-evaluated methods and their products to challenge previous victors. See also Edmund J. James, "Address of Welcome," *Armco* (1914), Box 3, File 44, Alvin Howard Sanders Papers, Division of Rare Manuscript Collections, Cornell University Library, Ithaca NY (henceforth

bought, processed, and shipped livestock and animal-based products at the Union Stockyards, controlling every aspect of the meat business from the purchasing and slaughtering of the animals to the retail counter. They faced the wrath of "muckraking" journalists, distrustful consumers, and angry producers who criticized the consolidation of the industry and leveled price-fixing and food quality charges against the packers.[9] And indeed, the meatpackers did intend the International Livestock Exposition to function in part as a "pure food display" to dispel the consumer distrust provoked by unsettling events such as an embalmed meat crisis during the Spanish-American War, which resulted in the deaths of soldiers, and a rising storm of negative publicity culminating with the 1906 publication of Upton Sinclair's *The Jungle*. Beautifully groomed animals might recast the industry as the more humane pursuit of healthy, safe food. But the meatpackers' primary motive, and the main reason for the industry's financial and institutional support of the International, was a more pressing concern with the quality and quantity of livestock available to them.

AHSP); Alvin H. Sanders, "His Influence Upon American Agriculture," *Armco* (1914), Box 3, File 44, AHSP.

[9] Scholars have taken a direct look at the Stockyards and the relationship between the meat butchered and the consumer. See Roger Horowitz, *Putting Meat on the American Table: Taste, Technology, Transformation* (Baltimore: The Johns Hopkins University Press, 2006). Others have looked at the politics, the architecture, and the work environment of the Stockyards; see James R. Barrett, *Work and Community in the Jungle: Chicago's Packinghouse Workers, 1894-1922* (Urbana and Chicago: University of Illinois Press, 1987); Louise Carroll Wade, *Chicago's Pride: The Stockyards, Packingtown, and the Environs in the Nineteenth Century* (Urbana and Chicago: University of Illinois Press, 1987); and Robert A. Slayton, *Back of the Yards: The Making of a Local Democracy* (Chicago: The University of Chicago Press, 1986). For an extensive conversation on the impact of railroads and refrigeration on the agricultural and meatpacking industries, see William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton & Company, 1991); Richard White, *Railroaded: The Transcontinentals and the Making of Modern America* (New York: W.W. Norton & Company, 2011).

Despite the acknowledged power of the Chicago meatpacking industry at the close of the nineteenth century, the packers felt genuine supply-side vulnerabilities and fretted about limited control over animal quality, uniformity, and timing-to-market. Industrial transformations in meatpacking, including the systematized disassembly of livestock and the refrigerated shipment of dressed carcasses, was limited in its productive ability without comprehensive changes in farm practices and animals themselves. The packers used the International to address these deficiencies in supply.[10]

The limited supply of beef in the 1890s worried the packers. As the demand for meat grew in America's cities, the number of meat-producing animals available declined. Consequently, packers blamed suppliers and farmers for price fluctuations instead of their own models of production and distribution. Their critics believed, of course, that the packers' control over the industry allowed them to inflate prices. But packers argued that shortages in supply forced the prices to rise. Founding the International was one way for the packers to address the supply problem by transforming livestock breeding and farm practices.

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[10] Many scholars have evaluated the Stockyard's control over the meat industry. See Cronon, *Nature's Metropolis*. However, the supply limitations of Chicago meatpackers' recasts this conversation. Scholar David Igler, in his evaluation of Miller and Lux's largescale cattle operation, offers a different perspective on organization. Miller and Lux not only butchered cattle, they raised the animals too. This horizontal organization of meat production differed from the Chicago case. Igler's work forces this study to evaluate supply as an essential part of the meatpackers operation and their lack of direct control. Nevertheless, real differences existed between Miller and Lux and the Chicago meatpackers, primarily regarding scale. In 1913, for example, Miller and Lux's receipts were $5 million, and in the same year the Union Stockyards generated $409 million in revenue. As such, the supply loamed as a perennial liability for the Chicago packers. See David Igler, *Industrial Cowboys: Miller & Lux and the Transformation of the Far West, 1850-1920* (Berkeley: University of California Press, 2001).

Meatpackers provided the financial foundation for the International, but the Exposition could not have functioned without a second set of participants: a deeply invested group of land-grant university researchers who worried about the precarious relationship between national agricultural output and rural stability. These economists and crop and animal husbandry experts wanted farm productivity and food production to keep pace with the explosive growth of urban populations, even as farm areas themselves lost population and fewer farmers remained tied to the countryside. They wanted rural standards of living to more closely match urban standards and hoped such improvements would entice rural residents to stay on the farm. Increased incomes required increases in output, which would also address the nation's growing food demands.[11]

Improving both farm income and farm stability required major shifts in agricultural practice. With new or "virgin" lands no longer available as the "frontier" closed, these scientists and social scientists feared diminished farm output because of limited access to unexhausted land. To resolve this problem, the professors pushed "permanent farming" or "balanced farming," which required the use of livestock on each farm. Animal waste replenished the soil with nutrients and organic matter. Combining fertility goals with farm revenue concerns, the university researchers concluded that not only should every farm keep livestock, but also that agricultural improvement obliged farmers to breed better stock—animals that efficiently converted grain (not wild forage)

[11] "International Live Stock Show," *The Duroc Bulletin and Livestock Farmer* 12, no. 303 (1917): 42. The advertisement announced the benefit of improved feeding and breeding in meeting the "NATION'S CALL" as "A Food Production Camp In the Service of the United States."

to human food. Raising livestock specialized in meat production allowed farmers to feed corn to animals and then sell surplus meat for a profit.

What bound together these two unlikely interests—Chicago meatpackers and land-grant university professors—was a focus on the transformation of meat-producing animals. Livestock improvement might solve the supply problem, increase food production, and address the maintenance of soil fertility. The International unambiguously promoted the guidelines for selecting and raising these animals. Among the most important tenets was feeding grain to livestock, which regulated both meat quality and the timing of slaughter. Grain hastened the pace of growth, muscle development, and fat cover. By using stored grain, and roughages like hay, feeders could fatten animals and send them to the market more steadily throughout the year, which helped the packers ameliorate the seasonality of supply. The Stockyard's industrial model required constant access to meat-producing animals, and feed and feedlot husbandry reoriented the sequencing of production and mitigated the impact weather and growing seasons had on the flow of animals to the market.

Professors thought of time somewhat differently. To improve the farmer's monetary return, these researchers defined and applied concepts of efficiency, which obliged producers to consider input cost in relation to the sale value of livestock. The most significant input consideration in grain-fed livestock production was time. Each passing day cost the farmer more money to grow animals, and every pound after an animal's birth cost slightly more to add than the day before. Thus, weight gain cost more as livestock aged, and also meat tenderness and quality diminished with older age.

Finding the proper feeding regimen and animal age for marketing required farmers to ignore total weight and focus on rates of gain and carcass yields. The economists and scientists applied a rates-based model to feed conversion, nutritional waste, and age-to-finish costs and compared these input variables to market value. They urged farmers to disregard the gross value of animals and focus instead on the marginal returns gleaned from livestock production. Simply put, the heaviest animals sold on the market were no longer the most profitable. Feeding animals to extreme weights and ages reduced marginal returns for the farmer.

But grain alone could not transform animal husbandry into a modern enterprise. Progressive breeding also necessitated the injection and propagation of purebred British genetics in American livestock. With the proper genetic makeup, improved livestock provided quicker and larger returns for the feed consumed by the animal. The animals' bodies, like standard products assembled in the factory, needed to be uniform, efficient in design, and oriented toward the production of one commodity.[12] Preferences shifted in favor of purebred genetics and small, early-maturing cattle, sheep, and pigs that possessed efficient, higher-yielding characteristics. The packers benefited from product consistency, but the smaller and more compact bodies also helped them fit more edible meat on a railcar during live shipment and extract more valuable meat per animal on the disassembly lines in Chicago.

Given these mutual interests, Chicago packers and land-grant professors collaborated to create the International Exposition in 1900 as the hub for the livestock

[12] O'Brien, *Through the Chicago stock yards*, 32-34.

improvement movement. The International's early success also led to an endorsement from and the direct participation of the United States Department of Agriculture (USDA), as well as the formation and hosting of issue-oriented associations to foster scientific relationships and to encourage and disseminate agricultural research. These professional associations reflected the International's central goals and provided the International organizational support in research areas like animal nutrition, genetics and breeding, and scientific grain production. In this regard, the International helped create and bring together an emerging class of nonfarm agricultural specialists that simultaneously promoted and served the needs of scientific crop and animal husbandry.

As the hub or "pivot" around which these professional organizations and specialists organized, the International created competitions to incentivize a new type of husbandry. The Stockyards housed and underwrote purebred associations, and these registries provided the organizational framework for competition. The International's classes were structured around breed. Possessing a purebred animal of British descent became a prerequisite for participation. Even in events aimed at improving commercial breeding, like the mutton competition, participants were required to breed average females of unknown genetics to purebred sires to demonstrate the value of well-bred sires to college students and livestock breeders.

Their known ancestries and uniform phenotypical traits provided information to breeders about probable productivity in future matings. But the affinity for purebreds had limits; these well-bred animals were not considered fixed, permanent, or already complete. Genetics alone did not constitute the modern animal. Instead, purebred animals

provided only the foundation for the "ideal" animal. The International also focused on the actual physical makeup of meat-producing livestock beyond the aesthetic or "fancy" traits, like color, ear shape, or horns, often associated with purebred phenotypes. As such, the International set out to alter animal bodies, and the show ring dictated these forms. Showmen led cattle with a halter and sheep by hand, and they guided pigs with a nicely-fashioned stick or cane around the ring for evaluation. The judges looked at animal depth, width, and thickness. They "handled" the most valuable parts, like the rack, loin, and leg on the sheep, to assess and compare the estimated market value of each animal. Finally, the judges placed the animals based on these visual and tactile metrics.

Meat-producing cattle preferred by the Exposition's judges replaced the old, tall, and thin nineteenth-century range cattle. The modern meat animal was compact with a rectangular, bulky body. Shorter in stature and younger in age, less than 24 months old, the ideal market steer produced a higher yielding carcass, not a larger overall carcass weight. In prioritizing these traits, the show provoked such hostility among showmen toward older steers that aged market animals all but vanished. Compact cattle, sheep, and pigs with efficient, high-yielding bodies became the modern animal form.

By promulgating and promoting these new standards, the International Livestock Exposition served as both the standard maker and the final arbiter for the livestock world, settling disputes within the agricultural community and resolving disparities in judgment at county and state fairs. The International founders often touted the show's central importance by comparing it to the United States Supreme Court. Even though the show could not legally enforce its standards, it created norms by shaping breeders' tastes and

preferences and by penalizing farmers and animals with disqualification or low placings. In its role as hub, the International established the criteria for animal evaluation, and it influenced the advice and information distributed by land-grant affiliated agencies that directly interacted with farmers. The International's standards therefore radiated out into the agricultural community. To win at state fairs around the country and receive positive reviews from judges, exhibitors oriented their breeding toward the International's goals.

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Many scholars have recognized that animal agriculture underwent changes between 1900 and 1920 that fundamentally transformed supply in the meat industry from the nineteenth-century range model to the corn-based scientific husbandry practices that characterize the twentieth century. They often highlight the deteriorated range conditions and other factors that destabilized production, such as the extreme winter weather in the 1880s, economic depression in the 1890s, and the end of the open range symbolized in academic literature and popular culture by the barbed wire fence.[13] But such scholarship usually overlooks the public institutions and the industrial firms that promoted and

[13] Richard White, "Animals and Enterprise," in *The Oxford History of the American West*, ed. Clyde A. Milner II, Carol A. O'Connor, and Martha A. Sandweiss (New York: Oxford University Press, 1994): 237-273; Terry Jordan, *North American Cattle-Ranching Frontiers: Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993); Jimmy M. Skaggs, *Prime Cut: Livestock Raising and Meatpacking in the United States, 1607-1983* (College Station: Texas A&M University Press, 1986).

instituted changes to husbandry that ultimately undermined nineteenth-century practices; it also ignores animals as dynamic actors.[14]

This dissertation instead analyzes the livestock improvement movement to evaluate the influence modernization had on animal genetics and body types, and to examine the impact of changing livestock forms and functions on farm organization. The International sponsored a professional network that worked to transform animal shapes to suit the needs of twentieth-century industry and agriculture, while modern animals required farmers to use different feeds, possess and apply new scientific knowledge, and rearrange and rebuild farm infrastructure.[15] This transition in American livestock

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[14] Harriet Ritvo captures the interaction and impact of human culture and politics on livestock in Victorian England; see *The Animal Estate: The English and Other Creatures in the Victorian Age* (Cambridge, MA: Harvard University Press, 1987). Also, Virginia DeJohn Anderson, in *Creatures of Empire: How Domestic Animals Transformed Early America* (New York: Oxford University Press, 2004), describes the ways in which livestock not only shaped the culture of colonial America but also the landscape. This dissertation builds on these works by treating animals as historical actors but considers livestock less as static beings and more as dynamic creatures. See Nicholas Russell, *Like engend'ring like: Heredity and animal breeding in modern England* (New York: Cambridge University Press, 1986).

Also see Edmund Russell's *Evolutionary History: Uniting History and Biology to Understand Life on Earth* (New York: Cambridge University Press, 2011). He argues that there is a need for "evolutionary history," or the academic blending of history and biology. In this way, Russell characterizes biological and human events as intertwined, and thus, biology should not be separated from political, cultural, and economic developments. For this dissertation, his work on "intended evolution" or the explicit manipulation of biological beings through control and breeding merits special attention. In addition, humans intervened in the shaping and control of the biological. However, it is useful to note that these nonhuman actors also influence human history; thus, evolutionary history includes the give-and-take between biological developments, whether pushed by humans or not, and experiences and events of human history—an ongoing interaction.

[15] For more on government involvement in agricultural advocacy, see Claire Strom, *Making Catfish Bait Out of Government Boys: The Fight Against Cattle Ticks and the Transformation of the Yeoman South* (Athens: The University of Georgia Press, 2009). Strom focused on the cattle tick eradication program during this period. Government scientists, based on their sense of societal needs, directed a program that forced southern farmers to regularly submit cattle to dips in vats to kill the tick. The cattle tick carried a fever, but most southern cattle possessed partial immunity. The program was designed to protect northern cattle. This story, for Strom, represented a shift in power and authority in agriculture toward the federal government.

breeding and meat production resulted in the deliberate change in stock animals themselves, transforming these seemingly "natural" creatures from sources of food and fertilizer to units of technology.[16]

Alan L. Olmstead and Paul W. Rhode have analyzed this change as moving from multipurpose to single-purpose use.[17] Specialized livestock allowed farmers to produce a single, surplus commodity to generate a profit. In their analysis of this shift away from multipurpose animals, Olmstead and Rhode detail the massive growth of the dairy industry in the twentieth century, and the incredible increases in milk output per cow—conditions that required labor- and capital-intensive animal husbandry. This dissertation, however, looks specifically at the body types and carcass qualities of animals specialized

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Even more, Strom posits, this program proved less burdensome to large-scale farmers than yeomen breeders. Wealthy farmers more ably adjusted and adapted to these new relationships.

[16] Soil fertility, land use, and discussions on intensive and extensive farming, which involve animals in their role as sources of fertilizer, have been common topics investigated by agricultural historians, see Allan G Bogue, *From Prairie to Corn Belt: Farming on the Illinois and Iowa Prairies in the Nineteenth Century* (Chicago: The University of Chicago Press, 1963); Benjamin R. Cohen, *Notes from the Ground: Science, Soil, and Society in the American Countryside* (New Haven: Yale University Press, 2009); Brian Donahue, *The Great Meadow: Farmers and the Land in Colonial Concord* (New Haven: Yale University Press, 2004). Also see Steven Stoll's work, in *Larding the Lean Earth: Soil and Society in Nineteenth-Century America* (New York: Hill and Wang, 2002), that builds on this theme, which includes an enlightening chapter on Merino sheep and politics.

Another focus of scholars is the role of livestock in land use, in particular public land in the West. See Alexander Campbell McGregor, *Counting Sheep: From Open Range to Agribusiness on the Columbia Plateau* (Seattle: University of Washington Press, 1982); Karen R. Merrill, *Public Lands and Political Meaning: Ranchers, the Government, and the Property between Them* (Berkeley: The University of California Press, 2002); William D. Rowley, *U.S. Forest Service Grazing and Rangelands: A History* (College Station, Texas A&M University Press, 1985); John T. Schlebecker, *Cattle Raising on the Plain, 1900-1961* (Lincoln: University of Nebraska Press, 1963).

[17] Alan L. Olmstead and Paul W. Rhode, *Creating Abundance: Biological Innovation and American Agricultural Development* (New York: Cambridge University Press, 2008).

in meat production, which created a wholly separate type of cow than those intended for dairy production.

The modern meat-producing bovine also differed greatly from the Longhorns that populated the range. The animals known as Longhorns, Texas cattle, or Mexican cattle carried negative connotations. Packers and professors associated range cattle, raised on grass-based diets, with tall, thin bodies and long horns. They were considered inefficient relics of the past. Instead, modern livestock—British purebreds, well-fleshed, thick, and early-maturing—were animal machines that consistently produced uniform offspring and cuts of meat. In Chicago, an emerging network of nonfarm specialists focused on these genetics and physical traits, leading them to correlate improvement with specialization.[18]

Terry Jordan analyzes this conflict—demonstrated by the Chicago packers' use of "Mexican" or "Chihuahua" cattle in a pejorative way—as a tension between the Hispanic-based nineteenth-century range and the Anglo-techniques of Corn Belt animal husbandry. He argues that the latter became the predominant regime at the turn of the century, but he fails to identify the institutions, people, and disciplines that underpinned this transformation.[19] As a cultural geographer, Jordan effectively mapped the pluralism

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[18] Olmstead and Rhode convincingly trace the growing importance of purebred livestock in the late nineteenth and early twentieth centuries. They correlate the adoption of these animals with a shift in husbandry that reduced the importance of the Longhorn. However, they do not treat the physical shape of purebreds as fluid. Of course, the adoption of British breeds was central to improvement, but these breeds were not fixed, already ideal for meat production. As such, the reformers in the livestock improvement movement, who fail to appear Olmstead and Rhode's study, saw meat-producing purebreds as fundamental, but not complete. The British purebreds needed to be selected and reproduced based on body types and carcass data that increased feed conversion efficiency and carcass yield.

[19] This dissertation looks at the International as part of a transnational exchange of genetics. Other scholars in the field have focused on the politics of economic and ecological imperialism, see Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe*,

of American animal husbandry; he traced these practices to the Old World and unveiled the importance of different regimes in the United States, Mexico, and the Caribbean. In doing so, he recast the significance of Texas ranching that is so embedded in the American imagination. Critical of scholarship that overgeneralizes husbandry or characterizes the history of American livestock systems as monolithic, Jordan argues that animal husbandry was a story of diverse cultural, geographical, and environmental factors.

Jordan ends this broad synthesis by describing the emergence of the British-oriented, midwestern cattle production. Despite his brief acknowledgement of this change, and a passing handling of feedlot husbandry, Jordan leaves the reader to wonder in what specific ways midwestern husbandry differed. Were the animals similar to livestock in other production regimes? And, most importantly, what were the specific cultural, political, and institutional forces behind this midwestern transformation? One

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900-1900 (New York: Cambridge University Press, 1986); John Soluri, *Banana Cultures: Agriculture, Consumption, and Environmental Change in Honduras and the United States* (Austin: University of Texas Press, 2005); Lester D. Langley, *The Banana Wars: United States Intervention in the Caribbean, 1898-1934* (Lexington: University Press of Kentucky, 1983); Mark Finlay, *Growing American Rubber: Strategic Plants and the Politics of National Security* (New Brunswick, New Jersey: Rutgers University Press, 2009); Richard P. Tucker, *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World* (Lanham: Rowman & Littlefield Publishers, Inc., 2007).

In addition, the issues of food security and food sovereignty have been well researched, especially in the social sciences. Scholars typically discuss issues of poverty, development, conflict/war, and international institutions, such as the International Monetary Fund. See Fred Magdoff and Brian Tokar, eds., *Agriculture and Food in Crisis: Conflict, Resistance, and Renewal* (New York: Monthly Review Press, 2010); Philip McMichael, ed., *Food and Agrarian Orders in the World-Economy* (Westport, CT: Praeger, 1995); Robert Paarlberg, *Food Politics: What Everyone Needs to Know* (New York: Oxford University Press, 2010); Michael Goldman, *Imperial Nature: The World Bank and Struggles for Social Justice in the Age of Globalization* (New Haven: Yale University Press, 2006); William D. Schanbacher, *The Politics of Food: The Global Conflict between Food Security and Food Sovereignty* (Santa Barbara: Praeger, 2010).

answer is the International Livestock Exposition. The hub of the national livestock improvement movement, its participants envisioned a system of animal husbandry that was standard across regions. It nurtured a persistent group of public-funded reformers at the USDA, land-grant universities, and experiment stations, all who worked with the Chicago meatpackers to remake American agriculture around the agronomic proclivities of the Corn Belt.

Deborah Fitzgerald's work also remains foundational to any understanding of these interactions among public institutions, private interests, and American farm practice. *The Business of Breeding* analyzes the adoption of hybrid corn and explores the relationship between private interests and government-funded institutions.[20] Research stations and land-grant universities developed hybrid corn for the benefit of the farmer, while private-sector seed scientists sought profits. As a result, the seed companies' vast networks of salesmen and businessmen helped them reach and influence farmers, a process that undermined the control of experiment stations over these products. Similar to the seed corn companies, the meatpacking industry influenced farmer calculations and decisions. But unlike these seed manufacturers, the meatpackers did not sell the product; they received it. Thus they deployed the International and the land-grant institutional networks to influence farmer behavior through education and socialization.[21] Professors

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[20] Deborah Fitzgerald, *The Business of Breeding: Hybrid Corn in Illinois, 1890-1940* (Ithaca: Cornell University Press, 1990).

[21] Louis Ferleger, "Arming American Agriculture for the Twentieth Century: How the USDA's Top Managers Promoted Agricultural Development," *Agricultural History* 74, no. 2 (Spring, 2000): 211-226. Ferleger traces the development of government-funded and -run organizational networks that contributed to the managerial revolution. The Hatch Act, Adams Act, and Smith-Lever Act created and provided the institutional framework and personnel necessary for the government to initiate and distribute innovative technologies and practices to

partnered with the meatpackers to institute the most effective and efficient animal husbandry practices, which made animals as much an industrial product as machines, seed, or fertilizer.[22]

Fitzgerald's work also requires scholars who follow in her footsteps to reflect upon the relationship between the packers and professors. Did the more powerful packers simply use the professors to achieve outcomes different from the academics' goals? After all, their shared interests existed only in relation to livestock improvement, and the packers cared little about the professors' vision of balanced farming. This research suggests that the academic reformers were not simply the packers' pawns. They worked

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American farmers. As Ferleger demonstrates, the source of funding did not originate in the business sector. This government-directed "national system of innovation," which included land-grant institutions and experiment stations, utilized the nation's natural endowments, but it also proactively increased land productivity on a per acre basis. This dissertation highlights the work of these public-funding institutions in animal husbandry at the International and adds that the Union Stockyards also financially contributed to this particular effort.

[22] Fitzgerald, *The Business of Breeding*; Deborah Fitzgerald, *Every Farm a Factory: The Industrial Ideal in American Agriculture* (New Haven: Yale University Press, 2003). This dissertation seeks to analyze the path toward modern-industrial agriculture as it directly related to the transformation of livestock and animal husbandry practices. In this vein, food-producing animals were seen as units of technology. For conversations on technology and industrialization on the farm, see J.L. Anderson, *Industrializing the Corn Belt: Agriculture, Technology, and Environment, 1945-1972* (DeKalb: Northern Illinois University Press, 2009); Paul K. Conkin, *A Revolution Down on the Farm: The Transformation of American Agriculture since 1929* (Lexington, the University Press of Kentucky, 2008); Pete Daniel, *Breaking the Land: The Transformation of Cotton, Tobacco, and Rice Cultures since 1880* (Urbana and Chicago: University of Illinois Press, 1986); Bruce L Gardner, *American Agriculture in the Twentieth Century: How it Flourished and What It Cost* (Cambridge: Harvard University Press, 2002); Peter D. McCelland, *Sowing Modernity: America's First Agricultural Revolution* (Ithaca: Cornell University Press, 1997); Cohen, *Notes from the Ground*; Steven Stoll, *Larding the Lean Earth*; Olmstead and Rhode, *Creating Abundance*.

See Susan R. Schrepfer and Philip Scranton, eds., *Industrializing Organisms: Introducing Evolutionary History* (New York: Routledge, 2004) for a conversation on the shaping of crops and animals into technology. For a broad look at the interaction between the development of human civilization and biology, see Crosby, *Ecological Imperialism*; Alfred Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Connecticut: Greenwood Publishing Company, 1972).

to create an animal husbandry system that encouraged the specialization of animals and increased food output, and they successfully redirected farm behavior. As time passed, however, experts were far less likely to agree that specialization in livestock actually contributed to permanent agriculture or to reliably high farm incomes. Single-purpose livestock actually accelerated specialization in farm structures and habits, the reliance on off-farm inputs like commercial feed and fertilizer, and maximum-yield grain production—processes that characterized every aspect of American agriculture during the twentieth century and routinely defied any easy political or environmental solution.[23]

The packers and university researchers used the International competitions and educational displays to encourage the adoption of these new technologies and single-purpose animals. In this sense, the International's indisputably modernist impact—like Gabriel Rosenberg's characterization of the 4-H youth organization, agribusiness, and the American state in *The 4-H Harvest*—flies in the face of historical interpretations that privilege the antimodern impulses of agrarian reformers.[24] Instead of "protecting a

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[23] Fitzgerald, *The Business of Breeding*. For more conversations on technology, factories, and machines on the farm, see Edmund Russell's introduction, "The Garden in the Machine: Toward an Evolutionary History of Technology," in Schrepfer and Scranton, eds., *Industrializing Organisms*. On surplus commodity production, see Conkin, *A Revolution Down on the Farm*; Gardner, *American Agriculture in the Twentieth Century*; R. Douglas Hurt, *Problems of Plenty: The American Farmer in the Twentieth Century* (Chicago: Ivan R. Dee, 2002); Richard Levins, *William Cochrane and the American Family Farm* (Lincoln: University of Nebraska Press, 2000)*;* Sarah Phillips, *This Land, This Nation: Conservation, Rural America, and the New Deal* (New York: Cambridge University Press, 2007); Monica Prasad, *The Land of Too Much: American Abundance and the Paradox of Poverty*, (Cambridge: Harvard University Press, 2012).

[24] Gabriel N. Rosenberg, *The 4-H Harvest: Sexuality and the State in Rural America* (Philadelphia: University of Pennsylvania Press, 2016).

vanishing agricultural past from an encroaching urban, industrial future," Rosenberg argues, early twentieth-century agrarianism was "radically modernist and futurist."[25]

This study looks for "agrarian futurism" not only within the institutions and the ideas that shaped cultural behavior, but also considers the genetic and physical reorientation of animals as having a reconstructive, futurist orientation. It therefore complicates Rosenberg's assessment of the "hidden" state; instead, the government was in plain sight and fully engaged in agricultural reformation and animal transformation. At the International, government institutions directly intervened in farm life and animal husbandry. The USDA advocated for and developed displays depicting the benefits of food regulation and animal health policies, including disease eradication and farm specialization.[26] Even more, the central goals of the livestock improvement movement became the official policy of the federal government when the USDA initiated a better-sires campaign and promoted scrub-sire trials aimed at the elimination of inferior bulls, rams, and boars.

To be sure, Rosenberg does argue that, to address rural degeneracy and modernize agriculture with 4-H, the technocratic state and agribusiness partnered to instill an urban capitalist order in the rearing, processing, and distribution of farm products. Not only did 4-H attempt to shape the cultural behaviors of children, including gender-segregated projects, proponents of rural reform also espoused an "industrial ideal," which they linked to a set of interchangeable terms including "efficient," "progressive,"

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[25] Rosenberg, *The 4-H Harvest*, 12.

[26] For more on this active set of government officials, see Claire Strom, *Making Catfish Bait Out of Government Boys*.

"businesslike," and "scientific" agriculture.[27] In many ways, 4-H competitions, along with state and national fairs, failed to achieve the "ideal" products in the exhibition halls and show rings in which these children participated. Throughout the twentieth century, animals experienced wild oscillations in type and size sometimes creating abysmal health, as well as reproductive and commercial consequences for show livestock. The results of these 4-H projects remain unaddressed, however, which raises questions about the outcomes of such youth programs and state and national exhibitions. If an industrial or scientific logic underpinned these institutional goals, then why did such a gulf develop between practical agriculture and competitive animals? This study investigates this problem and compares the motives and goals for improvement with exhibition results by evaluating the changes made to animals' bodies and husbandry regimes.

The needs and principles of agricultural systems dictated the pedagogy of these expositions and youth programs. The agrarian calendar, husbandry practices, and farm labor concerns shaped agricultural advancement efforts, including 4-H curricula. At the International, the livestock improvement movement associated rational, efficiency-driven practices with Corn Belt agriculture. Utilizing grain, investing in expensive permanent buildings, eliminating Longhorn cattle, and altering body types to suit feedlot husbandry, which they believed addressed market demands, validated the packers and professors'

[27] Rosenberg's work raises some unanswered questions. He effectively establishes the institutional origin story of 4-H, explains rural population concerns, and the activism of technocratic state officials. Despite being a rural organization, as Rosenberg outlines, the high-rates of participation of nonfarm children over the course of the twentieth-century problematizes some of these assumptions about the participants. Why did 4-H appeal to so many children with little to no farm experience? What was the value of 4-H to not only nonfarm rural residents but also town and city people?

efforts. In 1916, the International delved into youth education by hosting boys' and girls' club competitions directed at feeding efficiency and the reformation of animal bodies.[28] The junior contests focused on rates of gain, cost of gain, and carcass quality, which led to the baby beef competition—a special type of steer that was small, early-maturing, and high quality. In fact, youth organizations formed around these ideas—hence, the state-level baby-beef clubs developed at this time.[29]

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[28] Rosenberg argues that girls were excluded from revenue-generating projects and instead they focused on the "relationship of domestic labor to the care and cultivation of the self and family." The gendered segregation inherent to 4-H that Rosenberg cites was indeed supported by the limited participation of boys in domestic science competitions, like canning, and the high rates at which they joined crop and animal husbandry projects. Still, animal husbandry competitions included both boys and girls.

In the first years of youth events, girls won several feeding and confirmation awards by besting America's top-performing farm children. Sisters Cara and Frances Ray of Indiana were perennial winners at the International with their steers. In 1918, Josephine Garden enrolled in the Boys' Baby Beef project, and she left the International the champion over all other participants. Despite the gendered disparity noted by Rosenberg, this imbalance was not evidence of women's relegation to homecare and removal from animal husbandry decisions and show-ring fame. The Ray sisters' and Garden's husbandry acumen gave rise to their celebrity status in the agricultural community; their expert application of progressive husbandry principles helped them skillfully select and rear livestock, which resulted in their national accolades.

Female 4-Hers did not vanish from the barnyard; instead, they still cared for, groomed, and showed livestock at county, state, and national competitions. Perhaps women involvement in both the labor and pageantry of livestock improvement demonstrates the limited efficacy of these 4-H contests in actually creating roles based on its heteronormative goals and/or the refusal of some women to be consigned to gendered projects.

R.J.H. De Loach, "The Tale of Two Steers," *Farm Boys' and Girls' Leader and Club Achievements* 2, no. 8 (1920): 3; O.F. Hall, "Boys' and Girls' Club Camps," *Purdue University Department of Agricultural Extension* Bulletin 115 (1923): 4-5, 7; *A Review of the International Live Stock Exposition*, 1919; *A Review of the International Live Stock Exposition*, 1918; *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1921).

[29] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1916); *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1917); *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1918).

Youth involvement grew each year at the International; by 1919, after competing under the direction of agricultural colleges and the USDA, 552 champion boys and girls out of over 500,000 club members were selected to travel to the International. Because of the overwhelming success of these club trips, the International hosted the first National 4-H Club Congress in 1922, and boys and girls in 4-H journeyed to Chicago each year for this national meeting for over 70 years.[30] The city itself became a symbol for agricultural advancement not just for improved livestock breeders, but also for these children.[31]

The International's junior projects initially cohered around husbandry goals. Exhibited by both boys or girls, the winning animals of these junior projects reflected the International judges' preferences and land-grant research on feeding efficiency and improved stock—a modern-industrial objective in which uniformity and consistency in livestock and animal-based products drove packers and professors to prefer British purebreds. After decades of selective breeding, culling, and record-keeping, purebred livestock eliminated uncertainty and narrowed potential biological outcomes. These genetic preferences initiated selection practices in twentieth-century breeding that restricted biodiversity in livestock. Olmstead and Rhode, for example, argue that large-scale and high-density mega-hog farms accentuate the loss of biodiversity. This dissertation evaluates the goals of agricultural advocates and explains the ideas and the

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[30] This inaugural event was unofficial because the meeting did not carry the 4-H name until the following year at the second Club Congress.

[31] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1919); Larry L. Krug, "National 4-H Congress in Chicago: Draft Copy – November 2017," *National 4-H History Preservation Program*, https://4-hhistorypreservation.com/History/4-H_Congress/Chicago/4-H_Congress_Chicago.pdf.

mechanisms land-grant professors and big business advocated and used to reduce genetic diversity. The ramifications of limited biodiversity have been revealed by many environmental and food scholars; this project demonstrates that genetic similarity in food-producing animals was intentional. In fact, at the International, the cultural preference for British livestock and the drive to eliminate genetic diversity was a central tenet of constructive husbandry.

At the International, judges and breeders picked or selected for animals that they saw as exemplary of how animals "ought to be," both for the farm and the industry as a whole. The futurism inherent in livestock evaluation provokes a reinterpretation of the anti-modern-farmer narrative.[32] The progressive breeders and judges at the International were uninhibited in shaping both animals' bodies and animal husbandry. In this way, the judges'—often breeders of livestock themselves—opinions, priorities, and rankings performed a normative function, demonstrating their idealistic vision. By analyzing the individual parts of an animal, like a steer's width, fat content, and structural confirmation, the judge connected individual characteristics with functional outcomes for the whole animal, farm profitability, and meatpacker success.[33]

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[32] For debates on the state of the American farmer at the turn of the century, see Richard Hofstadter, *The Age of Reform: From Bryan to F.D.R.* (New York: Knopf, 1955); David B. Danbom, *The Resisted Revolution: Urban America and the Industrialization of Agriculture, 1900-1930* (Ames: The Iowa State University Press, 1979); Elizabeth Sanders, *Roots of Reform: Farmers, Workers, and the American State, 1877-1917* (Chicago: University of Chicago Press, 1999).

[33] Despite the idealism behind "agrarian futurism," often this kind selection came at a cost. Picking animals that were different from the rest, and demonstrated physiological traits that other animals did not, meant that the "ideal" animal was an aberration. A constant appeal to an aberration limited the effectiveness of standardization of show livestock. The animal "most" desirable was different from the average one because of its superlative qualities. Thus, this moving target made it difficult to create consistency in body type.

And, by creating a meeting space for breeders, judges, and nonfarm agricultural experts, the packers and professors developed a network of science-based relationships that constituted the livestock improvement movement, which centralized the industry around the Corn Belt and Chicago. The International Livestock Exposition brought together agriculturalists from around the country to promote the adoption of new husbandry practices, technologies, and management principles—a commitment that engaged and engrossed the curricula and activities of agricultural students. Colleges participated directly in International proceedings with educational displays and exhibits and also as competitors with their own university-raised livestock.[34]

The technology around which these scientific relationships coalesced was modern livestock. The commercial feeds and fertilizers and the permanent buildings that characterized twentieth-century livestock production served the needs of these single-purpose animals. In this regard, as Olmstead and Rhode note, these livestock and associated farm structures challenge the "mechanization was all that mattered" premise posited by many agricultural historians. Major shifts in animal genetics and physical type

[34] For more on the USDA, land-grant universities, and experiment stations, see Alan I. Marcus, ed., *Science as Service: Establishing and Reformulating American Land-Grant Universities, 1865-1930* (Tuscaloosa: University of Alabama Press, 2015); Alan I. Marcus, ed., *Service as Mandate: How American Land-Grant Universities Shaped the Modern World, 1920-2015* (Tuscaloosa: University of Alabama Press, 2015); Ralph D. Christy and Lionel Williamson, eds., *A Century of Service: Land-Grant Colleges and Universities, 1890-1990* (New Brunswick: Transaction Publishers, 1992); Norwood Allen Kerr, *The Legacy: A Centennial History of the State Agricultural Experiment Stations, 1887-1987* (Columbia: Missouri State Experiment Station, 1987); Wayne Rasmussen, *Taking the University to the People: Seventy-five Years of Cooperative Extension* (Ames: Iowa State University, 1989); T. Swann Harding, *Two Blades of Grass: A History of Scientific Developments in the U.S. Department of Agriculture* (Norman: University of Oklahoma Press, 1947).

accompanied machines in the industrial transformation of the twentieth-century American farm.

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Chicago meatpackers and land-grant university professors created the International Livestock Exposition with two clear goals regarding animal genetics and physical shape. Chapter One describes the emergence of Chicago as the primary meatpacking center and identifies the motives for the collaboration between these seemingly unlikely partners. The packers wanted to influence the supply of animals shipped to them, and the professors looked to improve farmer revenue and national food output without exhausting the soil. Despite their differing agendas and contributions to the International, the packers and professors agreed that creating animals with uniform genetics and bodies benefited both of their projects.

The middle three chapters trace the ideas and institutions that underpinned the improved livestock movement in Chicago. Chapter Two introduces the preference for purebred animals. Eliminating inferior livestock required farmers to adopt animals with pedigreed proof of their elite ancestry. But not all purebreds were seen as superior. The International exclusively cultivated the use of British livestock. This chapter details the cultural preference for British animals and considers the reasons why agricultural advocates associated purebred animals with uniformity and superiority. To ensure consistency, progressive breeders identified like animals, including close relatives, and

bred them to reduce the statistical likelihood of physiological variations. To catalogue and track ancestries and guarantee breed purity, purebred associations and registries organizationally and administratively supported this movement. Shortly after the inaugural International, the Union Stockyards built the Purebred Livestock Record Building to house these registries and records. Breed associations provided the necessary institutional backing for the International to conduct its show and also to encourage the use of purebred animals throughout the United States, which included the USDA's "breeding up" campaign in the 1920s.

Ultimately, the show ring shaped the tastes and preferences of breeders. Chapter Three examines how the ideas of efficiency and specialization manifested in the transformation of animals' bodies. In this case, the judge was the arbiter of modern animal design. In trying to create machines of animals, the International prioritized a specific set of physiological traits for cattle, sheep, and pigs. These traits linked form to function. More simply, the judges identified body width, depth, and formation, and they associated those traits with a single purpose—meat production.

Land-grant universities not only contributed to the International's organization; the schools' animals, students, and professors also participated. Chapter Four outlines these various activities. The most prestigious student honor at the International was awarded to the winners of Collegiate Livestock Judging Contest. To win the judging contest, students evaluated and placed animals based on the International's standards. Through education, advocacy, and participation, the land-grant partnership helped packers socialize a generation of students and young farmers in the preferences of the

Chicago market. The impact of the Exposition also radiated out to campuses and influenced student life. The universities held Little Internationals to prepare livestock and students for the big show in Chicago. University livestock filled the rings at the International and competed against progressive farmers' animals. These show animals required a specific grain-based diet based on age, time of year, and production goals. To assist the transformation of feeding practices, land-grants disseminated ideas pushed by packers and professors through their demonstrations. In particular, they urged farmers to adopt Corn Belt husbandry in educational displays and by organizing the grain competition.

Finally, Chapter Five evaluates the success of the International compared to the goals of the meatpackers and professors who organized it. The show overwhelmingly captured the essence of the reform movement. The International successfully altered breeders' preferences and animals' bodies. Even though the show pushed farming toward specialization, it failed to establish a consistent standard in the show ring. To be sure, breeders adopted purebred, British stock and animals' bodies became smaller. But by prioritizing superlative or the "best" animals, producers were driven toward extremes. Consequently, the show ring unintentionally encouraged fads in animal type. The livestock market splintered and commercial animals on the farm developed around notions of moderation and efficiency while show livestock continued to move toward extremes. This gulf between commercial goals and show-animal extremes manifested in the formation of a secondary market for elite, "well-bred" animals.

The International, nevertheless, redirected animals toward single-purpose functions, which led to further specialization at other levels of production. For example, the dislocation of organic material from the farm to the market prevented the producers from retaining the requisite biological materials to replenish soil fertility. Even as it related to animal feeds and animal health, scientific management of inputs encouraged more specialization on the farm, demonstrating the extent to which the International espoused and normalized science-based husbandry, consequently limiting the realization of balanced farming.

CHAPTER ONE

Meatpackers and Professors Take Aim at "Scrubs"

Texas Jane

My father was a Hereford thoroughbred;
  My mother a wild Texas scrub;
The cross makes me easily fed,
  And I am able to rustle for grub.

Don't stare at the meat on my back,
  Or be surprised at my snowy-white face;
For 'tis all the work of Pa Pa
  That gives me this Hereford grace.
—W.E. Campbell, 1883

A towering, central figure in the improved livestock movement, Alvin Sanders served as founder, vice president, and eventually president of the International Livestock Exposition. As the editor of *The Breeder's Gazette*, he was the "chief propagandist" for the movement after 1882, when he took over the publication from his father, until his death in 1948. Six years before his death, he published *The Story of the International Live Stock Exposition*, the only comprehensive treatment of the International, which detailed the show's purpose and impact, and described its varied facilities, animals, and goals. Sanders also worked assiduously to gain the trust of American political officials. In 1900 he was selected to represent the United States at the Paris Exposition; in 1905, he served as the chairman of the American Reciprocal Tariff League, charged with promoting

legislation to expand foreign trade. He regularly corresponded with Presidents Theodore Roosevelt and William Howard Taft on issues both personal and political.[1]

In his various roles as publisher, organizer, and unofficial historian, Sanders developed both the voice and the mechanisms for the transformation of American livestock. In *A History of Hereford Cattle*, he described the nineteenth-century forays into breeding better cattle and included the 1883 poem "Texas Jane," written by W.E. Campbell—a farmer and livestock showman. The poem highlighted the qualities that made Texas Jane a celebrity heifer. While she came from a wild "scrub" on her mother's side, she also possessed purebred, Hereford genetics, and the meat on her back indicated to breeders and judges that she had a superior carcass. The improved livestock industry, and Sanders's reform efforts, would mirror the story of Texas Jane and take shape around her qualities.[2]

Sanders repeatedly stressed the importance of eliminating poorly-bred animals by importing and reproducing British stock throughout the United States. The esteemed author of multiple volumes that detailed the ancestries and benefits of cattle breeds, including Herefords, Aberdeen-Angus, and Shorthorns, Sanders became the foremost

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[1]Alvin H. Sanders, *The Story of the International Live Stock Exposition: From its inception in 1900 to the Show of 1941* (Chicago: International Live Stock Exposition Association, 1942); Alvin H. Sanders, *A History of Aberdeen-Angus Cattle* (Chicago: The New Breeder's Gazette, 1928); Harold McGee, *On Food and Cooking: The Science and Lore of the Kitchen* (New York: Scribner, 2004), 136; Richard Bryan Helmer, *James & Alvin Sanders: Livestock Journalists of the Midwest* (Bryn Mawr, Pennsylvania: Dorrace & Company, 1985). See the Alvin Howard Sanders Papers at Cornell University, Ithaca, NY, which contains many letters and exchanges between Sanders and Presidents Theodore Roosevelt and William Howard Taft.

[2] Alvin H. Sanders, *The Story of the Herefords* (Chicago: The Breeder's Gazette, 1914), 529.

American authority on British genetics and the history of improved breeding practices, affectionately nicknamed the "Psalmist of Husbandry" by his contemporaries.[3]

Sanders loathed the scrubs, actually, and made it his quest to populate the country with more Texas Janes—using purebred males to breed better animals, feeding grain to increase animal performance, and selecting for livestock with meat on their backs. At the time, agriculturalists used the word "scrub" as a catchall, pejorative term that referred to low quality carcasses and unknown or inferior genetic make-up. "Eradicat[ing] the scrub," for Sanders, was essential for agricultural advancement. These "unwelcome acquaintance[s]" required the importation and dissemination of improved livestock. Purebred Shorthorns, Sanders remembered, were the pioneers that conquered the scrubs throughout the United States and exterminated the Longhorn from the plains and mountains.[4]

Nineteenth-century range cattle often came from some mix of Longhorn cattle, genetic ancestors of the Iberian Longhorn. Despite some hybridization with British Longhorns, they mostly came from the Spanish Criollo, populated Florida and Mexico in 1521, and advanced into Texas from Mexico in the eighteenth and early nineteenth centuries. Tough and highly mobile, Longhorns suited the droving and vast grazing demands of the range. They had large, distinct horns and hard hooves that allowed them

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[3] Edward N. Wentworth, *A Biographical Catalog of the Portrait Gallery of the Saddle and Sirloin Club* (Chicago: Union Stockyards, 1920), 43-45.

[4] Alvin H. Sanders, *Red White and Roan* (Chicago: American Shorthorn Breeders' Association, 1936), 43-45, 246-247, 532-534; Alvin H. Sanders, *Shorthorn Cattle: A Series of Historical Sketches, Memoirs and Records of the Breed and Its Development in the United States and Canada* (Chicago: Sanders Publishing Co., 1916), 744-745.

to fend off predators. They also possessed an immunity to Texas tick fever, and their bodies, including long legs useful for long-distance travel, allowed them to thrive in the subtropical, open-range areas of the United States. Combining these hardy characteristics with their fertility and aggressiveness, these cattle had high rates of natural increase—the Longhorn heavily populated the South, the West, and most notably, Texas. Their resilient nature helped them flourish with minimal labor or intervention by ranchers.[5]

Range animals' primary food source came from the roughages available on the land. Producers rarely augmented the animals' diets by feeding grains, and they depended on unmanaged and seemingly natural pastures. These operations thus required large tracts of land to support the animals' calorie needs. The cattle cared for themselves year-round and ate grasses and other roughages to reach market weight. Cattle indiscriminately made use of the range and sometimes wandered as far as fifty miles in any direction. Self-maintenance, nevertheless, came with consequences for the range. Not only did land expansion opportunities for would-be ranchers wane at the end of the nineteenth century, this extensive herding model also resulted in ecological damage and habitat modification. Overstocking led to soil compaction, selective foraging, and overgrazing near water and salt reserves. By killing off perennials and destroying many native plants, overgrazing fostered ecological problems that affected moisture retention, water quality, erosion, and soil exhaustion. In some cases, open-range cattle stimulated desertification. These

[5] Alan L. Olmstead and Paul W. Rhode, *Creating Abundance: Biological Innovation and American Agricultural Development* (New York: Cambridge University Press, 2008), 264, 286, 323-328. See also Claire Strom, *Making Catfish Bait Out of Government Boys: The Fight Against Cattle Ticks and the Transformation of the Yeoman South* (Athens: The University of Georgia Press, 2009).

ecological consequences reduced the carrying capacity, or the number of animals the land could support, over large swaths of the West, which resulted in herd reproductive problems and food output limitations.[6]

Ranch owners invested little in the permanent structures, like barns, silos, or feedlots, that later characterized the Corn Belt. Because of limited contact with humans, the animals were often wild and untamed. A "Texas steer" or a "rangy steer" carried negative associations on the market; Chicago buyers ridiculed them. Their brands and behavior reflected the husbandry system in which ranchers raised them. These semi-wild animals were given few feed supplements and reached market weights at slower rates. By that point, they often were old, tall, and thin.[7]

By 1900, Chicago meatpackers controlled nearly all aspects of the industry, but they remained vulnerable to supply fluctuations and quality, and committed significant resources to ridding farms of scrubs. Armour & Company, one of Chicago's major meatpacking companies, for example, housed its own research institute to evaluate and disseminate information to farmers. In *Armour's Handbook of Agriculture,* Director R.J.H. De Loach railed against inferior livestock and depicted the negative characteristics of inferior cattle. The "scrub" steer (Figure 2) carried excess hide and had obvious protruding bones, especially on his top and at the hip, which correlated to poor-

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[6] Ibid.

[7] Ibid; Terry Jordan, *North American Cattle-Ranching Frontiers: Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993); Jimmy M. Skaggs, *Prime Cut: Livestock Raising and Meatpacking in the United States, 1607-1983* (College Station: Texas A&M University Press, 1986); Jeremy Rifkin, *Beyond Beef: The Rise and Fall of the Cattle Culture* (New York: A Dutton Book, 1992).

performing, low-yielding beef animals. The color pattern also suggested that the animal did not belong to a specific breed. Indeed, the "scrub" steer lacked recognizable features of any known beef-producing breeds. The Chicago packers additionally associated head shape—the large size accompanied the animals' older ages—and aesthetic characteristics with inferior value. The steer's horns consumed valuable space on railcars and injured animals and their meat as well as human handlers. The packers linked these horns, spotted color pattern, and weak shoulders and backs with the "scrubs" of the declining western range.[8]

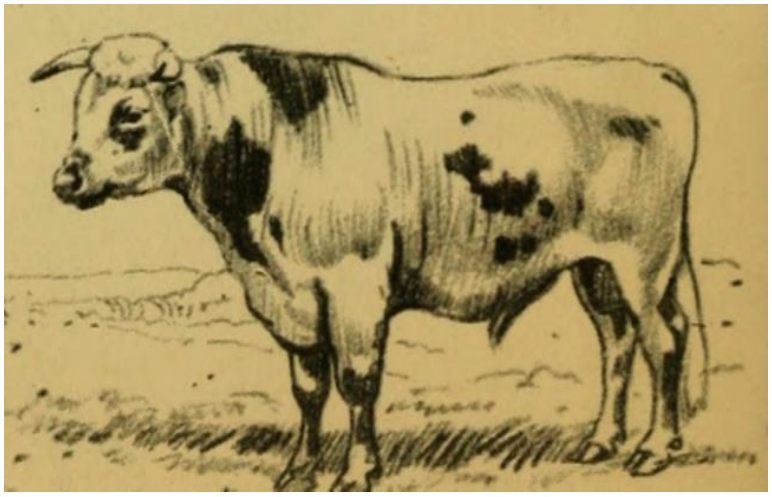

FIGURE 2. An illustration of a scrub bull. *Source: Armour's Handbook of Agriculture*, 1921.

[8] R.J.H. De Loach, *Armour's Handbook of Agriculture* (Chicago: Armour and Company, 1921); R.J.H. De Loach, "Beef Cattle," *Armour's Bureau of Agricultural Research and Economics,* Circular no. 5 (1918). De Loach worked with H.A. Phillips, who was manager of Armour's Sheep Department, to write a book on progressive sheep raising. In this publication, they mentioned that the limits of new lands available to ranchers forced a change in agriculture. Sheep raising methods, De Loach and Phillips argued, needed to shift toward an eastern model. To be sure, they realized that sheep still existed on the ranges of the West, but a closed grazing or finishing system required scientific methods applied to both breeding and feeding.

Accordingly, to raise high-yielding sheep, they insisted that the incorporation of purebred breeding and the use of breeds specialized in either wool or meat would be necessary for western producers, not just Corn Belt farmers. See R.J.H. De Loach and H.A. Phillips, *Progressive Sheep Raising* (Chicago: Armour's Bureau of Agricultural Research and Economic); "With Sanders in the Saddle and Sirloin Hall," *Clay, Robinson & Company* (1916).

Disdain for these livestock types linked Chicago meatpackers with land-grant university researchers in the improved livestock movement. To be sure, the packers were driven by supply-control goals to expand productivity and profits, while the professors worked to improve farm efficiency to increase food output and farmer revenue. But alongside the packers, Edmund L. Worthen from Cornell University, for example—a soil technology and farm fertility expert—connected improvement to minimizing the use and reproduction of razorback hogs and the "raw-boned, long horned Texas steer."[9] These semi-wild hogs and cattle embodied pre-modern agriculture. The rangy steer from Texas had thin bodies, long legs, and rough visual traits that indicated minimal fat cover, which signified poor animal quality and limited access to nutritional supplements.[10] The pre-modern steer, for Worthen and his colleagues, lacked adequate muscle development across his back, hip, and rear leg—areas where the highest quality meat was located.[11]

The effort to eliminate "scrub" livestock thus forged a partnership between Chicago meatpackers and an active set of university researchers. Together, they created the International Livestock Exposition as a hub that coordinated the activities of

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[9] *Review of the First International Live Stock Exposition* (Chicago: The Union Stock Yard & Transit Company, 1900), 164.

[10] Worthen argued that the "modern" animal was "smooth, broad and low." Reformers used words like fat, broad, thick, and, in this case, "low," to differentiate modern animals from the observable characteristics associated with range steers that were thin with flat ribs. See also George William Lambert, *A Trip through the Union Stock Yards and Slaughter* Houses (Chicago: Hamblin Printing Co., circa 1900, exact date unknown). Lambert illustrated the differences between midwestern cattle and range steers in the West. For him, range cattle lacked the overall market appeal of the corn-fed steer and "[were] generally thin and unfit for cutting into the best grades of meat." Lambert's perspective reverberates throughout the generalizations made by agricultural reformers who use "range" cattle as a pejorative description laden with meaning about anti-modern qualities.

[11] *Review of the First International Live Stock Exposition*, 1900, 163-165.

progressive farmers and nonfarm agricultural specialists. This "amalgamated exposition" in Chicago united the forces of the livestock improvement movement into a singular body.[12]

The Emergence of Chicago in Meatpacking

Prior to the Civil War, Cincinnati held the distinction as the primary meatpacking city west of the Appalachian Mountains. Close to the expanding agricultural production of the Midwest, with a developing banking industry, and with access to rivers both to the East and South, Cincinnati served as a point of connection between farmers and consumers. Surrounded by fertile soil and a growing livestock industry, Cincinnati also attracted drovers trying to market livestock. A system of canals in the 1830s allowed meatpackers in Cincinnati to move salt-preserved pork products along the Ohio River on flatboats and steamboats. As a result, the city earned the well-deserved nicknames of Porkopolis and Hogopolis by butchering 150,000 pigs per year in the 1830s, a number that rose to 400,000 by mid-century.[13] Cincinnati participated heavily in the pork industry but travel limited advancement and burdened logistics. Most of the live animals moved along roads driven by herders to the market; driving hogs to the market frequently proved difficult and inefficient. These semi-wild hogs with poor herding instinct often caused drovers problems. Herders caught the most rambunctious pigs and stitched their eyes

[12] W.E. Skinner, "Lifting the Lid," *The Shepherd's Criterion* XV, no. 12 (1905).

[13] J'Nell L. Pate, *Livestock Hotels: America's Historic Stockyards* (Forth Worth: TCU Press, 2005), 63-67.

shut, which prevented hogs from running away from the group.[14] Long journeys to market not only proved untimely and inefficient, but also caused damage to the animal. Hogs, because of their short stride, lost weight and value during the trip. Cattle and sheep more ably made the drives, but the trips reduced the finished weight of all the animals and bruised or toughened the product.[15]

During the Civil War, technological innovation and shifting demand eroded Cincinnati's dominance and allowed Chicago to emerge as a meatpacking powerhouse. The demand created by the Civil War pushed the livestock center of the United States west to Chicago and the meatpacking industry quickly outgrew prewar facilities.[16] John B. Sherman, who started several stockyards in Chicago prior to the war, partnered with some of his competitors to create the Union Stockyards and Transit Company in 1865, incorporated with $10 million. They bought 120 acres of swamp ground and expanded to

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[14] Rudolf Alexander Clemen, *The American Livestock and Meat Industry* (New York: The Ronald Press Company, 1923), 3-91.

[15] Ibid.; Robert B. Hinman and Robert B. Harris, *The Story of Meat* (Chicago: Swift & Company, 1939); Louis Unfer, "Swift and Company: The Development of the Packing Industry 1875 to 1912," (dissertation, University of Illinois, 1951); Howard Copeland Hill, "The Development of Chicago as a Center of the Meat Packing Industry," *The Mississippi Valley Historical Review* 10, no. 3 (1923): 253-273; Joseph G. Knapp, "A Review of Chicago Stock Yards History," *The University Journal of Business* 2, no. 3 (1924): 331-346.

[16] Cincinnati meatpackers tried to keep pace with the Union Stockyards by acquiring land, building more pens, and improving production to over 500,000 hogs in the 1870s; however, the city's packers could not compete with the technological and strategic advantages of the Union Stockyards. Chicago's networks of railroads and refrigeration capabilities prevented Cincinnati from retaking her position as the passage way to the West and the country's top meatpacking city. The geographic and transportation advantages that Cincinnati utilized to grow into a bustling livestock trading center from 1820-1860 proved temporary as advances in railroads and meatpacking processes in Chicago overtook the industry. See Pate, *America's Historic Stockyards*; William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton & Company, 1991); Richard White, *Railroaded: The Transcontinentals and the Making of Modern America* (New York: W.W. Norton & Company, 2011).

340 acres by 1896. The owners commissioned engineer Octave Chanute to build a stockyard that could handle all the livestock arriving by train. Chanute remade the landscape south of the city to accommodate the rail traffic, the masses of workers, the hordes of animals, and the waste. He drained low-lying lands and marshes and managed a gentlemen's agreement to keep the different railroad and livestock companies together.[17]

Most of the railroads going north, south, east, and west intersected in or connected to Chicago by the end of the century.[18] Every railroad in Chicago was linked with the Stockyard track system; Chanute equipped the Stockyards with a web of lines that increased the efficiency and speed of the movement of live and butchered animals, which included main lines, side lines, and storage tracks with platforms big enough for workers to unload whole trains at once. In the end, Chanute laid thirty miles of sewers and drains, created a grid of streets that expedited work-related traffic, and arranged 500 pens complete with chutes, gates, and ramps to move and house the livestock.[19] To

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[17] John O'Brien, *Through the Chicago stock yards; a handy guide to the great packing industry* (Chicago: Rand, McNally & Company, 1907); W. Joseph Grand, *Illustrated History of the Union Stockyards: A Sketch-Book of Familiar Faces and Places at the Yards: Not Forgetting Reminiscences of the Yards* (Chicago: Thos. Knapp Ptg. & Bdg. Company, 1896); Clemen, *The American Livestock and Meat Industry*, 3-91; Hinman and Harris, *The Story of Meat*; Unfer, "Swift and Company: The Development of the Packing Industry 1875 to 1912;" Hill, "The Development of Chicago as a Center of the Meat Packing Industry;" Knapp, "A Review of Chicago Stock Yards History."

[18] The emergence of the locomotive as primary means of transportation for live cattle eliminated issues of proximity for producers and allowed Chicago to consolidate business operations in one central location. See also Louise Carroll Wade, *Chicago's Pride: The Stockyards, Packingtown, and Environs in the Nineteenth Century* (Urbana: University of Illinois Press, 1987), 51-57.

[19] Grand, *Illustrated History of the Union Stockyards*. The owners equipped the Stockyards with the ability to handle 50,000 cattle, 200,000 hogs, 30,000 sheep, and 5,000 horses at one time. In 1895 alone, the total Stockyards receipts demonstrated the capability of the facility: 2,588,558 cattle, 168,740 calves, 7,885,283 hogs, 3,406,739 sheep, and 113,193 horses. During the first 30 years, the Stockyards received nearly 50 million cattle. After arrival, the

accommodate the influx of stock, he also created an extensive labyrinth of watering and feeding structures and laid six miles of water pipes. The facility kept expanding as sales and demand improved for the products manufactured in Chicago. To water the livestock, the owners built 25 miles of water troughs. The facility contained 50,000 miles of electric wire, 10,000 incandescent lamps, and massive engines for lighting and powering the plant.[20]

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animals received care and maintenance from the Stockyard employees. The Stockyards charged producers handling fees. For cattle, penning the animals cost 25 cents per head and the feed had rates as well. For timothy hay, the Stockyards charged $1.50 per hundred weight, prairie hay cost $1.00 per hundred weight, and the Stockyards charged $1.00 per bushel for corn. The yardage fee helped defray Stockyard expenditures, which included pens, feed, bedding, weighing, fuel, gas, electric lighting, lost stock, worker salaries, attorneys, fees, taxes, insurance, stationary, and salaries of officers in addition to the cost of maintaining the Stockyards' own police force and fire department. During this early period of the Union Stockyards, the annual expenditures ranged from $2,000,000 to $3,500,000.

[20] Cronon, *Nature's Metropolis*, 211; O'Brien, *Through the Chicago stock yards*, 13-14. By 1907, the Stockyards expanded to include 500 acres, 300 miles of railroad track, and 25 miles of streets. For more on the development of the meatpacking industry, see Clemen, *The American Livestock and Meat Industry*, 3-91; Hinman and Harris, *The Story of Meat*; Unfer, "Swift and Company: The Development of the Packing Industry 1875 to 1912;" Hill, "The Development of Chicago as a Center of the Meat Packing Industry;" Knapp, "A Review of Chicago Stock Yards History."

FIGURE 3. Union Stockyards in Chicago. *Source:* International Livestock Exposition Records, MS 506, Box 7, Folder 4, 1906, Special Collections Department, Iowa State University Library, Ames, Iowa (henceforth ILER).

The meatpacking industry in Chicago became a technological and commercial marvel, provoking observers to tout the Union Stockyards as "the eighth wonder of the world."[21] The owners sought to make the Union Stockyards itself a spectacle, which later allowed city officials and meatpackers to advertise it as a tourist destination. Guidebooks navigated readers and spectators through the modern amenities of the Stockyards, which included administrative buildings, commercial buildings, and a hotel. The hotel, originally named the Hough House, featured a 130-foot frontage, six stories, two wings

[21] Pate, *America's Historic Stockyards*, 75.

with porches, wide verandas, a billiard room, a parlor, and a barbershop. The proximity of Hough House to Chicago prompted many observers to speculate that the Stockyards might well become a retreat for suburbanites and tourists—a sentiment challenged by other popular images of a meatpacking facility as a place of industrialized slaughter. Guidebooks and Stockyard manuals featured the size and scale of the Union Stockyards, along with its engineering feats and amenities.[22]

Despite the architectural achievements, however, some spectators experienced a Stockyards and Chicago that left disquieting and unsavory impressions of smell, noise, pollution, and displeasure. For many spectators, the slaughtering of sheep in particular provoked sharp emotional discomfort. During this process, the workers shackled the back legs of the lambs, hoisted them off the ground, and they cut their throats to begin the

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[22] Wade, *Chicago's Pride*, 51-57; Cronon, *Nature's Metropolis*, 211. See also O'Brien, *Through the Chicago stock yards*; Lambert, *A Trip through the Union Stock Yards and Slaughter* Houses; Grand, *Illustrated History of the Union Stockyards*. With their guidebooks, O'Brien and Lambert took readers through Stockyard facilities and also illustrated and described in graphic detail the process of meatpacking. With these guides, the reader encountered a highly mechanized understanding of the Stockyards. Grand offered a biographical perspective. Certainly, he detailed the process of meatpacking, but he also featured the people and animals well-known at the Stockyards, including a story called "The Slickest Confidence Game in Chicago." The packers often used a steer to lead cattle down the chutes to the workers waiting to kill them or for sheep they used a goat. The workers called these animals by the generic name Judas—reference to the biblical Judas.

One "bovine Judas" that workers admired and affectionately remembered, named Phil, worked at the Stockyards for years. They groomed him and blanketed him to protect him from the cold in the winter and flies in the summer. He would roam the Stockyards looking into the cattle pens, and when the drovers notified him, Phil would go to the chute and stand in front. As the cattle filed in behind, he started his walk through the chutes toward the butcher, and then Phil would take a side door out of the chute right before the workers began killing the cattle following him. This steer worked in the Stockyards for five years. As he aged, his productivity waned and one day the side door did not open for him. Phil walked forward under the workers with sledgehammers waiting to begin the butchering process.

process. Even though the spectators often witnessed the slaughtering of the other species without acute distress, the sheep caused many tourists to faint and leave.[23]

Rudyard Kipling, during his tour of America, traveled to Chicago and saw, as he put it, "a real city." But the sensory experiences of his tour there inspired more disgust than awe. The polluted air and canals, the noise and bustle, the energy and "barbarism" of the drive for money, he recalled, represented his first impressions of Chicago.[24] After visiting the Stockyards, he wrote, "you will never forget the sight." Kipling witnessed the butchering of hogs from their gathering in the Stockyards to the slitting of the animals' throats. The blood covered the floor and the workers, he remembered, making it difficult for tourists to find good footing on the killing floor. After the workers punctured the hog's throat, they dipped the animal in a boiling vat to remove the hair and skin. Kipling remarked that the deafening shrieks of the hogs during this process alarmed the other animals, but after the boiling vat the pigs went silent. From that moment on, the mechanized disassembly of the hogs quickly depersonalized and removed the lives of the animals from their human and nonhuman counterparts. Kipling ruefully observed that the livestock lost their individuality as each animal proceeded down the "railway of death." The dissecting of the animals made a bigger impression on Kipling than did the simple

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[23] Lambert, *A Trip through the Union Stock Yards and Slaughter Houses*.

[24] Rudyard Kipling, *American Notes* (New York: Frank F. Lovell Company, 1899). Kipling wrote the letters contained in *American Notes* as a result of his trip through the United States in 1889 on a journey from India to England. *Pioneer* in India published the original letters.

Kipling's correspondence questioned the notion of progress itself when visiting Chicago. He criticized the waning value of language, the apologetic nature of the press appeasing readers instead of pushing them, and even preachers, he argued, said what the parishioners wanted to hear. As it related to the ethos of the city, he wrote, the "papers tell their clientele in language fitted to their own comprehension that the snarling together of telegraph-wires, the heaving up of houses, and the making of money is progress."

slaying of them. The animals, he wrote, "were so excessively alive…and then, they were so excessively dead."[25]

Waste and pollution accompanied the advancements meatpackers made in the disassembly of livestock. The packing plants emitted odorous smells into the air and expelled toxic pollutants. Many referred to the fork into which the Union Stockyards unloaded refuses as "Bubbly Creek." The pollution flowed into the south branch of the Chicago River, an oily and black substance filled the water, and odors ascended from the surface. As boats sledged through the drainage canal, bubbles arose out of the frothy water behind the vessel—in essence, sewage flowed freely in the creek open to passersby in the city.[26] Activists in Chicago worked with sanitation experts to improve the condition of Bubbly Creek and pushed the Stockyards to limit the broader impact on quality of life for both humans and livestock. As a result, a conflict arose between the Union Stockyards and livestock men. Producers worried about the quality of water provided the animals at the facility. In response, Stockyard chemist Charles Jennings guaranteed to sellers and

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[25] Ibid. The of killing cattle, sheep, and hogs varied, but each butchering operation utilized specialized labor and the disassembly line. After the workers killed the animals, they strung them up by their back feet on a moving rail. Being upside down helped drain the animal of blood while workers gutted the animal as it moved down the line. As matter of fact, Henry Ford replicated the disassembly line of the Union Stockyards to create the assembly of cars. See Pate, *America's Historic Stockyards*, 8-9.

[26] "'Bubbly Creek's' Wonders Revealed to Investigators," *Chicago Daily Tribune*, Oct. 15, 1905; "Line Up in War on Bubbly Creek," *Chicago Daily Tribune*, May 10, 1915. In 1911, thieves robbed a man and threw the unconscious victim off a bridge into Bubbly Creek. The man floated in the creek for hours; however, he did not drown because of the semi-solid contents of the Stockyard channel. When he regained his consciousness, the victim struggled to swim out of the substance. Reportedly, it took the man two hours to find his way to shore "having half climbed and half swum" across the creek. When he neared the shore, the last few feet of the journey, which consisted of hardened grease, caused the most difficulty. See "Bubbly Creek Victim Lives," *Chicago Daily Tribune*, May 21, 1911.

producers that filtered Chicago River water fulfilled expectations of quality and was as safe as Lake Michigan water. Notwithstanding assurances, livestock shippers complained that their animals refused to drink the water until desperate with thirst.[27]

Despite the consequences of industrial slaughter, Chicago meatpackers remained focused on technological innovation and the vertical consolidation of the industry. The ability to buy and process livestock in one place and deliver products around the world allowed Chicago meatpackers to undercut competitors, including those in Cincinnati, by marketing products directly to consumers. The development of the refrigerated car for the shipment of dressed meat spurred the growth and dominance of the major meatpackers in Chicago, the Meat Trust. For Gustavus Swift, shipping animals alive prevented the wholesale competitiveness of the beef industry. On average, every steer shipped to the eastern markets contained 60 percent waste—a live steer's body constituted only 40 percent of edible meat. In addition to shipping costs, the risk of damage to animals, death,

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[27] Like the shippers, reformers remained skeptical especially as they witnessed how quickly the Stockyards filled the waterway with waste. The federal government dredged Bubby Creek 17 feet deep in 1899 at a cost of $75,000. Within 7 years, Stockyard refuse had already filled the river leaving many spots as shallow as three feet deep. In response, the drainage board sent a formal letter to the Stockyard companies demanding they dredge the creek. Activists amplified the demands made on the Stockyards to find a permanent solution. They organized demonstrations and even held Bubbly Creek mock funerals in the hopes that the attention would force Stockyard representatives into action. Not only did Bubbly Creek present dangers, but it became a synonym for toxins and an infamous landmark representing waste, dissolution, and damage. Health officials decried the risks of the water by satirically warning that the creek could kill people, and it also could kill typhoid germs. See "Orders Packers to Dig: Drainage Board Wants 'Bubbly Creek' Dredged," *Chicago Daily Tribune*, May 30, 1906; "Bubbly Creek Dead, But Lives," *Chicago Daily Tribune*, May 20, 1915; "Glad Mourners for Bubbly Creek," *Chicago Daily Tribune*, May 21, 1915; "Bubbly Creek's Doom Finally Decided Upon," *Chicago Daily Tribune*, Oct. 17, 1919; "With a Long Pull and Strong Pull They'll Get Odors from 'bubbly,'" *Chicago Daily Tribune*, Oct. 30, 1910; "Ward, Unclean, Kills Babes," *Chicago Daily Tribune*, Aug. 4, 1910; "Yankees Would Swap Rhine for Bubbly Creek," *Chicago Daily Tribune*, Feb. 14, 1919.

and labor worried Swift. Dressed beef, on the other hand, traveled more efficiently by taking up less space per unit allowing for a greater degree of productivity for the meatpackers.[28]

Other companies experimented with refrigerated cars, but their prototypes contained many flaws. George H. Hammond, for example, sent beef to Boston in poorly designed cars that amounted to large iceboxes on wheels. In these cars, the packers stored meat dangerously close to the ice and the dressed meat often came in contact with the ice during transportation when the train turned corners, which ruined or discolored the meat. Also, as the hanging quarters moved, they shifted the weight in the car and sometimes caused derailment. When the trains arrived at stations along the way, workers opened the doors to refill the ice, which triggered dramatic shifts in temperature that harmed and spoiled the hanging meat. Swift developed his own chilled cars by shipping dressed meat

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[28] Mary Yeager Kujovich, "The Refrigerator Car and the Growth of the American Dressed Beef Industry," *The Business History Review* 44, no. 4 (1970): 460-482; Lee E. Lawrence, "The Wisconsin Ice Trade," *The Wisconsin Magazine of History* 48, no. 4 (1965): 257-267.

In *The Yankee of the Yards*, the authors reflected on Swift's drive toward efficiency and his investment in improved productivity, and his goal to further consolidate business in a central location. However, efficient transportation concerned many in the industry, and these concerns filled many livestock journals, especially *The National Provisioner*—a journal devoted to the American livestock trade. *The National Provisioner* reminded readers that the transportation of live cattle took up four times as much cargo space as dressed meat. Ideas and articles circulated around efficiency as it related to railways and refrigerated cars, which directly impacted both economic competitiveness. Each publication devoted a section to advances and benefits in refrigeration, including the sale of anhydrous ammonia for meatpackers' coolers. Armour and Morris, from the Union Stockyards, advertised and distributed anhydrous ammonia from Chicago. Louis F. Swift and Arthur Van Vlissingen, Jr., *The Yankee of the Yards* (Chicago: A.W. Shaw Company, 1927). For an extensive breakdown of the risks and costs involved in transporting live animals, the well-being of the animal, and loss of animals in transit, see "Fresh Meats: The Export Trade in Dressed Beef, Pork, Mutton, Etc.—Why Live Animals Should No Longer Be Transported Long Distances," *Chicago Daily Tribune*, May 6, 1877.

in the middle of winter in boxcars, and he instructed workers to leave the doors cracked open to cool the meat and circulate air.[29]

In 1878, Swift hired Andrew S. Chase, a Boston engineer, to update the chilling cars to a standardized, advanced refrigerated car—a proposition that Swift thought would revolutionize the industry and make him fortunes. Chase designed an insulated car with ice and salt at each end, and by ventilating the car, the forced air chilled the meat without the danger of touching the ice or the need to expose it to refill the ice compartments. Because of this technological advance, Swift ably delivered products to customers year-round and maintained slaughter operations throughout the summer months. Refrigerated cars and cold warehouses allowed him to avoid seasonal shutdowns and to evade the burdensome impact of heat on butchered meat. Prior to the cooling rooms, meatpackers slowed production in summer months and in December output peaked. Before the Civil War, July receipts paled in comparison to wintertime, often as little as a tenth of December receipts. By 1880, July packing improved to over half of December production, which reflected the vast growth in ice packing and the correlated advantages of maintaining regular output throughout the year.[30]

As a result, cheap dressed beef butchered in Chicago successfully infiltrated eastern markets. But participation in the refrigerated meatpacking industry required high

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[29] Dominic A. Pacyga, *Slaughterhouse: Chicago's Union Stockyard and the World It Made* (Chicago: The University of Chicago Press, 2015), 53-55; Cronon, *Nature's Metropolis*, 234; Donald L. Miller, *City of the Century: The Epic of Chicago and the Making of America* (New York: Simon & Schuster Paperbacks, 1996), 207-208. Also see Swift and Van Vlissingen, *The Yankee of the Yards*.

[30] Cronon, *Nature's Metropolis*, 231.

levels of spending and investment; only big companies had the capital to develop or buy their own fleets. On Swift's heels, Armour, Hammond, and Morris transformed their methods of butchering to compete. The major meatpackers in Chicago all made the investment in refrigeration. The Union Stockyards not only bought and sold animals for all the packers, but Swift, Armour, Hammond, and Morris also centralized the production operations. In 1871, meatpackers butchered less than 4 percent of cattle that went through Chicago; by 1883-1884, dressed beef surpassed live shipments of cattle for the first time. Refrigeration spurred the vertical integration of this industry, which included buying, butchering, packing, and shipping. By the late nineteenth century, weather and transportation no longer dictated the butchering and processing of animals; it became a year-round, industrialized business.[31]

The Meatpackers

Despite the packers' control over the meat processing and distribution industry, vulnerabilities to fluctuations in livestock quality and quantity worried Stockyard owners, investors, and managers. Restrictions to the availability of uniform meat products placed limitations on three objectives. First, the packers intended to expand sales in the urban centers of the United States and foreign markets in Europe and South America. Second, they wanted to improve the public image of the Meat Trust by challenging price-fixing accusations. And, third, the intention to expand markets required the meatpackers to

[31] Miller, *City of the Century*, 208-209; Swift & Company, *The Meat Packing Industry in America* (Chicago: Swift & Company, 1920); Cronon, *Nature's* Metropolis, 232-234; "Fresh Meats," *Chicago Daily Tribune*.

address consumer uncertainty regarding food quality. Expanding market share, defending prices, and demonstrating food quality—these impulses motivated meatpackers to support and participate in the livestock improvement movement. Indeed, these three goals revolved around one central aim: resolving the meat supply problem.

In the 1895 annual report to the shareholders of the Chicago Junction Railways and Union Stockyard Company, the board of directors bemoaned the reduction in the number of cattle shipped to Chicago. Concerned by the increase in the demand for beef that accompanied the growth in urban population, the Union Stockyards rushed to find cause for this supply problem. After three years of agricultural depression, stock raisers shipped more cattle to the market to subsidize their lost revenue, which caused a temporary oversupply of cattle on the market and price volatility. Concomitant with the decreasing farmer revenue were fluctuations in the availability of grain. The depression of 1893 and crop failures in 1894 affected corn price and corn supply—an additional burden on livestock producers. To supplement income, producers sent production females or brood cows to the market along with steers, which undermined total calves available for slaughter and reduced herd size in subsequent years.[32]

In 1895, for example, one-third of receipts, 900,000 head of cattle, shipped to Chicago figured into this reduction in cows, which rippled outward causing an annual

[32] "Fifth Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*, (1895); "Third Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*, (1893); "Sixth Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*, (1896); "Chicago Tribune," *The National Provisioner* 26, no. 17 (1902): 15; "Changes on the Range," *The National Provisioner* 26, no. 17 (1902): 13.

supply problem. The sale of brood cows resulted in a shortage of calves birthed in succeeding crops. The restocking of herds took years; breeders had to retain female calves to rebuild their herds, which placed an additional encumbrance on the market by eliminating potential finished calves to send to Chicago.[33] Consequently, as an Armour & Company publication demonstrated (Figure 4), this trend continued into the twentieth century. The number of beef-producing cattle shrank as the human population grew, which required fewer cattle to feed more people.

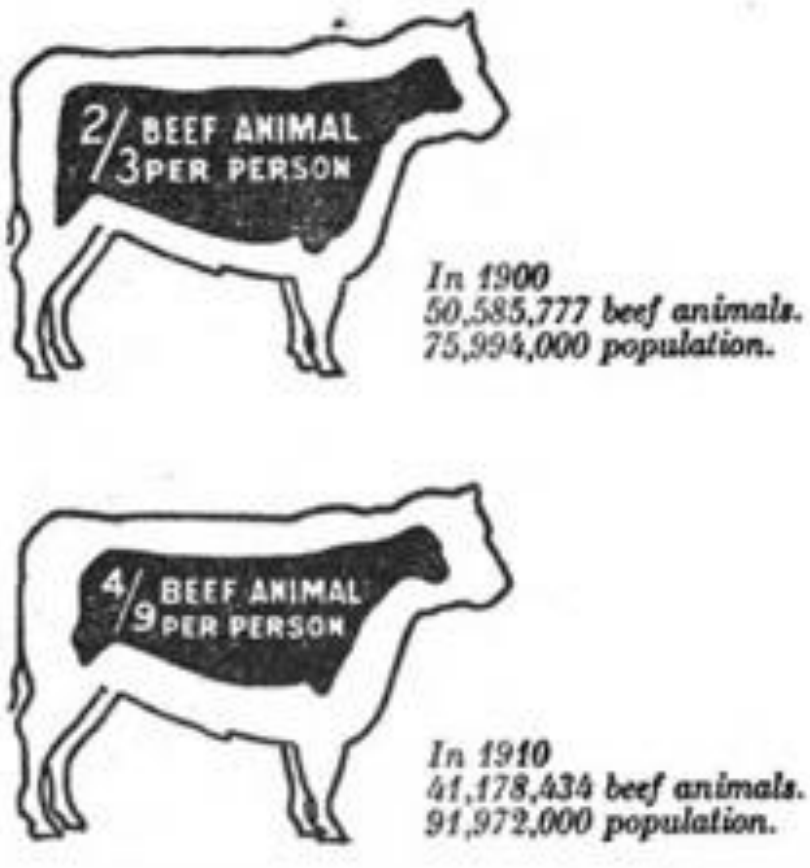

FIGURE 4. The decrease in beef animals in relation to consumers. *Source:* R.J.H. De Loach, "Beef Cattle," *Armour's Bureau of Agricultural Research and Economics*, Circular no. 5, 1918.

[33] Ibid.

During this period, the Stockyards received fewer livestock of all classes—in the 1890s, shipments decreased by 11 million cattle, 14 million pigs, and 11 million sheep.[34] This supply problem overlapped with an increasing urgency among the Chicago meatpackers to expand production and market share in domestic and foreign markets as the consumer class grew and the demand for quality meat increased accordingly.[35] The meatpackers sought to penetrate, control, and command these markets for their own goals of growth and to justify the expansive development of the Union Stockyards. At the end of the nineteenth century, the Stockyards Company heavily invested in infrastructure updates, including new pavilions, pens, viaducts, tracks, and railcars.[36]

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[34] "Ninth Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*, (1900).

[35] "Fifth Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*; "Ninth Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*.

[36] The beef shortage troubled meatpackers at the turn of the century. The editorial staff at *The National Provisioner* scrambled to address this issue. *The National Provisioner* was the leading journal for the meat trade industry and the "official organ of the American Meat Packers' Association." The editorial staff reflected this broad concern about supply.

Consequently, *The National Provisioner* worked to redirect the conversations around solutions by publishing a series of articles about improvement. Dr. A.S. Heath, the author of the series, argued that the United States went from agricultural plenty to shortage resulting from the closing of the "frontier," decreased livestock numbers, and a vast growth in urban population. And, for Dr. Heath improvement of animal quality, not quantity, served as a rational solution to the beef shortage. This required the use of "modern" livestock. Judicious breeding, for the meat trade journalists, became a central solution for improved yield.

And the editorial staff broadened their concern beyond breeding and argued that confirmation mattered too. As Dr. Heath demonstrated, the body of the animal correlates to production and performance. For example, any attempt to fatten a dairy animal for slaughter was fruitless and foolish, because the calories produced went to the production of milk and not meat.

See A.S. Heath, "For More and Better Meat: How to Increase and Improve Our Meat Animals," *The National Provisioner* 39, no. 1 (1908): 17; A.S. Heath, "For More and Better Meat: Proper Cross Breeding Suggested as Cure for Disease," *The National Provisioner* 39, no. 5 (1908): 17; A.S. Heath, "For More and Better Meat: How to Increase and Improve Our Meat Animals," *The National Provisioner* 39, no. 6 (1908): 17; A.S. Heath, "For More and Better Meat: How to Increase and Improve Our Meat Animals," *The National Provisioner* 39, no. 9

With such control over the market, the Chicago meatpackers became targets of criticism related to high food costs and price fixing. Volatile markets aroused producer suspicion and high retail meat prices stirred consumer resentment.[37] Charles Edward Russell's *The Greatest Trust in the World* especially stoked this popular, anti-monopoly discord. A journalist and political activist, Russell served as one of the founding board members of the National Association for the Advancement of Colored People (NAACP) and won a Pulitzer Prize in 1927 for a different volume. This publication originally appeared in serial form in *Everybody's Magazine*. Readers responded with great interest and dismay over the "tragic" nature of modern business relations, which prompted the book-form publication.[38]

No governmental institution, including legislature or court, had as much power as the Chicago meatpackers, Russell contended. The Meat Trust, he argued, owned factories, shops, stockyards, mills, land and land companies, plants, warehouses, politicians, legislators, and congressmen, all of which allowed the Chicago packers to fix prices in a vital industry—so vital that every consumer depended on the products of these companies three times a day for food. Russell furthermore contended that price fixing

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(1908): 17; Richard Nash, "Cattle Paper and the Changing Conditions of the Live Stock Trade," *Proceedings of the Fourth Annual Convention of National Live Stock Association* (Denver: The Smith-Brooks Printing Company, 1901): 388-392; "Chicago Tribune," *The National Provisioner*, 15; "Changes on the Range," *The National Provisioner*, 13; "High Prices," *American Meat Trade and Retail Butchers Journal* XV, no. 479 (1911): 5.

[37] "Chicago Tribune," *The National Provisioner*, 15; "Advancing Meat Prices Stir the Press," *American Meat Trade and Retail Butchers Journal* XV, no. 479 (1911): 6; "High Prices," *American Meat Trade and Retail Butchers Journal*, 5.

[38] Robert Miraldi, *The Pen is Mightier: The Muckraking Life of Charles Edward Russell* (New York: Palgrave Macmillan, 2003); Charles Edward Russell, *The Greatest Trust in the World* (The Ridgway-Thayer Company, 1904 and 1905).

unfairly distorted the signals of supply and demand sent to producers, warped the market, and falsely created shortages and gluts in animal production. Russell's concerns reflected a broader movement against the packers; journalists, producers, and consumers used similar accusatory language—like price fixing, monopoly, evil, greed, graft, and loot—to characterize the power of the Beef Trust. [39]

The packers fought anti-competition claims and deflected price-fixing accusations by instead blaming the supply problem. Meat trade journalists and meatpackers, like Armour & Company and Swift & Company, vociferously defended the consolidation of the industry and also sidestepped these accusations by shifting the conversation to the ethics, or lack of ethics, of their critics. The meat interest openly criticized journals, newspapers, and "a debased class of politicians" for imbuing consumers with falsehoods about dressed meat and the Meat Trust. This "yellow journalism," they despaired, attempted to "degrade and debauch American industries."[40]

To explain the "real" culprit behind price volatility and supply, the meat trade journalists and meatpackers focused on economic explanation. In a flurry of publications, the meat interests tried to convince the public and producers that the meatpackers did not

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[39] Russell, *The Greatest Trust in the World*.

[40] "A Serious Condition," *The National Provisioner* 26, no. 17 (1902): 19. This article tried to gain sympathy among readers. The author gratefully recognized the efforts of the meatpackers to feed a "nation of meat eaters" and anything to jeopardize the supply—conditions uncontrollable in Chicago—caused the suffering of many. In this attempt by meat trade journalists to reverse public opinion with a narrative of service and empathy, they also warned that threatening the supply of meat or the motives of food distributors, whether from a "yellow" journalist or debased politician, was unpatriotic and suicidal.

See also Harper Leech and John Charles Carroll, *Armour and His Times* (New York: D. Appleton-Century Company, 1938); J. Ogden Armour, *The Packers, the Private Car Lines, and the People* (Philadelphia: Henry Altemus Company, 1906).

influence price.[41] This propaganda characterized the packers as actually fairly powerless in their ability to manipulate the market. Over and over again, the articles iterated that when supply contracted on the farm or range, the price of buying the raw materials, the livestock, for the packers increased, and then they sold the dressed meats to retail suppliers in consumer markets at higher costs, but at no significant advantage. The "natural cause" emanating from the laws of supply and demand explained fluctuations in the market, the packers contended; consumer complaints and the dismay of frustrated producers was unfounded and at no fault of the "combine" or the monopoly of meatpackers.[42]

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[41] "High Prices," *American Meat Trade and Retail Butchers Journal*, 5; Leech and Carroll, *Armour and His Times*; Philip D. Armour, "The Relation of the Packing House to the Cattle Industry," *Proceedings of the Third Annual Convention of the National Live Stock Association* (Denver: The Smith-Brooks Printing Company, 1900): 208-212.

[42] Armour, *The Packers, the Private Car Lines, and the People*; "Live Stock Show Aid to Industry," *Chicago Daily Tribune*, Dec. 2, 1908; "A Serious Condition," *The National Provisioner*, 19; "The Real Meat Facts," *The National Provisioner* 26, no. 14 (1902): 22-23; "Our Beef and Its Maligners," *The National Provisioner* 26, no. 14 (1902): 19; "Chicago's Food the Best: Secretary of Agriculture Wilson Gives Opinion," *Swift & Company* (1908); "The Meat Situation," *The National Provisioner* 26, no. 16 (1902): 11-12; George B. Van Norman, "Live Stock Exchanges and Their Relation to the Producer," *Proceedings of the Fourth Annual Convention of National Live Stock Association* (Denver: The Smith-Brooks Printing Company, 1901): 384-387; "Chicago Tribune," *The National Provisioner*, 15.

See Swift & Company publicity statements and advertisements at the Chicago History Museum Research Center, Swift and Company records, 1879-1954, Box 3, 4, and 5. "The Missouri Valley Farmer," (1916) Box 4, Publicity File; Letter to Henry Wallace, Box 4, Publicity File; Letter to Swift, (1916), Box 4, Publicity File; Letter to Henry Wallace, (1916), Box 4, Publicity File; Letter to The Christian Herald, (1916); "There is No Monopoly," (1918), Box 5, Folder 1; "High Cattle Prices Accompany High Beef Prices," (1918), Box 5, Folder 1; "Why live stock prices go up and down," Box 5, Folder 1; "An International Service Built on Tiny Profits Per Pound," (1918), Box 5, Folder 1; "You Profit By Our Bigness," (1919), Box 5, Folder 2.

See also Edmund J. James, "Address of Welcome," *Armco* (1914), Box 3, File 44, AHSP; Alvin H. Sanders, "His Influence Upon American Agriculture," *Armco* (1914), Box 3, File 44, AHSP.

The Stockyard board of directors especially desired farmers to understand the benefits that the consolidation of meatpacking provided the agricultural community. The centralization of the meatpacking industry modernized national food distribution networks, and thus, the packers offered farmers more outlets for commodities. This Stockyard narrative focused on the service the Union Stockyards provided farmers, which inverted the anti-monopoly argument made by critics. The meatpackers contended that the Meat Trust provided a public good. This unapologetic defense of the Chicago meat trade cast aside distrust as unpatriotic and pernicious and redirected spectators, producers, and students toward the propaganda of the Stockyards, which envisioned the meatpackers as standard-bearers of modern industry, uniformity, standardization, and, to dispel criticism of monopoly, competition and honor.[43]

Nevertheless, price and quality drove consumer concern as beef became a larger part of the American diet. A survey conducted in 1909 found that with increased incomes and urbanization, the appetite for beef grew. R.J.H De Loach of Armour's Bureau of Agricultural Research and Economics also observed that consumer demands for quality food accompanied this growing appetite for meat; consumers looked for food that was both unspoiled and flavorful. De Loach's evaluation of consumer expectations reflected a decades-long struggle for the meatpackers. When Swift and Armour first shipped dressed meat in refrigerated railcars to eastern consumers, a general prejudice against Chicago meat rebuffed packer attempts to penetrate markets. Doubt and distrust characterized

[43] Norman, "Live Stock Exchanges and Their Relation to the Producer," *Proceedings of the Fourth Annual Convention of National Live Stock Association*, 384-387; Armour, *The Packers, the Private Car Lines, and the People*.

retail butcher and consumer sentiment. For consumers, spoiled meat posed a serious health threat, which coincided with a preference for freshly butchered meat. According to Swift's son, the idea of eating beef a week or more after workers slaughtered the animal provoked a "nasty-nice horror" among customers.[44]

Public outcry from an "embalmed beef" disaster during the Spanish-American War had forced the Union Stockyards to deal with negative consumer attention. Critics alleged that packaged meat sickened and killed soldiers. At the time of the war, the technology to package meat rations for tropical climates failed to prevent spoilage and caused a "sanitary nightmare" for the United States military. For example, 345 men died in action in Cuba, Puerto Rico, and the Philippines; but over 2,500 deaths resulted from disease, poor food, and unsanitary conditions—an alarming imbalance that provoked backlash toward the meatpacking industry. "Embalmed beef," as it became known, even received the blame for deaths related to malaria and other illnesses and disease. After the war concluded, many allegations directed at the secretary of war surfaced. Improper refrigeration of dressed beef, harmful preservatives, and canned meat became the focus of investigations.[45]

Accompanying concerns about preservatives, the unsavory accounts of the slaughtering and dressing of livestock made popular by Upton Sinclair in *The Jungle* heightened public wariness, which led to federal regulation. Evidence mounted against

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[44] Roger Horowitz, *Putting Meat on the American Table* (Baltimore: The Johns Hopkins University Press, 2006), 1-42; De Loach, *Armour's Handbook of Agriculture*; Swift and Van Vlissingen, *The Yankee of the Yards*, 69; Cronon, *Nature's Metropolis*, 235.

[45] Leech and Carroll, *Armour and His Times*, 321-338.

the meatpackers. As the chief chemist at the USDA, Harvey Wiley provided food quality critics with invaluable information on the health effects of these acids. A champion of government food regulation and considered by many as the "Father of the FDA," Wiley conducted a study for the Department of Agriculture on human subjects to determine the consequences of using preservatives. Wiley claimed that over time, these chemicals interfered with digestion and caused damage to the kidneys, and he publicized the dangers posed by the digestion of borax and boric acid. In addition, the outcry provoked by Sinclair's portrayal of the meatpacking industry helped Wiley push for regulation and reform in the industry and the Department of Agriculture banned these chemicals and approved only salt, sugar, wood smoke, vinegar, pure spices, and saltpeter as preservatives.[46]

The packers labeled the "embalmed beef scandal" a hoax and insisted that it cost the industry both money and its reputation. The remaining proponents of borax and boric acid used their own medical tests and experts to thwart accusations of misconduct or impropriety. They proved, at least with their own doctors, that the human body digested the chemicals easily. J. Ogden Armour spoke out aggressively against claims of unsanitary food and disease or ill-health resulting from eating the packers' meat. He said it was impossible for the meatpackers to sell diseased meat and that any public uneasiness stemmed from unjust charges. He took personal offense to these "false allegations" because they diminished the confidence consumers had in his products; Armour believed that export trade, in particular, diminished as a direct consequence of this negative

[46] Horowitz, *Putting Meat on the American Table*, 55-74; Pacyga, *Slaughterhouse*, 129.

attention.[47] The meatpackers also insisted that danger did not result from the use of chemical preservatives. As an improvement over previous practices, the chemicals safeguarded the public from spoiled food.[48]

To address these food quality concerns and fluctuations in meat supply, the Chicago meatpackers created the International with land-grant universities as a "pure food display"—a spectacle that included government inspection demonstrations, dressed meat and meat-product displays, and refrigeration, preservation, and transportation exhibits—to serve as a weapon in this public relations fight to protect and expand the Chicago meat trade.[49] Still, notwithstanding the public relations campaign over food quality, the beef shortage was the central problem for the meatpackers. They blamed supply for all the limitations in meeting American and international demand. From the packers' perspective, criticism from producers about price volatility and from consumers about price fixing and food quality really required addressing the supply of quality beef—a problem the packers attributed to inefficiencies in American agriculture.

In approaching the supply problem, the meatpackers hoped breeders would address animal quality to improve carcass value and yield. This quality approach to agricultural improvement relied on farmers "breeding up" livestock. The meatpackers

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[47] Ibid.

[48] T.F.B. Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association* (Denver: The Smith-Brooks Printing Company, 1900): 343; Horowitz, *Putting Meat on the American Table*, 59; Pacyga, *Slaughterhouse*, 129; Armour, *The Packers, the Private Car Lines, and the People*.

[49] "Eleventh Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*, (1902); "Stock Breeders' Exposition," *New York Times*, Nov. 25, 1899; "Unite for a Big Stock Show," *Chicago Daily Tribune*, Nov. 25, 1899; "Breeders' Aid Is Sought," *Chicago Daily Tribune*, Nov. 20, 1899.

would use the International to push farmers to abandon "scrub" livestock and increase the proportion of improved animals they raised and sold.[50] As such, the packers tried to reconfigure the percentage of animals sent to Chicago toward a higher number of improved stock.

Land-Grant University Professors

Eliminating "scrubs" and modernizing the farm became the nexus where the meatpackers intersected with land-grant university professors. But the academics' motives differed from the meatpackers. Land-grant university officials possessed two unremitting anxieties. First, they worried about American demographic shifts. Questions emerged about the ability of a seemingly decreasing rural population to produce enough food for a growing urban consumer class. Second, as the "frontier" closed and farmers were limited in their ability to take more land under the plow, professors worried that growing pressures to produce more food would exhaust soil fertility. Land-grant professors focused on both short-term national food needs and long-term agricultural production. Soil fertility drove these conversations on demographic shifts, limited acreage, and the modernization of agriculture.[51]

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[50] "General Review 1901," in *"Our Year Book:" Telling Tables of the Livestock Trade for the Year 1901* (Chicago: Chicago Daily Drovers Journal, 1902), 5-9.

[51] William Bowers, *The Country Life Movement in America, 1900-1920* (Port Washington, NY: National University Publications), 10. By 1910, farmers represented one-third of the population and at that time urban populations were booming; in the first two decades of the twentieth century the urban population grew by 80%, representing 24 million additional consumers. Many forces influenced this shift. For some, the lure of the city and improvements in transportation and industry drew rural Americans to the metropolis. But also, increased agricultural efficiency lessened the need for labor on the farm.

In 1909, H.P. Armsby, president of the American Society of Animal Nutrition, spoke before a large audience in the Exposition Hall at the International. As the foremost authority in the United States on animal nutrition and experiment station director and department head of the School of Agriculture at Pennsylvania State College, Armsby represented these professors' concerns about food production and soil exhaustion. The projected growth of the American population, he declared, signaled a potential "deficiency in food supply." Armsby told the crowd that "new worlds" and the "Old West" no longer offered new land and fertile soil for farmers to till, and thus, scientifically-informed "permanent agriculture" had to provide for expanding urban populations.[52]

Between 1870 and 1890, farms in America nearly doubled and tilled acreage grew by almost 169 million acres, but this rate drastically diminished at the turn of the century. At the same time, America's urban population boomed. In the first two decades of the twentieth century, the urban population grew by 80 percent, which represented a vast

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As the "frontier" closed, more emphasis was placed on intensive farming and husbandry practices that garnered larger yields from crops without massively expanding acreage. The limits on land expansion drove up the cost of tillable acres. Land prices increased by an estimated 118.1% in the first decade of the twentieth century. Thus, agricultural experts' focus shifted toward increased efficiency and production and improved crop and animal husbandry practices. These improvements included machines and access to off-farm inputs that simultaneously increased output, required less labor, and necessitated more capital funds.

This process of mechanization placed pressure on the funds and capital needs of farmers. As a result, farmers were becoming more reliant on credit and the help and services of a network of agricultural experts, many of whom worked at land-grant universities. Nevertheless, the combination of city conveniences and the challenges of farm life, whether it was access to credit, land, or modern amenities, encouraged many Americans to leave the farm and move to the city—a demographic shift that greatly concerned many about deficiencies in agriculture and rural life.

[52] H.P. Armsby, "The Food Supply of the Future," *The American Society of Animal Nutrition: Record of Proceedings of Annual Meeting, November, 1910* (1911); "International Live Stock Exposition," *The Country Gentleman* LXXIV, no. 2961 (1909).

growth in nonfarm or non-food-producing consumers. Professors worried about why people were leaving the countryside and how farms would produce more food. These two issues together reflected a rural problem that linked demographic shifts and food output to developmental disparities between rural and urban spaces. Simply put, they predicted that advances on the farm would help produce more food, improve farm revenue, and reduce the burdens of overly laborious farm work.

Reformers believed that experiential and technological disparities, or "the unequal development of our contemporary civilization," between urban and rural life drove people to move to the city.[53] By the 1920s, less than a quarter of Americans worked in agriculture, down from over 50% in the 1870s. During this same period, farmers made less and less money when held in comparison to their urban counterparts.[54] And,

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[53] Theodore Roosevelt, letter to Liberty Hyde Bailey, *Report of the Commission on country life* (New York: Sturgis & Walton, 1917), 37, 41. Even though President Roosevelt felt that the farmer was better off in 1908 than ever before, he was still concerned that rural life lagged behind urban society. In a letter outlining the goals of the County Life Commission to Chairman Bailey, President Roosevelt lamented that the farmer's "increase in well-being has not kept pace with that of the country as a whole." The president wanted Bailey, as chairman of the commission, to address this disparity in development and to improve methods of farming to end the "suffering and needless loss of efficiency on the farm."

For President Roosevelt, better farming was key to broader societal goals. He argued that increased productivity and efficiency in animal and crop husbandry provided a better lifestyle for farmers, not to mention his stern belief that national prosperity relied on the ability to produce ample food. In this regard, President Roosevelt asserted that improving the income of farmers, through better marketing and business practices combined with greater yields, directly addressed deficiencies in rural life. See also C.F. Curtiss, "The Rural Education Problem," *The Alumnus: Iowa State College* VI, no. 5 (1911), Box 1, Folder 9, Charles F. Curtiss Papers, RS 9/1/12, Special Collections Department, Iowa State University Library, Ames, Iowa (henceforth CFCP).

[54] Bowers, *The Country Life Movement in America*, 13-14. In the first income tax filings in 1916, everyone with net earnings of $3,000 or more were required to file, when looking at who filed from each occupation it was apparent that farmers filed in lower rates. For example, out of 6 million farmers only 14,407 met the threshold that mandated filing. Only one out of every 400 farmers filed compared to other occupations that had much higher rates, including teachers, ministers, salesmen, doctors, and engineers.

producing the nation's food required more access to credit and capital, while, to many observers, farm work seemed difficult and unrewarding. In this regard, a prevailing sense permeated reformers about rural decline—a concern that led President Theodore Roosevelt to appoint the Country Life Commission to address the rural problem.[55]

Land-grant professors disentangled this "unequal development" by addressing the push/pull factors of the migration of farm children and young adults to the city by making life and work in the country seem more attractive and rewarding. In farm journals at the time, rural Americans and reformers addressed the problem of farm children leaving. These articles highlighted the need to improve farm life and lessen the burden of labor to keep farm children at home. Farm work limited children from using their "wits." Physically exhausting unskilled labor consumed their time, which left the development of the brain wanting.[56]

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[55] *Report of the Commission on country life*; Liberty Hyde Bailey, *The Country-Life Movement in the United States* (New York: The Macmillan Company, 1913). See also G.I. Christie, "The New Agriculture," 1916 [An address delivered before the National Fertilizer Association], MSF 89, Folder 2, G.I. Christie Papers, Purdue University Archives and Special Collections, West Lafayette, IN (henceforth GICP); G.I. Christie, "Opening Address," *State Conference on Agriculture and Country Life in Indiana*, 1913, MSF 89, Folder 1, GICP; Howard H. Gross, "Better Country Life," *State Conference on Agriculture and Country Life in Indiana*, 1913, MSF 89, Folder 1, GICP; H.J. Waters, "The Building of National Agricultural and Country Life," *State Conference on Agriculture and Country Life in Indiana*, 1913, MSF 89, Folder 1, GICP.

[56] "Suggestions for Keeping Boys on Farms," *The Breeder's Gazette* LIII, no. 4 (1908): 175. These commentators offered many solutions, including a nicely-bred, well-organized team of draft horses, like Percherons. A good team of horses lessened the burden of physical labor and allowed farm children to fixate their minds on the skilled labor of the running the machine, perfecting animal and crop husbandry practices, and using progressive management skills to operate the farm. See also "How to Make Farm Life More Attractive," (1908), Box 21, Folder 1, Liberty Hyde Bailey Papers, Division of Rare Manuscript Collections, Cornell University Library, Ithaca, NY, (henceforth LHBP); G.F. Warren, *Elements of Agriculture* (New York: The Macmillan Company, 1909); O.F. Cook, "City and Country," *The Journal of Heredity* XII, no. 3 (1921); O.F. Cook, "City and Country," *The Journal of Heredity* XII, no. 4 (1921); *Rural*

Improving farm technology and offering children mentally-stimulating tasks became a central cause for reformers—a cause that required the application of science to create better-performing animals and feeding techniques. Land-grant scholars hoped to reshape rural life in accordance with the rest of society by applying "modern" principles.[57] Land-grant universities had broadened access to education, and in particular practical sciences, to the citizens of each state. By 1900, land-grant universities had taken on many practical and scientific pursuits. The colleges included in their curricula zootechny, or animal husbandry, along with many other scientific-based courses to mold students' approaches to husbandry. Universities initially involved at the International had developed their own farms, many of them raising purebred livestock, and they attempted to disseminate these notions of progressive animal husbandry to students and surrounding communities. On university farms, instructors produced the idealized animal while developing techniques and recommendations for feed rations by raising food and forage on university property. These methods included planting and fertilizing, harvesting and storing, and creating the "most efficient" feeds for the university-raised cattle, sheep, and hogs. Students worked on the university farm, and animals produced on university farms were often shown at the International. By 1910, agricultural colleges had large holdings of land for these projects: Illinois 620 acres, Iowa 1,200, Kansas 800, Pennsylvania 600, New York 638, and Mississippi 2,000.[58]

Communities and Centers of Population, (Augusta, Maine: State of Maine, Education Department), Box 24, Folder 3, LHBP.

[57] Ibid.

[58] Alfred Charles True, *A History of Agricultural Education in the United States, 1785-1925* (Washington D.C.: Government Printing Office, 1929), 230, 240-273.

Professors took on the task of educating students and farmers in the classroom and at the International. Land-grant institutions participated directly in the International's proceedings to address the rural problem by utilizing and distributing scientific approaches to farming; they focused on feed rations, the "ideal" physiological traits in cattle, sheep, and swine, and proper land use. Professors especially linked the rural problem to soil exhaustion. Regardless of academic specialization, whether crop production, weed and pest control, animal nutrition, genetics, or meat science, the seemingly urgent need to educate a persistent class of "soil robbers" provided professors justification for their drive to modernize agriculture.[59] In *The Modern Farmer in His Business Relations*, published in 1899, Edward F. Adams warned readers that ignoring,

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[59] Edward F. Adams, *The Modern Farmer in his Business Relations* (San Francisco: N.J. Stone Company, 1899); Thomas Shaw, *Animal Breeding* (New York: Orange Judd Company, 1901); Cyril G. Hopkins, *Soil Fertility and Permanent Agriculture* (Boston: Ginn and Company, 1910); Cyril G. Hopkins, *Plant Food in Relation to Soil Fertility*, University of Illinois Agricultural Experiment Station Circular no. 155 (1912); Herbert W. Mumford, *Beef Production* (Urbana, Illinois: Published by the Author, 1907); T. Lyttleton Lyon and Elmer O. Fippin, *The Principles of Soil Management* (New York: The Macmillan Company, 1912); W.A. Henry and F.B. Morrison, *Feeds and Feeding: A Handbook for the Student and Stockman* (Madison: The Henry-Morrison Company, 1920); Charles S. Plumb, *Beginnings in Animal Husbandry* (St. Paul, Minnesota: Webb Publishing Co., 1921); Charles S. Plumb, *A Study of Farm Animals* (St. Paul, Minnesota: Webb Publishing Co., 1922); "Barnyard Manure," *The Prairie Farmer* LXVII, no. 13 (1895); "Problems of American Agriculture," *The Breeder's Gazette* XXXIV, no. 6 (1898); "To Maintain Soil Fertility," *Wallaces' Farmer* XXVI, no. 10 (1901); "Two Methods of Farming," *Farmers' Review* XXXV, no. 27 (1904); "System of Robbing the Soil," *The Prairie Farmer* 77, no. 38 (1905); "Decline in Rural Population," *Wallaces' Farmer* XXX, no. 41 (1905); "Urban vs. Rural Population," *Wallaces' Farmer* (Dec. 28, 1906); "Hopkins Addresses Rural Teachers," *The Prairie Farmer* 78, no. 37 (1906); "A Nation of Soil Robbers," *Wallaces' Farmer* XXXII, no. 35 (1907); "The Biggest Problem on the American Farm," *Wallaces' Farmer* XXXII, no. 46 (1907); "How to Keep Boys on the Farm," *Wallaces' Farmer* XXXIII, no. 26 (1908); "Maintenance of Fertility," *Wallaces' Farmer* XXXIV, no. 7 (1909); "Exhausting the Soil," *Chicago Livestock World* VI, no. 54 (1910); Cyril G. Hopkins, "The Story of the Soil," *The Prairie Farmer* 83, no. 11 (1911); "Decline in Soil Fertility," *Chicago Livestock World* XIV, no. 45 (1913); William Golloway, "Soil Fertility," *Farm Home* 40, no. 382 (1914); Alvin H. Sanders, "Cattle as a Major Factor in Successful Farming," Box 4, File 32, AHSP; Alvin H. Sanders, Essay on "Hobbies," Box 4, File 32, AHSP.

neglecting, or denying soil exhaustion imperiled national food production. Having worked as a practical farmer, a businessman, and an associate of the University of California school system, Adams feared that farmer prejudice against "book farming" or "scientific fellers" trying to transform agriculture into a modern enterprise ultimately undermined each farmer and his standard of living. Farmer resentment was understandable; land-grant professors characterized their methods as robbery, slovenly, wasteful, and unscientific.[60] However, farmer antipathy toward "book farming" did little to dissuade professors.

[60] Adams, *The Modern Farmer in his Business Relations*, 48-69. Also see Warren, *Elements of Agriculture*; "Science and the Farmer," (1893), Vol. II, Charles Sumner Plumb Papers, Ohio State University Archives, Columbus, Ohio (henceforth CSPP); C.S. Plumb, "Free Literature for Progressive Farmers," Vol. III, CSPP. Professor Plumb, employed by Ohio State University, linked good or productive farming to intelligent inquiry and scientific crop and animal husbandry regimes. Plumb correlated this approach and outlook to the core tenets of modern farming. He lamented that some of the criticisms directed at professors for being overly theoretical or bookish had some validity dating back to the creation of the land-grant system. Despite the prejudice against book farming, even if some of it was justified, the twentieth century demanded reconciliation between the farmer and the emerging science produced by land-grant schools. The principles of science tested at experiment stations and distributed by these universities focused on practical applications and methods. Like his colleagues, Plumb framed soil exhaustion as the central concern for agricultural scientists, and in these reviews of agricultural reform, he argued that "intelligent farming" was the only cure for the ills of nineteenth-century husbandry practices.

FIGURE 5. A cartoon that depicted skepticism of the rural reform movement, including scientific or "book" farming, led by President Theodore Roosevelt's County Life Commission. *Source:* Liberty Hyde Bailey Papers, Box 21, Folder 1.

The nation could no longer feed itself at the expense of soil fertility—new land did not exist. To increase output without taking in new land defined the modern farm. Instead of denying science or rejecting it based on prejudice, the modern farmer embraced the challenge of rejuvenating or maintaining "fertility by the operations of chemistry."[61] The responsibility to convince farmers and apply scientific agriculture galvanized land-grant professors around the seemingly altruistic goal of ensuring high-levels of food production for generations.

Soil scientists T. Lyttleton Lyon and Elmer O. Fippin of Cornell University held that soil management was a solemn responsibility and obligation of the university and of

[61] Adams, *The Modern Farmer in his Business Relations*, 69.

the farmer. In *The Principles of Soil Management*, their evaluation of soil robbing, they asserted that the "man who owns and tills the soil, therefore, owes an obligation to his fellowmen for the use that he makes of his land." And, they wrote that the farmer's fellowman had the responsibility of reciprocity. This equal duty from nonfarmers to the farmer required them to ensure that the farmer makes enough money so that he would not be driven to "rob the earth in order to maintain his life."[62]

These professors devoted their academic life to improving food output, soil fertility, and farm revenue. Their lofty goals mirrored a sense of peril and urgency. The imminent need to eliminate the deleterious practices of uneducated or "destructive" farming tied land-grant university professors together around the central goal of balanced farming—a husbandry regime that required livestock and crop production to coexist on every farm.[63] Under the balanced farming model, the modern farmer paired livestock and crops together. They fed grain to livestock for the surplus production of meat, and then they distributed the livestock waste—primarily manure, used bedding, and wasted feedstuffs—on fields to improve fertility. Despite the growing availability of commercial fertilizers, often manufactured and sold by the meatpacking companies, the added nitrogen, for example, from these commercial products failed to provide the requisite organic matter and soil structure to maintain the yield goals.[64]

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[62] Lyon and Fippin, *The Principles of Soil Management*, xxx-xxxi. See also Cook, "City and Country," *The Journal of Heredity* (1921); Cook, "City and Country," *The Journal of Heredity* (1921).

[63] "Two Methods of Farming," *Farmers' Review*; Adams, *The Modern Farmer in his Business Relations*; Shaw, *Animal Breeding*; Hopkins, *Soil Fertility and Permanent Agriculture*; Hopkins, *Plant Food in Relation to Soil Fertility*.

[64] Sanders, "Cattle as a Major Factor in Successful Farming;" Warren, *Elements of Agriculture*; Sanders, Essay on "Hobbies."

Professors often used balanced farming, mixed husbandry, and permanent agriculture to describe the objectives of reform.[65] Permanent agriculture juxtaposed the farming practices of the nineteenth-century range. The *extensive farming* model depended on new or "virgin" land as soil fertility diminished. Open-range livestock production fell into this category. The ecological consequences and the habitat destruction caused by overgrazing undermined the food output goals of the professors. Combined with the inferior animals that stocked the range, the output of food per acre or yield per acre fell short of the growing needs of the consumer class. Uncertainty in quality and quantity of the extensive farming model on the range worried professors because production relied on access to free grass, free water, and free land.[66]

Such researchers intended farmers to adopt balanced farming that improved yield per acre—*intensive farming* forced farmers to raise crops without the ability to move to new lands. For soil experts, pairing livestock with crops on every farm characterized the ideal production model, which required the education and behavioral transformation of soil-robbing farmers. Like ranchers on the range who produced one animal species on an open-range concept, soil robbers often produced one crop, which had severe consequences for the soil.[67] Therefore permanent agricultural also required the adoption

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[65] Isaac Phillips Roberts, *The Fertility of the Land: A Summary Sketch of the Relationship of Farm-Practice to the Maintaining and Increasing of the Productivity of the Soil* (New York: The Macmillan Company, 1897).

[66] John T. Schlebecker, *Cattle Raising, 1900-1961* (Lincoln: University of Nebraska Press, 1963), 11; Jordan, *North American Cattle-Ranching Frontiers*, 7-13, 210-217. See also Roberts, *The Fertility of the Land*; Hopkins, *Soil Fertility and Permanent Agriculture*, xvii-xxiii, 198-235; Warren, *Elements of Agriculture*; A.K. Short, "Ancient and Modern Agriculture," *Agricultural and Mechanical College of Texas*, Box 3, File 43, AHSP.

[67] Cook, "City and Country," *The Journal of Heredity* (1921); Cook, "City and Country," *The Journal of Heredity* (1921).

of a multiple-crop production system. Mixed husbandry—the rotation of several crops—contrasted to one-crop farming. Farmers would then feed these crops or crop products to livestock. Some advocates used balanced farming, permanent agriculture, and mixed husbandry interchangeably; the general meaning of the terms related to maintaining soil fertility by rotating crops and using livestock on each farm.[68]

Agronomist Cyril G. Hopkins was a prominent advocate of permanent farming and the leading authority on farm fertility. As vice president of the experiment station at the University of Illinois, Hopkins saw the broader land-grant and experiment-station community as "guardians of American soil." According to Hopkins, figuring out how to use land without abusing it became the central goal of these researchers. No country dependent on extensive agriculture, he contended, ever produced food without exhausting the soil. These practices, he argued, "ruined land" and the science of agriculture would restore it. Even more, Hopkins directed criticism at farmers for not accepting outside help; and, according to Hopkins permanent agriculture could only be achieved through the science produced by land-grant universities and experiment stations. Multigenerational farm profitability and food output requirements necessitated the belief

[68] Roberts, *The Fertility of the Land*; Hopkins, *Soil Fertility and Permanent Agriculture*, xvii-xxiii, 198-235; Warren, *Elements of Agriculture*; Short, "Ancient and Modern Agriculture;" G.I. Christie, "Supplying the Farm Labor Need," *United States Department of Agriculture* (1918), MSF 89, Folder 2, GICP.

In addition to soil depletion, Hopkins argued that one-crop farming caused other problems for the producer. He cited recent research conducted at experiment stations in Tennessee and North Dakota that showed problems with weeds, insects, and fungus in one-crop systems. Disease, competing plants, and pests plagued monocrop farms and diminished yields, farm productivity, and revenue.

in and practical application of science on the farm—a regime that coupled mixed crop husbandry with modern livestock.[69]

In the decade preceding the International Livestock Exposition, land-grant university professors had begun to establish these foundational concerns with soil fertility along with an intellectual, experimental, and institutional network.[70] However, without improved animals, the modern farm was incomplete. As Armsby declared at the International, "inferior animals," whether fed correctly or not, performed too poorly to advance the cause of scientific agriculture.[71] The type of animal mattered as much as the mere existence of that animal on the farm. Improved animals allowed farmers to increase the surplus production of human food. Producing more food per animal, which would improve national productivity per acre, helped professors solve farm-revenue and food-deficiency concerns by focusing their attention on the reconfiguration of livestock and the mass reproduction of the modern animal.

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[69] Hopkins, *Soil Fertility and Permanent Agriculture*, xvii-xxiii, 198-235. Hopkins insisted that finding the proper balance between commercial fertilizer and animal manure was essential for permanency. Hopkins was not as enamored by the use of livestock as machines for human food production as his land-grant colleagues; he worried about the caloric loss in the conversion of crops to meat and argued that perhaps it would be easier to meet the food needs of humans by avoiding dependence on a meat-based diet. Despite his uncertainty about livestock and meat production, he adamantly believed that permanent agriculture relied on livestock manure.

[70] "The Rural Science Series," *The Cornell Daily Sun* XVI, no. 20 (1895); F.H. King, *The Soil: Its Nature, Relations, and Fundamental Principles of Management* (New York: The Macmillan Company, 1895); Roberts, *The Fertility of the Land*; Lyon and Fippin, *The Principles of Soil Management*, v-vii; Warren, *Elements of Agriculture*.

[71] Armsby, "The Food Supply of the Future," *The American Society of Animal Nutrition*.

The Packers and Professors Meet

Meatpacking and land-grant university officials represented the two most prominent interests in the improved livestock movement. Despite their different motives for creating and sustaining the International, both sets of actors intended to fashion an exposition unmatched in scale and quality to serve as the central mechanism to improve meat-producing livestock. And, for this group, improvement meant first and foremost the elimination of "scrub" animals.[72]

Following John Sherman's retirement at the end of the nineteenth century, J.A. Spoor became the president of the Union Stockyard Company. Spoor believed that problems in the industry could be addressed by the meatpackers, and he confided in Arthur G. Leonard, manager of the Stockyards, who energetically crafted intervention plans to promote the production of better stock. Resulting from his experience at the Stockyards, Leonard worried about inferior livestock on the average farm.[73] He first created a plan to send "missionary bulls" to western ranges. He hoped to distribute a well-bred bull to each farming community to be shared among breeders, like a

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[72] James E. Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought Into Being the World's Most Conspicuous Live Stock Show" *The Shorthorn World* IV, no. 18 (1919).

[73] Alvin Howard Sanders, *At the Sign of the Stock Yard Inn* (Chicago: Breeder's Gazette Print, 1915), 8-22; Sanders, *Story of the International*, 25-30; "Dedication of the New Building," *The Breeder's Gazette* (1903): 1114; "Ninth Annual Report of Board of Directors," *Chicago Junction Railways and Union Stock Yards Company*; "Live Stock Exposition: The Union Stock Yards Plan for an International Event," *The Washington Post*, Nov. 20, 1899; "Stock Show to be Great," *Chicago Daily Tribune*, Aug. 4, 1900; "Stock Breeders' Exposition," *New York Times*; "Unite for a Big Stock Show," *Chicago Daily Tribune*; "For Chicago Live Stock Show: First Steps to Plan an International Exhibition to Be Taken at the Yards Today," *Chicago Daily Tribune*, Nov. 24, 1899; "Breeders' Aid Is Sought," *Chicago Daily Tribune*. See also Union Stock Yard & Transit Company minutes book [manuscript], 1865-1904, Chicago History Museum Research Center.

cooperative for genetics. He quickly gave up on this difficult-to-execute venture but remained convinced that the Stockyards needed to act to remedy the chronic supply problem. This failed attempt to reform animal husbandry primed him to hear bolder ideas. In 1899, Alvin Sanders, Robert B. Ogilvie, William E. Skinner, Mortimer Levering, and G. Howard Davison concocted a plan at a livestock show in Toronto; they envisioned a transformative national show, unmatched in scale, and underwritten by the Union Stockyards. Upon return, they approached Leonard with the idea, and he fully endorsed the proposition. This show, they believed, would be the ideal mechanism to transform animal agriculture.[74]

Leonard provided his unwavering support, which made convincing Spoor an easier task. Sanders remembered that Spoor gave Leonard the "'full steam ahead' signal," and the Stockyards quickly mobilized to arrange a meeting. The Union Stockyards sent out invitations to land-grant university officials and faculty, national breed associations, and many in the agricultural press. In November of 1899, top agricultural officials flocked to Chicago for a mass meeting at the Stockyard's Exchange Building. Mortimer Levering from the American Shropshire Registry Association called the meeting to order and appointed W.E. Skinner to temporarily chair the event. In addition to Spoor and Leonard, Skinner, who served as a general agent for the Union Stockyards, also

[74] Sanders, *At the Sign of the Stock Yard Inn*, 8-22; Sanders, *The Story of the International Live Stock Exposition*, 25-30; "International Live-Stock Exposition," *The Breeder's Gazette* (1900): 709; "Live Stock Exposition," *The Washington Post*; "Unite for a Big Stock Show," *Chicago Daily Tribune*; "Breeders' Aid Is Sought," *Chicago Daily Tribune*; "Dedication of the New Building," *The Breeder's Gazette*; C.S. Plumb, "International Live Stock Exposition," *Home Journal* (1900), Vol. III, CSPP.

represented the companies' interests. Following Skinner's appointment as chair, the body elected Levering as secretary.[75]

Sanders presided over the proceedings, and he began with a vote to authorize the permanent organization of the group, which became the International Livestock Exposition Association, and then he proceeded with the nomination of officers. When the group elected officers and directors, the interests of the organization became clear. The board overwhelming represented the interests of the Union Stockyards, including J. Ogden Armour and E.F. Swift; and Spoor took the reins of the association when they elected him president. First Vice President Dewitt Smith resided in Springfield, Illinois, and formerly served as president of the Consolidated Cattle-Growers' Association of the United States; and, Sanders served as second vice president. Skinner became the general manager. The board also included land-grant university and breed association representatives.[76] The breed associations possessed overlapping interests with the professors; land-grant university officials organized and ran many of the breed registries. The most prominent among them was C.F. Curtiss, who served as an International founder and official livestock judge as well as a breed association organizer, and professor of animal husbandry and dean at Iowa State College.[77]

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[75] Sanders, *At the Sign of the Stock Yard Inn*, 8-22; Sanders, *The Story of the International Live Stock Exposition*, 25-30; "Unite for a Big Stock Show," *Chicago Daily Tribune*; "Breeders' Aid Is Sought," *Chicago Daily Tribune*.

[76] Ibid.

[77] Charles F. Curtiss' organizational and associational work addressed the value of purebred livestock, nutrition and feeding practices, and general agricultural improvement. He first started at Iowa State Agricultural College as a student and received his degree in 1887. He returned to Iowa State College after a few years as a farm manager, and at that time, only one student formally enrolled in agricultural instruction. Curtiss worked with James Wilson to build a robust agriculture department. After Wilson went to Washington D.C. to serve as secretary of

After deciding on the roles and the powers of each office and director, the executive committee concluded that the show would be called the "International Live Stock Exposition" and that the show would take place the first week of December from Saturday to Saturday. Sanders referred to this meeting of people as the "founders of the International," and he emphasized that this group focused on improving livestock.[78] Progressive animal agriculture required the "extermination" of so-called "scrub" livestock.[79] To ensure quality, the founders created a sift committee to remove poor

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agriculture, Curtiss became the director of the program. When the department created the position in 1900, Curtiss was promoted to dean.

On Rookwood Farm, he raised and exhibited his own livestock, and producers recognized him for his frequent judging engagements at the International as well as other high-stakes expositions, including the Panama-Pacific Exposition, and nearly all leading state and provincial fairs in the United States and Canada. He was also sought after as a gubernatorial candidate in the Iowa Republican Party and was rumored to be considered highly for secretary of agriculture under President Calvin Coolidge.

See Bob Campbell, "He Put the 'A' in Agriculture," *Iowa Agriculturalist* (1952): 10-19, Box 1, Folder 8, CFCP; F.W. Beckman, "Dean C.F. Curtiss," *The Berkshire World* (1922): 26-58, Box 1, Folder 8, CFCP; Chester Randolph, "C.F. Curtiss Dies," *Iowa State Daily Student* 76, no. 181 (1947), Box 1, Folder 1, CFCP; Louis Hermann Pammel, Letter to President Calvin Coolidge (1924), Box 1, Folder 8, CFCP.

[78] Sanders, *At the Sign of the Stock Yard Inn*, 8-22; Sanders, *The Story of the International Live Stock Exposition*, 25-30.

[79] Poole, "The Twentieth International," *The Shorthorn World*. In the first two decades of the century, Poole noted a rapid decline in the use of inferior bulls and "scrub females" in both show herds and flocks as well as commercial operations. Poole provided an interesting take on how the International influenced this change. He argued that the International educated and demonstrated to college students and active producers the value of improved stock, which shifted preferences causing inferior or "scrub" animals to lose their "footing under the influence of accumulating hostile public opinion." By changing public opinion, the International, he wrote, institutionalized "progress of reform" in American agriculture.

Poole added that the International was created to "carry on the perennial battle for the extermination of the scrub." Reflecting on the International after two decades, Poole argued that the International marked a turning point in the production of livestock in North America, and as a result, the Exposition provided order in the agricultural community out of the "gigantic hodgepodge" and "veritable turmoil" of the previous century. Also see C.S. Plumb, "The Use of Words by Breeders," (1901), Vol. IV, CSPP.

livestock before the competition to guarantee that the International only displayed improved, modern animals.[80]

Although the founders had high hopes for the International, a degree of uncertainty prevailed; they recognized that transforming animal agriculture by reeducating farmers and altering animals would be difficult. Thus, Sanders referred to the first International as a "trial balloon." By the second year, over 400,000 domestic spectators had attended, along with visitors and dignitaries from Argentina, Germany, Italy, Belgium, Japan, Mexico, and Central America. American political officials also traveled to Chicago for the festivities, including Secretary of Agriculture James Wilson and governors from Illinois, Minnesota, Nebraska, Iowa, and Michigan. Sanders declared that an unabated interest permeated "public-spirited citizens," premier farmers, land-grant colleges, and the Stockyards for "our greatest single national industry." These expositions provided enough evidence to make it permanent.[81]

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[80] Sanders, *At the Sign of the Stock Yard Inn*, 8-22; Sanders, *The Story of the International Live Stock Exposition*, 25-30.

[81] Sanders, *At the Sign of the Stock Yard Inn*, 8-22; Sanders, *The Story of the International Live Stock Exposition*, 25-30, 37; "Live Stock Show Opens Gates Today: International Exposition, Attended by Stock Fanciers From All Over The World, Attracting More Attention Than Ever This Year," (1909), Box 2, File 38, AHSP; "Alvin Sanders," (Dec. 16, 1909), Box 2, File 38, AHSP.

Plumb, "International Live Stock Exposition," *Home Journal*. Plumb declared the first International an overwhelming success. He estimated that 50,000 spectators passed through the gates each day and on the most attended day that number reached 75,000. The hotels hardly had a vacant room, Plumb marveled, which required excess travelers to sleep on cots in dining areas and halls. The International, because of the high number of participants, tourists, and spectators, spurred growth in the local economy. Consequently, immediately following the conclusion of the first show, the organizers began planning the 1901 International.

The construction of an enormous new exposition building sealed the founders' commitment to the show's endurance.[82] To raise the money, the directors and Sanders offered annual or lifetime memberships to the International Livestock Exposition Association. Despite construction delays, which required organizers to postpone the International for two weeks, they finished and unveiled a large hall on Halsted Street in 1905.[83] The International Amphitheatre provided stadium seating to spectators in a facility that looked like a capitol building or a sports arena. At the time, no other construction devoted to livestock expositions rivaled the Amphitheatre, which seated 10,000. Built of cement, brick, steel, and glass, the Amphitheatre represented a new age in agricultural production and included the modern amenities of the city. Steam pipes heated the auditorium and ran by the feet of the spectators providing a comfortable experience in the cold and windy climate of a Chicago December. Incandescent, regular arc, and blazing arc lights illuminated the arena, especially for the nighttime events that drew maximum capacity crowds. The Union Stockyards provided the animals stalled and shown at the International conveniences unknown to many contemporary humans, let alone animals. Their steam-heated, electric-lit quarters directly contrasted with the experiences of the slaughter animals on the very same grounds.[84]

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[82] Sanders, *At the Sign of the* Stockyard; "Dedication of the New Building," *The Breeder's Gazette*; "Largest Exposition Building in World Nearing Completion in Chicago," *Chicago Daily Tribune*, Nov. 5, 1905; "Praises Show of Livestock: Secretary Wilson Says It Is a Magnificent Exposition," *San Francisco Call*, Dec. 2, 1902.

[83] Ibid.

[84] "New International Live Stock Exposition Building: The Largest of its Kind in the World," *The Shepherd's Criterion* XV, no. 12 (December, 1905): 30; "The Coming International," *The Shepherd's Criterion* XV, no. 11 (1905): 7; O'Brien, *Through the Chicago stock yards*, 30-32. In 1905, the board of directors postponed the International two weeks to give contractors the needed time to finish construction. The delay resulted from late shipments of

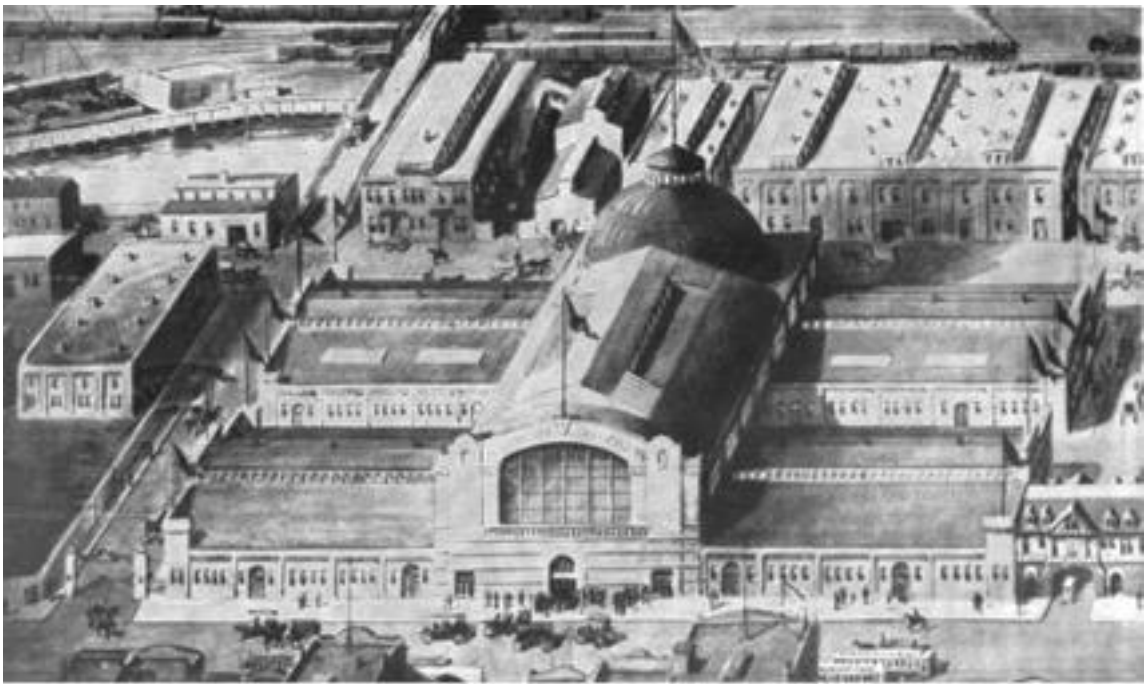

FIGURE 6. International Amphitheatre. *Source: A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1916, 2.

Conclusion

The Union Stockyards represented the new economy, which provided producers and urban spectators "demonstrations of modern industrial efficiency." However, without a modern animal, the meatpackers faced limitations. The animals themselves also required transformation. Just as the packers built the Stockyards for an industrial

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structural iron. Feeders' frustration rose as a result. They planned their feeding and marketing on the original date and complained that the delay would cause them to miss out on the high prices of early December stimulated by eastern buyers preparing for the coming holiday season. Nevertheless, General Manager W.E. Skinner guaranteed producers and potential spectators, in "The Coming International" published by *The Shepherd's Criterion*, that, despite delays, they could expect to see the showing of "the finest bovine aristocracy."

economy, so too did farmers need to rework their livestock.[85] The Chicago meatpackers and the land-grant university professors worked together to eliminate "scrub" livestock. At the International, the meatpackers would thoroughly incentivize the reproduction of meat-producing animals, while the land-grant professors defined the forms, types, and genetics of the modern animal. Unlike the unpredictability and uncertainty of tall, rangy "scrubs," this animal possessed uniformity in genetic and physiological makeup. Old carcasses produced excess waste and tougher meat, which accompanied the age. Modern livestock were smaller and younger with more consistency in size and quality.[86] The goals and the structure of the International, including class format and judging preferences, would revolve around two biological configurations: purebred genetics and standard body types.[87]

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[85] Per a publication by the Swift officials and a short piece by the Tennessee Experiment Station, the new animal was to be bred purposefully for meat production. The twentieth century needed cattle, these publications argued, with broad backs. Producers, the Tennessee Experiment Station reminded readers, should select meat-producing animals based on the needs of the meatpackers, and the mothers should not produce more milk than necessary. Instead, they should have bodies geared toward the production of meat. See Andrew M. Soule, "What Bull Should Be Used?," *The Breeder's Gazette* (1900): 71; "Union Stockyards," *Chicago Daily Tribune*, Oct. 10, 1904; Swift & Company, *The Meat Packing Industry in America*.

[86] "Union Stockyards," *Chicago Daily Tribune*; Sanders, *At the Sign of the* Stockyard; Soule, "What Bull Should Be Used?," *The Breeder's Gazette*, 71; Swift &Company, *The Meat Packing Industry in America*.

[87] "With Sanders in the Saddle and Sirloin Hall," *Clay, Robinson & Company*; Poole, "The Twentieth International," *The Shorthorn World*.

CHAPTER TWO

Breeding Up Livestock

> Every animal is the fruit not only of its own particular feeding and individual development, but of its ancestry.
>
> —Alvin H. Sanders

In 1902, on behalf of the Theodore Roosevelt administration, Secretary of Agriculture James Wilson offered lusty support for the goals of the Chicago International Livestock Exposition. During the unveiling of the newly-built Purebred Livestock Record Building, Secretary Wilson proclaimed to the crowd that the International was "the most magnificent expression of progressive breeding…in the history of any country."[1] The Secretary endorsed the objectives of the International and contended that its mission—improvement of domestic animals by demonstrating and embodying the elements of "progress"—enriched the overall well-being and competitiveness of the nation. "What a long time we have waited for all of this!" Secretary Wilson declared to the crowd.

Wilson also argued that the International effectively accompanied the work of the public land-grant universities and experiment stations. The International, he said, pushed "farmers toward the establishment of the science of breeding," which required them to raise the type of animals that increased the efficiency of food production and minimized waste. Indeed, as Wilson both declared and predicted, the International served as a hub

[1] "International Live Stock Exposition: A Livestock Renaissance," *Opportunities of To-Day* 3, no. 6 (1907): 29-38. The dedication of the of the Purebred Livestock Record Building marked a date in history, according to the *Opportunities of To-Day*, toward the development and improvement of livestock resources in the United States; the International pushed and sustained this transformation. In this vein, the author argued that in a few short years the International impacted the choices of producers substantially because of the awards, competitions, and education this major show offered.

for land-grant universities and experiment stations, along with Chicago meatpackers, in the dissemination of new husbandry practices.[2]

With the full support and involvement of the United States Department of Agriculture, the Union Stockyards promoted and advanced the cause of purebred livestock. The Stockyards housed the National Breeding Record Associations of the United States, and also provided breed associations offices and space to store official pedigrees in the Purebred Livestock Record Building.[3] A year after Wilson honored the unveiling of the building, Alvin H. Sanders worked with Arthur G. Leonard, manager of the Union Stockyards, and Robert B. Ogilvie, secretary of the American Clydesdale Association and head of the International Horse Department, to organize the Saddle and Sirloin Club, a sort of social club or fraternity located on the top floor.[4] As an exclusive society devoted to modern agriculture, the Saddle and Sirloin Club served the

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[2] "International Live Stock Exposition," *Opportunities of To-Day*. This article referred to the International as "The Exponent of a Great Movement for Improvement of the Domestic Animals of the United States." The International, according to this article, served as the centerpiece of a broader movement in the transformation of animal husbandry practices to make agriculture more productive and efficient. The International set forth the goals of progressive agriculture serving as a hub that included the United States government and land-grant institutions. For Wilson, the college students educated at the International represented one of the major successes of the Exposition. The standards learned by students, especially in the popular collegiate judging competition, radiated out and influenced the types of livestock producers raised for other shows. When they graduated and judged other shows, these young college alumni prioritized the type of animal they learned about at the International. Secretary Wilson argued that the value of college students "scoring" animals at the International related to the general improvement of agriculture, which provided an unprecedented opportunity for Americans, "as a people," to go to the front of other nations in "the production of meats."

[3] "Union Stock Yards," *Chicago Daily Tribune*, Oct. 10, 1904.

[4] Sanders, Leonard, and Ogilvie named this fraternity, or Brotherhood, the Saddle and Sirloin Club. British-born Richard Gibson, who bred improved cattle in North America, suggested the name of the Club. Gibson borrowed the name from writer H.H. Dixon, who wrote under the pen name "The Druid." Dixon titled a volume dealing with British breeders "Saddle and Sirloin," which referred to top cuts of meat on the sheep, saddle, and cow, sirloin.

International, having been created by Sanders, Leonard, and Ogilvie to provide a retreat that would impress the many guests.[5]

To compete on a national scale with the prestige of the steel and rail industries, the Saddle and Sirloin Club advanced and publicized the International's important reform work. It brought together rural agrarians and young students with Chicago businessmen, national policymakers, foreign dignitaries, and scientists, "serving as a university in the highest order." The organizers believed that "every young man interested in any phase of animal husbandry should become a member." And the members utilized the plush setting, the grandeur of the halls, and the sophisticated architecture to magnify the importance of the society's goals. Baronial Hall, for example, featured a vaulted oak-beamed ceiling and dark-paneled walls reminiscent of banquet halls in medieval England. The Club included a series of opulent rooms that exhibited oil portraits of Hall of Fame inductees.[6]

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[5] Edward N. Wentworth, *A Biographical Catalog of the Portrait Gallery of the Saddle and Sirloin Club* (Chicago: Union Stockyards, 1920), 8-9. Wentworth worked for Armour & Company as an executive, and he also provided his services to the International. As the ringmaster for the International, he served as the face and voice for the Exposition's proceedings. By 1903, Wentworth declared that the International had quickly emerged as the hub, or "pivot," for agricultural improvement. He saw the Saddle and Sirloin Club as an important institution in establishing and commemorating the forgotten British "heroes" who initiated this movement.

[6] Alvin Howard Sanders, *At the Sign of the Stock Yard Inn* (Chicago: Breeder's Gazette Print, 1915), 3-50, 155-160; Wentworth, *A Biographical Catalog of the Portrait Gallery of the Saddle and Sirloin Club*, 7-10; "Saddle & Sirloin Portrait Collection Guidebook," *Kentucky State Fair Board*, http://www.livestockexpo.org/saddleSirloin.html; "Saddle and Sirloin Club (unedited)," Box 1, Folder 1, International Livestock Exposition, ILER; "Saddle and Sirloin Club (edited)," Box 1, Folder 1, ILER; "Special Release from International Livestock Exposition Press Bureau," Box 1, Folder 1, ILER; "Statement of Incorporation of the Saddle and Sirloin Club of Chicago," Box 1, Folder 1, ILER; O.T. Henkle, "Saddle and Sirloin Club," Box 1, Folder 1, ILER; "With Sanders in the Saddle and Sirloin Hall," *Clay, Robinson & Company* (1916); "Cattle as a Major Factor in Successful Agriculture," Box 4, File 32, AHSP; C.S. Plumb and James F. Hum, "History of the Saddle and Sirloin Club," *The Agricultural Student*, Vol. IV, CSPP; "Prize Stock Given Finishing Touch: All Now Ready for Formal Opening of International Exposition Today," *Chicago Daily Tribune*, Nov. 29, 1909.

The walls of its old English dining room, lavish smoking room, and world-class agricultural library featured breeders. The Club used the library to add institutional and historical heft to the agricultural reform movement.[7]

The primary feature of this posh club was the Sanctum Sanctorum ("holy of holies"). Club members used a wide variety of religious-based words to explain the importance of this "holy" room and the Club itself. This room was "a Pantheon" for the forbearers of the improved livestock industry. For Sanders, Leonard, and Ogilvie, these ancestral reformers came from eighteenth-century Britain. As the nursery of superior animals, Britain supplied American reformers with the genetics needed to redirect livestock production and eliminate the scrub in the United States. Chief among their British "heroes" was breeder Robert Bakewell, who became one of the first enshrined in this sanctuary. Bakewell created an economically competitive sheep that emphasized meat production, which differed from uses during his era that revolved around wool, milk, and fertilizer. He systemized breeding and selection—an effort that marked the beginning of this movement. The Club "canonized" Bakewell in the Sanctum Sanctorum to highlight his foundational contributions to purebred animals, and to breeding practices of succeeding generations.[8]

As a founder of both the International and the Saddle and Sirloin Club, Sanders pushed farmers to adopt what he considered genetically superior British animals; as a

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[7] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1913), 292, 294.

[8] Ibid.

result of known parentage, purebred livestock produced more standard, predictable, and competitive types of animals.[9] Like Sanders, the packers and professors associated superior animals with Britain. Stockyard President J.A. Spoor and C.F. Curtiss, professor of animal husbandry and dean at Iowa State College, in particular, linked progressive agriculture to British husbandry. The use of purebred livestock, Curtiss argued, eliminated inefficiencies in food production.[10] The packers shared this conviction—Spoor argued that the goals of improvement had specific requirements and objectives related to genetic makeup. Purebred animals possessed tangible benefits in genetic predictability.[11]

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[9] In addition to his work as writer and editor for *The Breeder's Gazette*, Sanders published several books that covered the growth and importance of major purebred beef breeds. His devotion to scientific breeding manifested in several publications about the benefits of purebreds: *A History of Aberdeen-Angus Cattle*, *Red White and* Roan, and *The Story of Herefords*. In addition, in 1900, he published a volume devoted to the advantages of Shorthorn cattle, in which Sanders examined the history of genetic selection and famous breeders, such as Robert Bakewell, who provided producers guidance in phenotypical improvement through purebred influences. See Alvin Sanders, *Short-Horn Cattle: A Series of Historical Sketches, Memoirs and Records of the Breed and Its Development in the United States and Canada* (Chicago: Sanders Publishing Company, 1900).

[10] Bob Campbell, "He Put the 'A' in Agriculture," *Iowa Agriculturalist* (1952): 10-19, Box 1, Folder 8, CFCP; F.W. Beckman, "Dean C.F. Curtiss," *The Berkshire World* (1922): 26-58, Box 1, Folder 8, CFCP; Chester Randolph, "C.F. Curtiss Dies," *Iowa State Daily Student* 76, no. 181 (1947), Box 1, Folder 1, CFCP; Louis Hermann Pammel, Letter to President Calvin Coolidge (1924), Box 1, Folder 8, CFCP.

The Charles F. Curtiss Papers at the Iowa State University Library Special Collections Department contain an interview of the professor, undated, that details his broader optimism about the agricultural industry if the Corn Belt model of animal husbandry were to become more dominant. Curtiss emphatically reminded the interviewer that livestock on every farm was necessary for farms to maintain or improve their value because of the fertility benefits garnered from manure. Without a continued commitment to fertility, which he believed required animals, the nation as a whole would fail to meet the food demands of the growing consumer class.

[11] J.A. Spoor, "Tells of Great Year," in *"Our Year Book." Telling Tables of the Livestock Trade for the Year 1902* (Chicago: Chicago Daily Drovers Journal, 1903), 11-12. Spoor detailed the broader goals of agricultural improvement by rejecting "scrub" animals. The scrub's deficiencies resulted not only from genetics, but also feeding regime. Spoor indicated that animals needed to be fed by scientific standards; accompanied by improved genetics, livestock raised properly captured a premium at the market. For Spoor, purebred cattle, especially Herefords, Angus, Shorthorns, and Galloways, provided the genetic and practical traits for the

Purebred animals imported from Britain addressed both packer and university researcher concerns about agricultural production, problems they believed could be resolved through the "blood" of livestock. Furthermore, purebreds, through generations of selective breeding and inbreeding, offered producers and agricultural experts a narrow set of outcomes and a more standard product. Spoor and Curtiss linked the uniformity of purebred cattle, sheep, and hogs to superiority. In an effort to institutionalize this uniformity, purebred livestock registries recorded ancestries to aid farmers with genetic selection which reformers believed would eradicate, as much as possible, defective or undesirable traits. Consistency in genetic selection that manifested in dependable types of animals benefited farmers by increasing the reliability and value of their products and helped meatpackers address the food quality demands of urban consumers.

The International positioned itself as the primary bridge between this fervent belief in the superiority of purebred animals on the one hand, and the reality of crossbred or even inferior livestock prevalent among commercial operations on the other. The International indeed urged farmers to raise animals with purebred parentage, both male and female, of the same breed. Yet practical limitations existed for this idealistic goal,

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consistent production of prime beef whether raised on the western range or a smaller farm in the Midwest.

See also "International Exposition," in *"Our Year Book:" Telling Tables of the Livestock Trade for the Year 1901* (Chicago: Chicago Daily Drovers Journal, 1902), 9. In this article, the *Drovers Journal* declared that the success of the International doomed the "scrub" animal as the demand for "fine" animals grew as a result. Better selection and demand drove the sale price for improved stock, which greatly outpaced the value of the average animal. In 1901, western and range cattle sold in Chicago met a weakening market, an experience that the improved cattle of the Midwest did not experience. The market remained strong for improved animals both for show and commercial purposes. See "Cattle," in *"Our Year Book:" Telling Tables of the Livestock Trade for the Year 1901*, 6.

especially farmer resistance to abandoning all grade or crossbred livestock. For small farmers to incorporate the benefits of improved "blood" or genetics, they needed only to buy or rent a single purebred sire. Some competitions at the International and "breeding up" programs only focused on the use of a single sire to make this effort more affordable and practical for the average farmer. Federal officials, for their part, developed better-sire campaigns—which included the public execution of inferior male livestock—as the official policy of the USDA, parlaying this movement's focus on purebred sires into a national "crusade."[12]

Superior Genetics

The International became the standard for measuring improvement in progressive breeding; winning came with honors and recognition. The first champion steer in 1900, Advance, became an instant icon. Farmers knew of Advance's preeminence, and he became a focus of advertisements for those pushing purebred genetics.[13] The Aberdeen-Angus breed association featured Advance to impress upon producers the importance of record-keeping and purebred ancestry, as well as the superiority of Aberdeen-Angus among meat-producing breeds. Purebred breed associations competed amongst each other to encourage the spread and influence of their breed. Advance was a featured

[12] R.J.H. De Loach, *Armour's Handbook of Agriculture* (Chicago: Union Stockyards, 1921); R.J.H. De Loach, "Beef Cattle," *Armour's Bureau of Agricultural Research and Economics*, Circular no. 5 (1918). De Loach worked for Armour, and he believed that importing British livestock and increasing their presence on the average farm addressed many of the packers' supply concerns.

[13] Wentworth, *A Biographical Catalog of the Portrait Gallery of the Saddle and Sirloin Club*, 154-156.

representative of progressive agriculture and the Aberdeen-Angus breed after winning the highest honor in Chicago.[14]

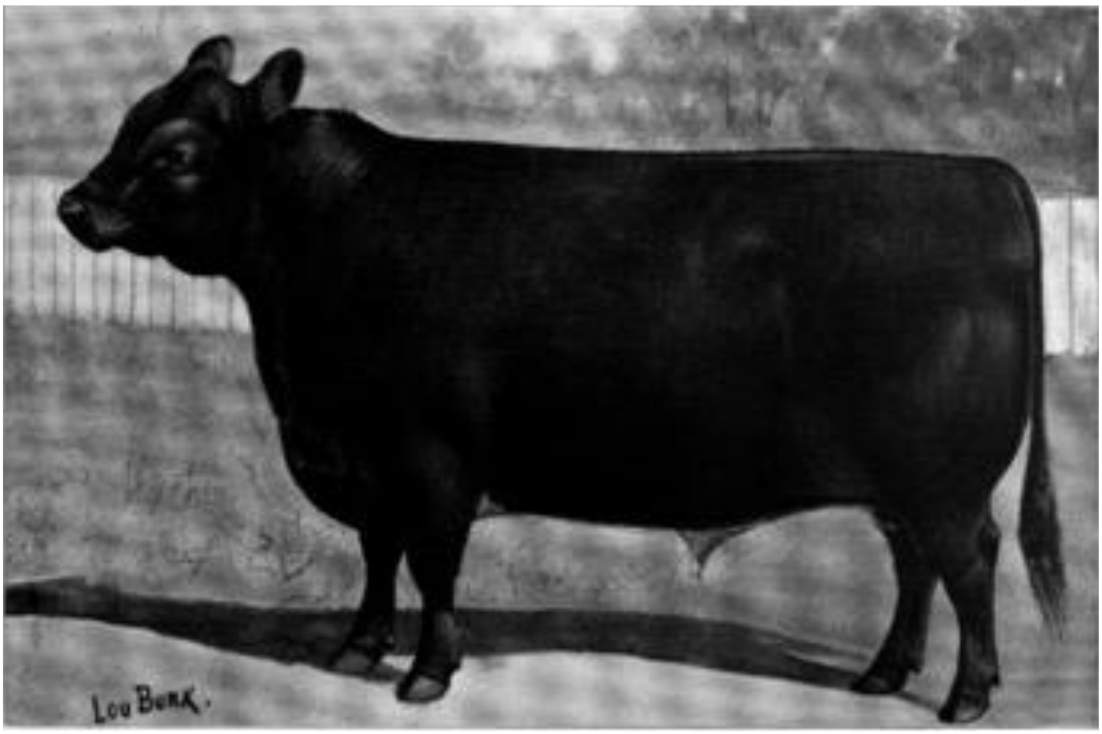

FIGURE 7. Advance, "The World's Champion Steer." *Source: The American Aberdeen-Angus Herd-Book*, 1901.

Advance received top reviews from the International judges. C.F. Curtiss, professor of animal husbandry and dean at Iowa State College, judged the Aberdeen-Angus steer competition. He commended Advance for demonstrating excellence in both quality and uniformity. Advance carried in his blood elite genes from an inbred cattle family—a close relative of Advance won champion at the World's Columbian Exposition at Chicago in 1893, Young Wellington the son of imported Wellington.[15] Advance

[14] Thos. McFarlane, *The American Aberdeen-Angus Herd-Book* (Davenport, Iowa: Egbert, Fidlar, & Chambers, Printers, 1901).

[15] C.S. Plumb, "International Live Stock Exposition," *Home Journal* (1900), Vol. III, CSPP. The *Drover's Journal* awarded the champion steer with a decorative cup. Following the show, Advance weighed 1430 pounds at the auction and sold for $1.50 per pound, which was the

merited particular acclaim, Curtiss argued; he had the type of body—stout with adequate flesh—best "for the butcher's block." Advance was first among a large contingent of Aberdeen-Angus that garnered high prices at the International sale. This breed of "Market Toppers" was featured as ideal beef cattle with easy-fleshing and high feed conversion traits.[16]

Not only did Advance gain fame for his elite genetics and success, but his accomplishments also made his owner a celebrity. The breeding of select Angus resulted in the nomination and induction of Blanford R. Pierce of Illinois into the Saddle and Sirloin Club Hall of Fame. The Club commended Pierce for his dedication to purebred livestock. In the Club's official biographical sketch of Pierce, it celebrated him for importing elite or superior bulls from Britain despite the cost, and it declared that his ambitious determination to obtain the best bulls had a broader impact on the industry. These reformers believed that the generational benefits gained by importing superior genetics more than compensated for the high cost incurred by Pierce—Prince Ito, for example, cost Pierce $9,100. The elite bulls, rams, and boars bought for improvement

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highest price ever paid for a steer to date, according to Plumb. Breeders showed Aberdeen-Angus cattle in large numbers at the first International—a major success in the promotion of purebred animal husbandry.

In many ways, the International borrowed from the Columbian Exposition to create an exposition that featured the changing components of American agriculture and to demonstrate to the public and producers what modern animal husbandry looked like. In this way, the International was a world's fair of the agricultural community to both present the best animals of the period and serve an educative function that disseminated ideas and socialized producers to adopt new practices. For a broader discussion on world's fairs, see Robert W. Rydell, *World of Fairs: The Century-of-Progress Expositions* (Chicago: The University of Chicago Press, 1993); Robert W. Rydell, *All the World's a Fair: Vision of Empire at American International Expositions, 1876-1916* (Chicago: The University of Chicago Press, 1984).

[16] *Review of the First International Live Stock Exposition* (Chicago: The Union Stock Yard & Transit Company, 1900), 23-31.

dramatically outstripped average values. At the turn of the century, the average price per acre and farm was $24.39 and $3,574, respectively, and the average value of all livestock on each farm was $536.[17] For those high price tags, Pierce's genetic arsenal, in the form of British bulls, led to the creation of Advance—a mating that contributed to his induction into the Hall of Fame.[18]

With this prestige, Britain became a sort of foundation farm or "stud farm" for the western world. Britain sold elite, well-bred stock to the United States—the transfer of biological technology in the bodies of animals, and in return, American producers sold commercial livestock and animal products to the island country.[19] Curtiss traveled in

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[17] United States Department of Agriculture, "Statistics of Agriculture: Introduction," *1900 Census Publications: Farm, Livestock, and Animal Products* 5, part 1 (Washington: United States Census Office, 1902); J.L. Coulter, "Agricultural Development in the United States, 1900-1920," *The Quarterly Journal of Economics* 27, no. 1 (1912): 1-26.

[18] Wentworth, *A Biographical Catalog of the Portrait Gallery of the Saddle and Sirloin Club*, 154-156.

[19] See published advertisements in the *Review of the International Livestock Exposition* albums and the *Live Stock Journal Almanac* publications from London. For example, the White Star Line advertised convenient shipment dates and competitive cargo fares. They had livestock shipments between Liverpool and New York every Friday on the "steamers." They assured potential clients that they built these ships specifically for the safe and comfortable travel of blooded stock, which included electric lights and water supply. On these ships, companies also provided care for the livestock, including a "surgeon" or animal expert. See *Live Stock Journal Almanac* (London: Vinton & Co. Ltd., 1902), 349.

As an island nation, vulnerable to blockade, the domestic production and the importation of food was essential. Even more, meat in particular offered the British a sense of general superiority. Being able to feed soldiers a hardy meal contributed to confidence in military adventures. But more than prosperity, patriotic agriculture had to do with pride—a national perception based on the bodies of animals. Their elite animals propelled notions of national superiority on the world stage—the belief that Britain was indeed a great nation and the supplier of great genetics to the world.

However, logical conflicts surfaced between the dialogue of service and the realities of elite livestock production. A gulf existed between breeders working toward a national cause and the self-serving nature of the production of elite animals. These breeders raised animals for the purposes of aesthetic appeal, not commercial production. For more on the intersections of patriotism and agriculture in Britain, see Harriet Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age* (Cambridge: Harvard University Press, 1987), 46-52.

1900 to Great Britain to observe livestock expositions and to inquire into the purebred livestock trade. Curtiss began his investigation while on a "cattle boat." The boat carried 657 cattle and 999 sheep for the Liverpool market, and he assured readers—producers interested in buying livestock from Britain—that the shippers successfully and safely transported livestock across the Atlantic Ocean.

Curtiss detailed the experiences of the animals to foster confidence among potential American buyers. Beyond the technical aspects of importing animals, Curtiss held that the United States was indebted to the advanced status of British genetics and farming practices. He lauded them for providing the western world with "[s]uperior breeds of live stock," and he reminded his audience that the success of British farmers in animal husbandry did "not come by chance." Instead, British livestock productivity resulted from "practical object-lessons and scientific illustrations." He commended British farmers for using a balanced husbandry regime which ensured the continual fertility of the soil through the application of manure as a nutritional supplement. Unlike many American producers, the British had "the almost universal interest displayed in matters pertaining to live stock, and the general intelligence characterising this interest." He admired the British belief that farms required animals to maintain soil fertility and to

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American reformers pushed the importation of purebred stock from Britain; in return the United States sold large numbers of commercial animals to Britain. The trade from 1870 to 1899 generated a sale of 389,490 cattle, 143,286 sheep, 45,778 horses, 33,031, and 6,775 mules to Britain at total value of nearly $38 million. See C.S. Plumb, "Crossing the Atlantic: University Men in Charge of Horses, Cattle and Sheep Aboard Tritonia—Ship's Equipment and Incidents of the Voyage," *Indianapolis Press* (1900), Vol. II, CSPP. Also see "British Sheep Farming," *Wool Markets and Sheep* VIII, no. 14 (1903): 6; "British Sheep Farming," *Wool Markets and Sheep* VIII, no. 15 (1903): 8.

ensure that they would be "permanently successful."[20] Curtiss credited initial achievements in American agriculture to Great Britain, as he believed those achievements stemmed from importing elite British stock.

To guarantee constant access to British livestock, late nineteenth century reformers, including Alvin Sanders' father, used *The Breeder's Gazette* and the influence cultivated through this popular publication to remove trade barriers on breeding stock. James Sanders reviled customs duties; he thought these restrictions on trade damaged agriculture and limited the "National wealth" generated by importation.[21] In particular, in 1887, he circulated an article about *United States v. One Hundred and Ninety-Six Mares*,

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[20] C.F. Curtiss, "An American on British Stock," *Live Stock Journal Almanac* (London: Vinton & Co. Ltd., 1900), 100-102. Also see Plumb's remarks during his trips to England and Scotland to observe agriculture and study their stock shows. He published a serious of articles during his trips in 1897 and 1900. Plumb marveled at the British system. He noted that, unlike Americans, the consumer on the British Isles preferred mutton and the meatpackers, as a result, specialized in lamb slaughter. Also, he admired the sheep throughout the countryside grazing on the hills and pastures everywhere he went. The grazing, he recalled, was different than the American improvement standard. British sheep were bred to utilize the foliage and the animals balanced crop regimes by needing very little grain during the summer months to perform well and also return fertilizer to the soil.

He wrote a piece on the uniformity among British purebreds, and these breeds, he thought, provided great value and opportunity for the American farmer. He wrote that British breeders raised and selected animals specifically for a purpose. This definite type and kind of sheep manifested in broad uniformity within flocks—an obvious choice by the farmer to breed "upward." Uniformity in type, Plumb recalled, prevailed to such a degree in Britain that even crossbred animals carried similar traits and standards as the purebreds, including broad backs, deep bodies, short legs, and good wool. C.S. Plumb, "Sheep Husbandry in England and Scotland," *National Stockman and Farmer* (1907), Vol. II, CSPP; C.S. Plumb, "An American Agriculturalist Abroad," *Rural New Yorker* (1897), Vol. II, CSPP; C.S. Plumb, "Across the Atlantic with Live Stock," *The Breeder's Gazette* (1897), Vol. II, CSPP; C.S. Plumb, "An Agriculturalist Abroad," *Home Journal* (1900), Vol. II, CSPP; C.S. Plumb, "An Agriculturalist Abroad," *Home Journal* (1900), Vol. II, CSPP; C.S. Plumb, "An Agriculturalist Abroad," *Home Journal* (1900), Vol. II, CSPP; C.S. Plumb, "An Agriculturalist Abroad," *Home Journal* (1900), Vol. II, CSPP.

[21] "The Court Decision Governing Importations of Breeding Stock," *The Breeder's Gazette* (1887): 939.

in which the court upheld a statute that protected livestock importers from paying a duty on the value of the breeding animals purchased. The statute, to encourage the advancement of agriculture, provided this loophole to farmers who bought animals only for "breeding purposes," and the court sanctioned this duty-free arrangement.

The Breeder's Gazette, however, objected to specific concerns the court raised as it related to intermediaries or middlemen who bought animals abroad and resold them for breeding purposes in the United States. Even though the court protected individual farmers from the customs duty, it did not extend that protection to the middlemen who bought and sold the animals for a profit, even though the animals purchased by brokers in the United States eventually made it to the farm for reproduction. The court reserved the "non-payment of duties" only for the farmer who had the "bona fide intention" to use the animals for breeding purposes "at and before he made the importation."[22]

This strict interpretation greatly concerned the editors and writers at *The Breeder's Gazette*, especially James and Alvin Sanders. They argued that the distinction between the producers importing animals for breeding purposes and the person who found animals of good character and value to import and sell to farmers was a damaging and arbitrary distinction which imperiled the viability and potential value of American agriculture. They proclaimed that the court needed to consider the intent of the law—the statute provided for "the free entry of animals especially imported for breeding

[22] For decision quotes and further reading, see "United States v. One Hundred and Ninety-Six Mares," *Federal Reporter* 5 (1897): 139. Also see Benjamin Vaughan Abott, *A Digest of Reports of the United States Courts: From the Beginning of the Year 1884 to December, 1888* (New York: Diossy and Company, 1889), 239.

purposes…to encourage improvement in live stock." Despite these arguments, the middlemen were mired by inconsistencies in application, which resulted in further court cases and even the seizure of animals. But for agriculturalists attempting to transform the industry in the twentieth century, importation could not be separated from the goals of improvement. Advancements made on the farm directly depended on the gains made through the purchasing of elite, foreign stock.[23]

While access to regular shipments of livestock from Britain helped progressive breeders regularly participate in this transatlantic trade, the frequency of sales to American breeders stoked protectionist concerns among the British breeders. Despite the financial gain, British farmers worried that this trade relationship could deplete their genetic advantage over other countries and that American farmers equipped with many of their best animals undermined British competitiveness. They worried that American farmers would edge out British farmers in the sale of purebred livestock to farmers in the United States. Despite this protectionism, optimism toward this trade relationship prevailed among others. A veterinary surgeon and entrepreneur, Sir Richard Powell Cooper argued that British stock had greatly contributed to the improvement of foreign and "Colonial" animals. With the establishment of purebred farms in other countries, he admitted, British farmers' newest competitors would be their former customers. He encouraged breeders, though, and urged them to keep pushing forward toward improved stock and the demand for their great stock would continue. By maintaining a competitive

[23] "The Court Decision Governing Importations of Breeding Stock," *The Breeder's Gazette*.

advantage and advertising in foreign markets, Cooper believed, the demand for British farmers' well-bred animals would remain strong.[24]

Those who aggressively embraced this trade relationship moved to take advantage of it. The success of British livestock in the United States prompted breeders to advertise and directly appeal to potential foreign customers. The Babraham Southdown Flock of Cambridge, England, for example, shipped sheep all over the world and advertised customer success, including a winning ram at the International Exhibition at Paris in 1900.[25] By 1910, the Babraham Southdown Flock sold rams and ewes to producers in 16 different countries, including the United States, Chile, Argentina, Japan, New Zealand, and Russia.[26] Other British breeders went beyond conventional international trade and established additional farms in other countries. The Rowe Brothers raised horses in Maple Park, Illinois, and Fishguard, South Wales, and they exhibited their horses in Chicago and London. The Rowe Brothers advertised extensively at the International, detailing the benefit of their animals to American producers and of having a horse seller with established farms on both sides of the Atlantic.[27]

Breeds with different nations of origin existed in the United States as well, but cultural biases resulted in an obsession with British stock and animal husbandry practices manifested in the inclusion of only British breeds at the International. For example, a

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[24] Richard Powell Cooper, "The Export Trade in Pedigree Stock," *Live Stock Journal Almanac* (London: Vinton & Co. Ltd., 1910), 108-110; "British Sheep Farming," *Wool Markets and Sheep*, (1903); "British Sheep Farming," *Wool Markets and Sheep*, (1903).

[25] "The Babraham Southdown Flock," *Live Stock Journal Almanac* (London: Vinton & Co. Ltd., 1901), 328.

[26] "The Babraham Southdown Flock," *Live Stock Journal Almanac*, 306.

[27] *A Review of the International Live Stock Exposition*, 1913, 245.

popular sheep breed of African origin, Tunis, did not have a breed show at the International. These preferences were rooted in an emerging cross-connection between these agricultural reformers and eugenicists in the American Breeders' Association (ABA).[28] This groupthink in favor of pure genetics went beyond practical economic gain and was underpinned by eugenics philosophies.

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[28] Tunis were often referred to as broad-tailed barbary sheep in reference to their fat tails, which stored nutrients like a camel's hump. Gen. William Eaton first shipped Tunis to the United States in 1799. Eaton served as Consul for the United States in Tunis, and he received permission to ship 10 Tunis on the man of war *Sophia*. The sheep that survived the trip found a home at the farm of Judge Richard Peters near Philadelphia. Peters raised Tunis for 20 years, and their mutton drove demand for the breed in the Philadelphia area. This demand hindered the development of the breed resulting from the high rate of slaughter. Many with government affiliations used their positions to leverage the importation of Tunis for their own flocks, including Commodore Barrron of the United States Navy and Thomas Jefferson.

Flocks spread throughout the North and went to the South in Virginia, North Carolina, South Carolina, and Georgia. In the North, the Tunis became obsolete in subsequent decades because of the Merino craze. Merino's, a breed of sheep, notoriously produced high-quality fine wool, and the craze was spurred by demand for this type of wool. Following this trend when American breeders switched back to mutton breeds away from wool breeds, they replaced their flocks with British breeds. In the South, the Civil War wiped out nearly all the Tunis flocks. A surviving flock from South Carolina helped reestablish the breed in the 1890s. This flock participated at the 1893 World's Fair in Chicago. Charles Roundtree, the breed's chief promoter, purchased Tunis from this southern flock and began to rekindle the breed in the North with J.A. Gulliams. Both Roundtree and Gulliams lived in Indiana, and they started the American Tunis Sheep Breeders' Association in Fincastle, Indiana, which later moved to nearby Crawfordsville. The association worked to advance the breed and advertise the benefits of the African broad-tailed sheep in the United States.

Gulliams served as president of the association; Roundtree worked diligently to promote the breed. He spoke at the Indiana Wool Growers' Association about the benefits of Tunis. Tunis were early-maturing animals that excelled in the production of high-quality meat. The fat infused with the meat helped with marbling. In addition, to their meat attributes, Tunis birthed, milked, and raised lambs with ease, and they were highly adaptable to both cold and hot climates. Critics, those who preferred British sheep, complained that Tunis had a ruinous impact on the purity of their breeds, but Roundtree strongly disagreed. He argued that Tunis performed well on any measurable scale and that the breed improved productivity and efficiency on the farm. By 1914, the association registered 2,530 Tunis sheep. Nevertheless, Tunis did not have a place at the International; the preference for British sheep remained strong.

Charles Roundtree, "Why I Breed Tunis Sheep," *Report of the Twenty-Sixth Annual Meeting of the Indiana Wool Growers' Association* (1901): 194-196; *The Annual Register of a View of the History, Politics, and Literature, For the Year 1810*, 2nd ed. (London: Baldwin, Cradock, and Joy, 1825), 624-630; "The Tunis Sheep in America," in *Sheep: Their Breeds,*

Curtiss worked with Secretary of Agriculture James Wilson and his top assistant, Willet Hays, to provide organizational support for the investigation into the value of genetic selection in both agriculture and humans. Curtiss, Wilson, and Hays formed and served on the ABA board; Secretary Wilson was the president.[29] The ABA held annual meetings to address wide-ranging topics on genetic selection, including commercial corn breeding and the importance of Mendel's Laws on animal reproduction. The ABA also published the *American Breeders Magazine*, which later changed to *The Journal of Heredity*, to broaden the discussion on selection and share Darwinian and Mendelian principles to farmers and professional agriculturalists.

The publication urged the reproduction of desirable traits, but also the elimination of unwanted characteristics. The ABA participated in this conversation with agricultural reformers that made the use of and preference for "elite" and "pure" genetics central to modern farming.[30] Nowhere in American society did this belief in genetic selection take

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Management, and Diseases (London: Baldwin and Craddock, Praternoster-Row, 1837): 124-125; "The Tunis," *Bulletin of the United States Department of Agriculture no. 94: Domestic Breeds of Sheep* (Washington D.C.: Bureau of Animal Industry, 1914): 30-33; "A Sketch of President Guilliams and His Tunis Sheep," *Wool Markets and Sheep* XII, no. 4 (1901): 6; L.G. Connor, "A Brief History of the Sheep Industry in the United States," *American Sheep Breeder and Wool Growers* XLII, no. 9 (1922): 462-466; C.S. Plumb, *Types and Breeds of Farm Animals* (Boston: Ginn & Company, 1906): 425-428.

[29] In 1903, Wilson received a personal letter from Theodore Roosevelt concerning race suicide in Hawaii and the planting class. Roosevelt insisted that "so far as in my power lies, [Hawaii will] be kept for the small, white landowners" to prevent the planters from ruining their own race by employing "every kind of Asiatic." A condition that Roosevelt thought might cause the "extinguishment" of the "blood" of the white landowners. Theodore Roosevelt, Letter to James Wilson (1903), *The Letters of Theodore Roosevelt* (Cambridge: Harvard University Press, 1951), 416.

[30] In the first publication, the ABA featured the founding principles of the association by introducing Darwin and Mendel. Darwin's *Origin of Species* became suggested reading for farmers in many of the modern or progressive farming texts of the period. See Edward F. Adams, *The Modern Farmer in His Business Relations* (San Francisco: N.J. Stone Company, 1899);

root more firmly than in the agricultural bureaucratic networks of the federal and state governments and land-grant universities and agricultural colleges.[31]

Whether conducting research or making recommendations on plants and animals or humans, members of the ABA applied the same fundamental principles of heredity and the transmission of positive and negative traits.[32] In this way, the ABA pushed a certain

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Manly Miles, *Stock-Breeding: A Practical Treatise on the Application of the Laws of Development and Heredity to the Improvement and Breeding of Domestic Animals* (New York: D. Appleton and Company, 1889).

[31] Scholar Edwin Black argued that American political structures adopted eugenics more quickly than European counterparts. The USDA, first among governmental agencies, endorsed the "master race" ideology and hereditary selectiveness. Associations devoted to eugenics emerged to support and disseminate these ideas in the hopes of solving many of the anxieties that plagued American society. See Edwin Black, *The War Against the Weak: Eugenics and America's Campaign to Create a Master Race* (New York: Four Walls Eight Windows, 2003).

[32] Bleecker Van Wagenen, "Preliminary Report of the Committee of the Eugenics Section of the American Breeders' Association to Study and to Report on the Best Practical Means for Cutting Off the Defective Germ-Plasm in the Human Population," in *Problems in Eugenics: Papers Communicated to the First International Eugenics Congress* (London: Chas. Knight & Co., LTD., Printers, 1912): 460-479. Bleecker Van Wagenen, chairman of the Eugenics Section of the ABA, presented to the International Eugenics Congress in 1912 on the inheritance of defects, and the potential to solve "anti-social" and "defective traits" in the human population. Those in these populations, he declared, constituted a "drag on society," and they placed a handicap on "industrial and social" progress. Among the possibilities available, he advocated for sterilization, both compulsory and voluntary, to eliminate unwanted traits.

One remedy that he mentioned, other than sterilization, included compelled or voluntary segregation of targeted individuals, or at least segregation during their reproductive years. He also recommended restrictive marriage laws and education about the inheritability of negative and positive traits, improved environmental conditions, and euthanasia. To directly manage reproduction, he included polygamy among the list of solutions and artificial interference to prevent conception. Finally, Van Wagenen argued that creating systems of reproduction to "remove defective traits" could be useful. To accomplish this goal, the Eugenic Section of the ABA collected and recorded pedigrees of human populations to help provide information on proper matings. They considered this program of management an effective approach to the improvement of immigrant populations and the selection of immigrants to be admitted into the United States.

To Van Wagenen, genetic selection of course included the reproduction of desirable traits in plants, animals, and humans. But it also meant eliminating unwanted traits and behaviors through culling or sterilization. This presentation and published report urged eugenicists to consider the need for sterilization in the human population. He lauded Indiana, especially the Jeffersonville Reformatory, and California for passing laws supportive of sterilization. At the Jeffersonville Reformatory in 1907 and 1908, Dr. Sharp, a major proponent of the sterilization

set of ideas about selection to shape the preferences and practices of practical breeders, researchers, and teachers. Genetic selection tied these actors together, and they believed that they could transform human society in the same way they were reforming livestock. The ABA advocated for the elimination of unwanted traits through sterilization laws and negative eugenics, and the transmission of desirable characteristics through positive eugenics or genetic selection. In humans and animals alike, eugenicists urged the application of race purity and the avoidance of mixing or crossing races for the betterment of agriculture and society. The ABA's journal articles frequently approached issues dealing with racial purity. Leading up to the International Eugenics Congress in 1912, the *American Breeders Magazine* addressed women in politics, immigration, defects, food production, animal specialization in the production of certain commodities, and yield improvement on the farm.[33] ABA members, including those who served on the

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law, performed 125 compulsory vasectomies. Less was known about women, he argued, because of limited attempts to asexualize females, but California performed some procedures.

Sterilization, he cautioned, as a practice for improvement among the human population required patience and foresight. Most of the sterilized, he argued, would still be more or less "dependent" on society, and those "afflicted" with social misbehavior, especially sexual immorality, would continue to behave as such. However, Van Wagenen believed that society would begin to see benefits generationally as states prevent the reproduction of "unworthy progeny." When Van Wagenen made his case to the International Eugenics Congress, he likened the genetic selection or culling of human genes to the evaluation and selection of desirable livestock. To prevent undesirable male cattle and horses from reproducing breeders sterilized them to prevent the propagation of these traits.

[33]The ABA criticized the growing activism of women in politics, and in particular the impact of increased independence of women on the decreased reproduction of America's "best racial blood." Because of growing participation in the workforce and waning dependence on husbands and fathers, eugenicists worried that the people from the "best" blood would reproduce at lower rates and that the lowest classes in society would out produce them, which, to the eugenicists, inverted the notions of progress espoused by politically active women—a condition that they thought would set the nation down a trajectory of worsening blood, behavior, and malady. Instead, women of the "best" blood, the author argued, had a "racial responsibility" to reproduce—a sort of a eugenic motherhood duty. See "The Woman Movement and Eugenics," *American Breeders Magazine* 2, no. 3 (1911): 225-228.

eugenics committee within the association, participated at the International Eugenics Congress, while other Americans highly involved in technical discoveries and agricultural reform filled the ranks of attendees, including Alexander Graham Bell, Gifford Pinchot, and C.S. Davenport.[34]

Davenport, who ran the Eugenics Records Office in Cold Spring Harbor, directly influenced the quest to instill the proclivities of genetic selection in the farmers' mind. Land-grant professors looked to and often reproduced Davenport's eugenic arguments on

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To rectify this dilemma, the author urged readers to learn from plant and animal breeders and apply the lessons of modern animal husbandry. In an effort to reverse this trend, the "best" blooded people needed to reproduce at high rates, "medium" blood should reproduce but more cautiously, and people of "low" blood should not reproduce. To accomplish this, just like with pedigreed animals, eugenicists hoped to collect data on humans to determine their eugenic value. In this way, the author hoped, the ABA could encourage the development of "a race of high average sanity, health, and general efficiency." In this same issue, the magazine published articles dealing with improved wheat production and the challenges of soil fertility, the "race genetics problem," and the improvement of American corn production. The ABA made no moral distinction between animals, plants, or humans.

See "Race Genetics Problems," *American Breeders Magazine* 2, no. 3 (1911): 230-232. The "mingling of human races" troubled the eugenicists at the ABA. They argued that the political, commercial, and industrial successes of the "long-light, blond, long-skulled race" did not result from race mixing. In "Race Genetics Problems," the author sincerely argued, despite the seemingly satirical tone, that white man's own inventiveness in conquering many regions of the world facilitated the mingling of the races, which threatened their own racial purity. From this sordid point of view, the success of the "white man" was also the potential cause of his downfall.

National boundaries no longer separated the races as strictly as centuries past, the authored reminded readers, and improved transportation increased the likelihood of race mixing. To curb this problem, the eugenicists clamored for further research and investigation into the deleterious impact of the "mingling" of races and the benefits afforded society by "the superiority of pure racial stocks." This article developed a human hierarchy—assumed an inherent superiority of the "aryo-german" people and correlated racial purity within "aryo-germans" with the advancement of civilization on the American continent. The ABA eugenicists wanted to determine beneficial or dominant positive traits and the undesirable traits of all races. In this vein, the call for research into race benefits reflected, in many ways, the goals of purebred livestock.

[34] Alexander Graham Bell, in addition to being a famous inventor, was also a sheep breeder. He investigated the genetic transmission of certain traits, like the number of nipples on sheep and deafness in humans. Gifford Pinchot served as the first Chief Forester of the United States Forest Service, and he was considered by many as the "father" of American conservation. After many failed electoral bids to political office, Pinchot successfully ran for governor in Pennsylvania in 1922.

the domestication of animals, especially his writing on the "complex nature of heredity." In *A Study of Farm Animals*, for example, Charles S. Plumb, professor of animal husbandry at Ohio State University, cited Davenport's work on the domestication of animals. In particular, he provided fundamental explanations about the transmission of genetic traits to offspring from parents, which helped university researchers explain that genetic makeup was not random. But he insisted that animal genotype was not as simple as just combining the traits of both parents. Davenport wrote that progeny "for the most part…is not like either one of [the parents], nor is he like the combined." In fact, he wrote, "[t]he most that can be said is that the offspring *resembles* his parents, and that all his characters are to be found somewhere in his parentage," as livestock inherited characteristics from parents, grandparents, and even more distant generations.[35] With the movement insisting that improvement required farmers to manage the "persistence of heredity" in domesticated animals, progressive breeders applied these understandings of genetic transmission.[36]

Knowing the importance of heredity, however, did not oblige farmers to be prisoners of it. Instead, breeders could shape the formation of family genetics to direct or control the bodies of animals.[37] To engage in progressive genetic selection, breeders

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[35] C.S. Plumb, *A Study of Farm Animals* (St. Paul, Minnesota: The Webb Publishing Company, 1922), 21-47. For more information, see Miles, *Stock-Breeding*; F.R. Marshall, *Breeding Farm Animals* (Chicago: The Breeder's Gazette, 1912). Davenport devoted much of his work and publications to heredity, genetics, and eugenics; see C.S Davenport, *Heredity in Relation to Eugenics* (New York: Henry Holt and Company, 1911).

[36] Ibid.

[37] Shaping or directing the genetic outcome and physiological shape of offspring linked agricultural reformers. At ABA meetings, Davenport contributed to this discussion on animal husbandry and referenced it in his work as an example of what was possible for the eugenics movement. Davenport's popular book *Heredity in Relation to Eugenics* outlined the general

navigated the ancestral tendencies of mating pairs to increase the transmission of positive traits and to eliminate negative qualities, including narrowing the likelihood of atavistic reversion or a predisposition for disease. Farmers adopted many practices to create food-producing animals that uniformly propagated certain body types.[38] The inheritability of certain traits from known ancestry led reformers to strongly prefer purebred animals. The uniformity of British-based Herefords, for example, resulted from over a century of ancestral "purity"—a family relationship that established unchanging type and character.[39]

British-based breeds provided the answer to the scrub problem. Animal husbandry experts revered the British tradition—a tradition that they agreed began with Robert Bakewell. The ABA selected visionaries to honor in the *American Breeders Magazine*, including Charles Darwin and Gregor Mendel. The magazine featured Bakewell as well in its first volume. His influence as an "originator" of scientific breeding and "creative" animal selection made him a legend among members of the ABA, including Secretary

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principles of heredity and the elimination of human problems. For example, Davenport argued that immigrants should be selected based on blood: "In other words, immigrants are desirable who are of 'good blood'; undesirable who are of 'bad blood.'" He proposed a multitude of possible approaches to determine this good versus bad immigration policy, including the collecting of genetic information and the use of American agents to scout for immigrants in Europe. However, he also argued that eugenicists could learn from crop and animal farmers in the positive breeding or pairing of mates to increase the likelihood of breeding better species instead of simply eliminating unwanted traits. Plant and animal breeders, he determined, had improved the quality of their products by breeding toward vigor and productivity. Davenport wanted the same for humans. He wrote, "proper matings are the greatest means of permanently improving the human race—of saving it from imbecility, poverty, disease, and immorality."

[38] Plumb, *A Study of Farm Animals.*

[39] "The Gospel of Improvement," *Chicago Livestock World* XII, no. 108 (1911): 2; T.F.B. Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association* (Denver: The Smith-Brooks Printing Company, 1900): 343-348.

Wilson and Curtiss. These reformers appreciated Bakewell's emphasis on increased productivity.[40]

Many breeders in Bakewell's time bred animals for size alone, but he rejected big animals as a meat type. He closely studied his animals' forms and proportions, which helped him maximize important carcass parts associated with quality flesh, like muscularity in the loin and rump. These priorities redirected Bakewell's livestock away from the big structural frames that his contemporaries raised, and instead he created early-maturing animals of uniform market design. Bakewell's insistence that physiological and aesthetic traits, such as color pattern, were inheritable and could be controlled by the breeder also ran counter to many of his contemporaries. Bakewell maintained that carcass and visual qualities could be passed down to offspring with increased certainty by limiting the number of genetic possibilities through controlled breeding. Although in an infant state, this developing notion of Bakewell's became the foundation for pedigreed animals through the identification and close breeding of like animals, a sort of race of similar cattle or sheep.[41] Bakewell's controlled breeding to create a specific type or breed of animal persuaded breeders throughout the nineteenth and early twentieth century—a conviction that was reflected in the familiar maxim "like begets like."[42]

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[40] "Robert Bakewell," *American Breeders Magazine* 1, no. 3 (1910): 160-162; "Charles Robert Darwin," *American Breeders Magazine* 1, no. 1 (1910): 9-10; "Gregor Johann Mendel," *American Breeders Magazine* 1, no. 1 (1910): 10-13.

[41] Ritvo, *Animal Estate*, 68. Also see Russell, *Like engend'ring like: Heredity and animal breeding in modern England* (New York: Cambridge University Press, 1986).

[42] Miles, *Stock-Breeding*, 2-10. The desire for noble or "pure" breeding encouraged the institutionalization of British breed societies and the correlated recording of animal ancestry. These breeders also draped their self-interest, primarily based on ego, in patriotic propaganda.

Thus, progressive breeding resulted from choices regarding both genotype and phenotype.[43] The responsibility of improvement required the farmer to advance or "breed up" livestock. Producers fell into two groups: "constructive" and "destructive." The word choice to describe breeders was telling and unveiled the societal value this movement placed on genetic choices. Destructive breeders weighted down agricultural improvement and, by extension, the advancement of society. By not applying the progressive breeding findings—a pseudo-science rooted in eugenics—emanating from land-grant colleges, these farmers failed in their responsibilities to enhance farm fertility and meet the demands of the market, which ultimately undermined farm revenue and exasperated the rural problem. Nineteenth-century range producers, for example, fell into this category. They only intervened in genetic selection as much as they used castration, which required them to identify worthy males and remove or cull inferior stock. Of course, castration helped calm behavior making them easier to handle and transport, and it quickened the process of finishing. Outside of castration, Longhorns populated the range without rancher control.[44]

Purebred breeders argued that their associations' devotion to agricultural improvement fortified the status and power of Britain; however, the show ring created a major gulf between the practicality of commercial breeding and the excesses of show animals. The show ring itself conflated the language of service with the reality of pride.

[43] Charles S. Plumb, ed., "Plumb, Charles, S.," *A Biographical Directory of American Agricultural Scientists* (Geneva, NY: Press of W.F. Humphrey, 1889), MSF 312, Folder 2, Charles Sumner Plumb Papers, Purdue University Archives and Special Collections, West Lafayette, IN (henceforth CSPP, Purdue); "Charles Sumner Plumb," *The American Society of Animal Production*: 475, MSF 312, Folder 6, CSPP, Purdue.

Also see Charles S. Plumb, "The Care of Domestic Animals," *no. 4 Leaflet: On Nature Study*: 1-6, MSF 312, Folder 4, CSPP, Purdue.

[44] Ibid; Terry Jordan, *North American Cattle-Ranching Frontiers*: *Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993).

The constructive breeder, on the other hand, utilized the "right type" to uplift his herd, as opposed to the "pernicious" and "depressing" impact of inferior stock. In this regard, "improved" animal husbandry was laden with meaning about genetic selection and the generational advancement of stock.[45] The effects of either constructive or destructive breeding were not confined to an individual farm. For those in the livestock improvement movement, the advantages of "breeding up" or the disadvantages of scrub breeding improved or reduced, respectively, the productivity and well-being of society. The use of either inferior or superior livestock "rippled" out into the broader agricultural community like a "stone thrown in the water, radiating out in still wider and wider circles." Consequently, producers had the responsibility to assist reform efforts by improving breeding on their own farm. And, to do this, these "better" or constructive

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[45] C.S. Plumb, "The Function of the Constructive Breeder of Registered Live Stock," *The American Breeder* IX, no. 7 (1915): 11. Plumb urged farmers to buy or raise the "right type" of females, and also to select males to correct deficiencies. An improved male had a larger net impact on the farm since he, genetically, represented half of the herd or flock; each crop of offspring carried within it half of their genetics from the male. Thus, major improvements or corrections in body type or genetic makeup could be made through the selection and use of a well-bred male even if that individual animal came at a greater cost to the farmer. The investment made in a single great male injected value into the entire herd or flock, which resulted in a net gain for the producer.

Plumb urged producers to avoid a minimalist or cheap strategy, and he likened the buying of cheap, inferior animals to speculation, which burdened farmers with risk and threatened their farm's general productivity and potential profitability. However, one type of animal, for Plumb, did not suit all production systems. Thus, "improved" animals did not all look alike or come from the same purebred heritage. Instead, Plumb urged farmers to identify the type of surplus products they would like to produce to sell on the market for a profit, whether meat, milk, fiber, power, or speed—power and speed related to horses. But once a producer, for example in cattle, decided between milk and meat, then that farmer, Plumb wrote, needed to identify and select animals with body types and genetics suited for the specific production of that commodity. In this way, Plumb urged producers to adopt specialized production not just on their farms, but also in the physiological and genetic makeup of their livestock. The specialization of animal type correlated with increased productivity, efficiency, and quality of product, and for Plumb, these were the central elements of constructive breeding.

breeders were obliged to thoroughly analyze the genetic history of livestock families with a keen eye toward the genotypes. Then, farmers should mate animals within those families to ensure that they combines "harmonious rather than antagonistic qualities."[46]

S.E. Morton & Co. was a well-known constructive porcine farm in Ohio, and in 1900, it exhibited the first International champion Duroc-Jersey boar: Ohio Chief.[47] H.E. Browning of *The Swine World* wrote a retrospective in 1917 on this early period of Duroc-Jersey breeding and lauded the transgenerational impact Ohio Chief had on the breed. Browning heralded Ohio Chief's owners for being preeminent "progressive breeders." S.E. Morton & Co. bred the boar Protection with a high-quality sow, Duchess 40th, resulting in a litter that included Ohio Chief. After winning the International, the owners returned to their farm to test his ability to pass on these elite genetics and physiological traits to his "get" (offspring). He quickly proved his "prepotency;" in 1904, S.E. Morton & Co. fielded their show herd with get from Ohio Chief. At the St. Louis World's Fair in 1904, for example, nearly all of the animals they showed came from him, and Ohio Chief himself won again. He took home the top award for a boar his age. Because of Ohio Chief and his gets' success at the Louisiana Purchase Exposition, S.E. Morton & Co. won the Premier Champion Breeder's Prize, which the organizers of the hog show gave to the top breeder.[48]

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[46] Plumb, "The Function of the Constructive Breeder of Registered Live Stock," *The American Breeder*.

[47] *Review of the First International Live Stock Exposition*, 1900.

[48] H.E. Browning, "A Short History of Ohio Chief 8727A," *The Swine World* 4, no. 12 (1917): 23. To examine the broader influence of Ohio Chief on the breed, see Robert J. Evans, *History of the Duroc* (James J. Doty Publishing CO., 1918). Evans founded the *Duroc Bulletin* and served as the secretary of the National Duroc Jersey Record Association and the American Swine Breeders' Association. For a discussion on the central role of the International and the

Ohio Chief became a cornerstone in Duroc-Jersey pedigrees, and impacted the breed for nearly two decades. Following his success in 1904, his Ohio owners sold him to a group of Iowa breeders who formed a company for the expressed purpose of purchasing Ohio Chief. R.J. Harding, O.S. Osborn, and a silent partner purchased the prize boar for $2,000 and shipped him to Iowa to breed to their sows. His impact was immediate, and the revenue generated from his offspring broke nearly all records at pig sales. However, the partnership soon failed, and the company closed. Two of the owners, Harding and Osborn, repurchased Ohio Chief for $6,000, while every boar sired by Ohio Chief brought at least $100 at auction. The demand for his genetics and his importance to the breed went unsurpassed, according to Browning. A long line of highly-sought-after and influential boars sired by Ohio Chief saturated the pedigrees of top Duroc-Jersey herds for years to come, a reign that began in 1900 at the Chicago International.[49]

In the end, whether through mating choices or the elimination of unwanted stock, effective genetic selection amounted to control for farmers over the genetic and physiological make-up of livestock. By attempting to transform meat-producing animals, twentieth-century agriculturalists worked to fulfill Bakewell's goal to make machines of

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goals of progressive agriculturalists, or "breeding up," in the hog industry, see "The International Swine Show," *The Swine World* 1, no. 10 (1913): 3. The author, frustrated with poorly bred hogs, complained about the ineffectiveness of state fairs in encouraging the use of purebred stock. Conversely, the International deserved positive reviews for normalizing the use of improved genetics, the author wrote; the International held breeders to high standards, and judges did not use superlatives to describe mediocre animals like at state fairs. The International, instead, institutionalized the importance of "prepotency" in sires and dams, like Ohio Chief, and the necessity of recording pedigrees.

[49] Browning, "A Short History of Ohio Chief 8727A," *The Swine World*. In the *History of the Duroc*, the author exclaimed that wherever the Duroc existed in the United States, the name Ohio Chief and the names of his progeny became widely recognized.

animals—machines that converted "vegetable products of the farm into animal products of greater value."[50] Purebred animals not only maintained a status of their own; they also carried in their bodies iterations of biological technology. Pedigreed stock allowed breeders to manufacture their desired product, by controlling potential undesirable outcomes—a process necessary for the creation or engineering of the ideal animal. Essentially, breeders treated their animals like engineered machines or duplications of technology. Rumor had it, for example, that Bakewell infected animals past their prime with parasites to prevent their genetics from being utilized by other producers—an infection that amounted to a grotesque form of intellectual property protection.[51]

Breeding Practices

Agriculturalists looked to Bakewell for practical breeding techniques to better understand the development of purebred livestock and uniformity within breeds. Inbreeding and linebreeding became common tactics to improve genetic similarity in a herd. Through inbreeding, standardizing improved qualities became possible by limiting

[50] Miles, *Stock-Breeding*, 2-10. Also see Thomas Shaw, *Animal Breeding* (New York: Orange Judd Company, 1901). Shaw, expert in animal husbandry at the University of Minnesota, argued that livestock should be regarded as "machines for manufacturing agricultural products into forms more concentrated and possessed of a higher value." Making machines out of livestock geared toward surplus production led, Shaw argued, to greater profits for the farmer. But surplus agriculture required farmers to select livestock breeds that specialized in the production of a single commodity and mate their animals toward the goals of efficiency responsive to market demands.

[51] Ritvo, *The Animal Estate*, 68; Russell, *Like engend'ring like*. For more, see Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association*. Sotham argued that purity in Hereford cattle fueled this breed's potency in reproduction. He ensured that farmers who used Hereford blood could count on uniformity and quality. As a result, Sotham likened Hereford genetics to a trademark, and the visual indicator of these "hall mark" traits were the animals' whitefaces.

potential outcomes in offspring, which also created a sense of superiority in the breed. Consistency resulted from a statistical advantage of strong traits by eliminating the diversity of competing traits. This technique required farmers to mate pedigreed stock closely with relatives—hoping to narrow the genetic pool. In doing so, British farmers like Shorthorn-breeder Thomas Bates rejected old traditions of "crossbreeding every now and then" to inject new life or traits into a herd, which helped avoid the weaknesses intensified by inbreeding.[52] In 1915, *The Journal of Heredity* featured Bates' careful evaluation and breeding of Shorthorns at the beginning of the nineteenth century. Like Bakewell, his successes in specialized breeding and genetic selection made him a transnational and transgenerational icon. In this reflection on the development of the Shorthorn breed, his livestock too garnered attention for being the foundational herd among Milking Shorthorns.[53] Bates focused on the production of heavy-milking cattle and developed a closely-bred family of Shorthorns. To create this strong family of cattle,

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[52] Farmers used inbreeding to improve the consistency and status of offspring; however, aside some of the ethical objections, breeders also observed a negative impact on outcomes. To mention a few consequences, breeders noticed lethargy, the exasperation of weakness, and low rates of fertility and vigor, which impacted the overall health of the animals on the farm.

For further information, see Nicholas Russell, *Like engend'ring like*. Russell notes that not only did high rates of inbreeding cause depressed results in on-the-farm performance, but it also was deceptive. Sometimes it created a perception of quality in pedigreed stock where it did not exist. Other systems of breeding both incorporated pedigreed stock and outcrossed animals to avoid genetic depression. Russell noted two approaches that avoided excessive inbreeding. Hybrid stock breeding involved the selection of two different purebred animals and mating them to try to combine the positive attributes of two purebreds and avoid the weaknesses involved with close breeding. This combination of purebred animals, in a systematic way, has provided the means to create wholly new breeds of livestock in the United States. Second, through the "grading up" system, producers imported purebred stock to inject life and vigor into existing regions or areas that needed outcross genetics. By this process, a local breed can be, over generations, turned into a "foreign" breed by the continual genetic modification of local stock.

[53] Orren Lloyd-Jones, "What is a Breed?," *The Journal of Heredity* VI, no. 12 (1915): 531-537.

Bates shunned introducing "mongrel vigor" into his elite cattle, which ruined ancestral purity. By pursuing inbreeding among pedigreed stock, these British breeders created animals, they believed, of both superior quality and more predictable outcomes; crossing their stock with other animals seemed speculative and dangerous. Inferior animals introduced too many potential outcomes in their genetic pool. Consequently, purity in genetic composition amounted to status, to be sure, but also control.[54]

Bates closely bred relatives to perpetuate desirable characteristics from a common ancestor, which created varieties of livestock that had similar production qualities and aesthetic markers. Different types of inbreeding occurred among famed breeders. Inbreeding included mating brother to sister, father to daughter, and mother to son. For F.R. Marshall, professor of animal husbandry at Ohio State University and official judge at the International, these matings were dangerous and undesirable.[55] He provided one of

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[54] Ritvo, *The Animal Estate*, 60-68. For examples in Hereford breeding, see Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association*; Duncan Marshall, "A Study in Scotch Pedigree," *The Shorthorn World and Farm Magazine* 3, no. 22 (1919): 4-8, 68-71; "The Gospel of Improvement," *Chicago Livestock World*.

[55] For more discussion on the negative consequences of inbreeding, see H. Kraemer, "Effects of Inbreeding," *The Journal of Heredity* V, no. 5 (1914): 226-234. Kraemer, a German academic, published this article as a resounding rejection of inbreeding practices. As opposed to the popular belief among American agriculturalists, he insisted that breeders should reject the notion of the "harmlessness" of inbreeding; furthermore, he remarked, inbreeding "injuriously" affected the health and productivity of farm animals. Kraemer cited many studies, including the work of Darwin, to navigate the complexities of inbreeding and the potential ill brought to the health of animals. He quoted Darwin's investigation into the difficulty of measuring whether or not inbreeding was problematic. In a lengthy evaluation of the literature, Kraemer capably demonstrated that another issue needed consideration, per Darwin; inbreeding two bad parents or parents with undesirable traits would intensify and make more likely the emergence of harmful traits. To be sure, by this logic, inbreeding increased the problem, but inbreeding was not the problem.

Kraemer reflected on Darwin's observations of Shorthorn inbreeding. Darwin looked closely at Bates' work and quoted him, "to breed in-and-in from bad stock was ruin and devastation; yet the practice may safely be followed within certain limits when the parents so

only a few dissenting opinions on these practices. Marshall's expertise on purebred animals and breeding elevated his status at the International and among bureaucratic officials. For example, the USDA sent him to New Zealand and Australia on a mission to evaluate livestock types and import "promising breeds of sheep" useful to American breeding stock. Marshall facilitated the importation of the first Corriedale sheep to the United States in 1914.[56] Given his experiences with purebred animals and the examination of breeding outcomes, Marshall warned breeders of the defects and weaknesses created by limited genetic diversity in purebred animals. Interestingly, his opposition originated from the human example, and he cited the Bible and state laws that forbade cousins from mating. But he also referenced observable defects that arose from inbreeding livestock—problems that manifested from inbreeding included barrenness, predisposition to disease, and weak constitution or physical strength.[57]

For many purebred breeders, however, the risk of outcrossing animals outweighed the repercussions of inbreeding. To escape these risks, breeders avoided the close matings

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related are descended from first-rate animals." As a result, Kraemer debated whether inbreeding was bad on its own terms or if inbreeding from inferior stock intensified undesirable traits. In the case of the latter, solving the problem required farmers to better identify and evaluate superior animals, but not abandon inbreeding. However, Kraemer resolved that the problem, despite the objections of many progressive breeders, was inbreeding itself. Kraemer contended that the best studies led to one conclusion: "Continued inbreeding always must result in weakened constitution, through its own influence." Despite his unwavering rejection of inbreeding or close breeding as an effective method, he conveyed to the readers that all improved breeds developed from intensive linebreeding; and students of improved agriculture, despite his rejection of inbreeding as a healthy mating practice, would be ill-informed if they did not understand the developmental influence of close breeding in the creation and standardization of prominent breeds of livestock.

[56] C.S. Plumb, *Types and Breeds of Farm Animals*, revised ed. (Boston: The Athenaeum Press, 1920), 657-659.

[57] Marshall, *Breeding Farm Animals*; Miles, *Stock-Breeding*, 138-140.

of brother and sister, or parent and offspring, and opted for half-brother and half-sister. Typically, the half that the matings shared came from a famed stud sire or dam. Thus, farmers could still breed animals closely enough to improve uniformity. Marshall noted, despite his reservations, progressive breeders worried that outcrossing was precarious in nature. These breeders likened outcrossing to speculation as a result of the dilution or dissipation of genetics from strong heritage. With each passing generation, as the offspring became more removed from famed ancestors, breeders thought that the animals' quality and purity regressed. For these producers, Marshall wrote, "the paramount question is not how much inbreeding is safe, but rather, how much outbreeding can be permitted?"[58]

Inbreeding, linebreeding, and close breeding helped farmers intensify traits through selection and mating decisions; however, to purge unwanted traits, agriculturalists also recommended negative selection practices. In the same way agriculturalists wanted to exterminate the scrub animals from American farms on the macro level, on each individual farm the progressive breeder bore the responsibility of eliminating animals, even purebred livestock, with unwanted features. As a result, professors called for "severe culling" of undesirable livestock.[59] Improvement obliged breeders to sterilize and remove males and females from the farm that possessed inferior bodies to prevent the proliferation of those traits.

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[58] Marshall, *Breeding Farm Animals*, 185. For a broader conversation on close breeding, see Marshall's chapter "Inbreeding and Line Breeding," in *Breeding Farm Animals*; Miles, "In-and-In Breeding," in *Stock-Breeding*.

[59] Plumb, *A Study of Farm Animals*, 21-47.

Sometimes, however, unwanted traits incidentally surfaced in offspring; often atavistic traits emerged in descendants from foundational ancestors that had been deceased for decades. Atavism, Marshall explained, occurred unexpectedly from the unlikely chance that a dormant or recessive trait surfaced in offspring. For example, the mating of two black Aberdeen-Angus cattle could a red calf. And, in subsequent matings of the two parents, all the calves birthed could be black. But in the one hypothetical mating, a dormant trait emerged in the offspring. Even though an improbable occurrence, reformers urged breeders to eliminate such offspring because keeping and breeding animals with unwanted, atavistic traits increased the likelihood of them resurfacing in subsequent matings.[60]

Thus, to manufacture better livestock, agriculturalists encouraged farmers to study the (1) individual merit, (2) value of offspring of each animal, and (3) genetic information or ancestry. Marshall called these three components of improvement the "triple test." To help breeders, Marshall supplied his own scorecard for evaluating matings and the performance of genetic pairings. Of course, the individual merit of an animal mattered and the International established the relative value of observable animal traits, having become the standard for breeders and universities throughout the United States. In print or in conversation, referring to the International or simply Chicago elicited a level of respect related to livestock performance that no other show or American city provided.

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[60] Marshall, *Breeding Farm Animals*, 73-78, 188-208. Not all unlikely, atavistic, or even mutated traits possessed a negative value. Many purebred animals created new breeds, including the Polled Durham. This breed came from a mutation in Shorthorns that eventually eliminated the horn. By mating those unusual traits with animals with similar inclinations, breeders changed animal types, aesthetics, or even purpose over time.

Universities and breeders advertised the performance of their individual animals by updating their contemporaries about their successes in Chicago.

The University of California's agricultural journal, for example, printed a spotlight section depicting the various accolades and accomplishments of the school's animals at the International, which served as a national measuring stick for the university's agricultural program. In 1916, California Favorite, the school's prize steer, won the highest honor among cattle. The university only showed him one other time—at the California State Fair—but all great animals went to Chicago for final evaluation and so too did California Favorite.[61] As the national barometer of well-bred animals, the International provided the standard for the industry. "The International" and "Chicago" were words and ideas that became synonymous with the highest individual merit among meat-producing livestock.

After individual quality, Marshall argued that the second test for selection shifted the farmer's attention to the uniformity and productivity of offspring, which offered keen insights into the ability of the sire and dam's genetic line to pass on traits. Marshall weighted "uniformly siring good stock" highly on the list of desirable qualities for parentage. An animal "[was] equally indebted" to each parent for its genetic makeup, and thus, he advised farmers to give "greater value…to the pedigree of an animal whose sire and dam are both proved to have produced offspring of merit." Accordingly, Marshall

[61] "Spotlight Stars of the University of California," *The University of California Journal of Agriculture* IV, no. V (1917): 160-161.

warned producers to conservatively use sires or dams with few offspring to guard against the high use of unproven livestock.[62]

Constructive animal husbandry required farmers to strike a balance between individual merit and the proof of quality offspring. At times, Marshall noted, the best producing animals on a farm often lacked the aesthetic appeal of the show animal, but when farmers determine the parental productivity of a sire or dam, they should weight those characteristics highly. Marshall nevertheless advised breeders to find like parents to ensure advancement in physiological type and uniformity. And for the third test, improved breeders studied ancestors beyond the parents of any individual animal. When breeding, farmers not only needed to collect information, but they also had to know the genetic impact of third, fourth, and fifth generation ancestors. Distant ancestors also, he cautioned, combined traits with other distant ancestors for the creation of offspring.[63]

Despite the bias that considered British purebred inherently superior, these agriculturalists did not consider purebreds permanent or fixed beings. In this particular case, they were able to consider purebreds both as ancestrally pure and as objects under construction. The triple test urged producers to consider the value of offspring, or progeny testing, and individual merit when making mating decisions. Combined with this information, constructive breeders utilized inbreeding and close-breeding to shape livestock genotype and phenotype by narrowing the statistical variations of mating pairs.

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[62] Marshall, *Breeding Farm Animals*.
[63] Marshall, *Breeding Farm Animals*.

Purebreds, in other words, were the building blocks of the ideal animal, not established perfect animals ready for agricultural use.[64]

Purebred Associations

When the Union Stockyards built the Purebred Livestock Record Building in 1902, the meatpackers formalized their institutional and administrative support of the International's central goals. The breed associations that represented the different purebred animal varieties provided the rules and regulations for breed shows; these associations governed their individual breeds and provided the requisite guarantees of authenticity, purity, and uniformity in their livestock.[65] By offering pedigreed proof and verifiable certification of farm animals, the breed societies worked as an essential cog in the reform movement. The organizations legitimized the animals shown and reproduced under this version of animal husbandry.

To provide the administrative framework for a registry, the breeders first worked together to create a board and a membership with other farmers who raised the same

[64] For a different interpretation of how these reformers viewed purebred livestock, see Gabriel Rosenberg, "The Trial of the Scrub Sire, Or How to Use Biopolitics in Environmental History," *Colloquium*, University of Pittsburg Humanities Center, http://www.humcenter.pitt.edu/sites/default/files/Trial%20of%20Scrub%20Sire%20for%20Colloq.pdf. Although Rosenberg rightly states that livestock reformers, many of whom were eugenicists, were attached to "antiquated racial logics," they did not, as he claims, see purebreds as fixed or permanent. In fact, these reformers unambiguously set out to reorient animals' bodies, including purebreds, to increase agricultural output—a rational, efficiency-driven goal. In this regard, they created separate, but complementary categories, that differentiated genotypes and phenotypes. These reformers considered animal phenotype to be more than aesthetic traits, like color, and focused on actual body formations that correlated to market value.

[65] "Pure Bred Sheep," *Wool Markets and Sheep* 5, no. 10 (1900): 16; Marshall, "A Study in Scotch Pedigree," *The Shorthorn World and Farm Magazine*.

breed. Each breed association, then, wrote either a constitution or a set of by-laws to govern interactions, establish goals, and institute a system of record-keeping. The American Aberdeen-Angus Breeders' Association, for example, published a herd book every year to establish a record of each registered animal in the breed and advertise the staff's administrative duties. In the organization's constitution, the board of directors clearly identified the role of the breed association. The association collected memberships—a farmer qualified after being nominated by at least three existing members and verified to be a reliable breeder of Angus cattle. The constitution explicitly defined the proceedings of annual meetings, the protocol for the election of directors and officers, the duties of the officers, and the function of the association's treasury for the management and promotion of the breed.[66]

Attached to the constitution was a set of by-laws outlining the function of the association. The registry collected and published the number or identification, sex, name, date of birth, breeder and owner, sire and dam, and color markings of each animal.[67]

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[66] Thos. McFarlane, *The American Aberdeen-Angus Herd-Book* (Davenport, Iowa: Egbert, Fidlar, & Chambers, Printers, 1902). Also see Marshall, *Breeding Farm Animals*. Marshall argued that associations promoted "uniformity in the objects of the breeders" by distributing standards among the membership. Also, organizations maintained a membership, and they promoted the breed. Most organizations relied on membership for funding. Members received benefits of reduced rates when registering animals and sometimes in transferring ownership of stock. For more on breed associations' duties and responsibilities, see "Transfer of Pedigree," *Wallaces' Farmer* XXXV, no. 18 (1910): 2; "Question of Pedigree," *Wallaces' Farmer* XXX, no. 26 (1905): 831; "Value of Pedigree to the Stockman," *Wallaces' Farmer* XXVII, no. 49 (1902): 1608; "Selling Pedigreed Stock," *Wallaces' Farmer* XXXIII, no. 10 (1908): 5; "Pedigrees of Live Stock," *Wallaces' Farmer* XXVI, no. 27 (1901): 836; "Registry and Transfer Fees," *Wallaces' Farmer* 42, no. 9 (1917): 9; J.W.C., "The Value of Pedigree," *Prairie Farmer* LXXII, no. 46 (1900): 3; "High Prices for Pedigree Stock," *Prairie Farmer* LXX, no. 46 (1898): 8; "Becoming a Breeder of Pure-Bred Stock," *Prairie Farmer* LXXIII, no. 25 (1901): 7.

[67] Ibid.

Thus, the association served a documenting role. For each animal born of purebred parentage from the same breed, the owner, often a member of the association, sent documentation to the breed registry to obtain a certificate. This certification process established the "purity" of the breeds—the central function of breed associations. These "certificate[s] of purity" were fundamental to establishing, propagating, and expanding purebred animal husbandry.[68] The birth and parental information that each animal's certificate contained validated the entire effort by creating a record of ancestry.[69]

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[68] C.S. Plumb, "Purebred Live Stock Associations and Their Methods: Methods of Registering Live Stock," (1907), Vol. IV, CSPP. Also see Marshall, *Breeding Farm Animals*. Marshall argued that promotion was a central responsibility of a well-functioning breed association. Promotion came in different forms; many breed societies advertised for the breeders to encourage the sale of their animals over competing breeds. Also, associations utilized livestock expositions to feature the preeminence of their breed and provided money for prizes and premiums to stimulate interest in raising and showing the breed. Marshall argued that large sums of money devoted to premiums increased the credibility of an association and attracted the attention of the public, which served to educate them on the accomplishments and the value of their "superior stock."

[69] Ibid. In *Breeding Farm Animals*, Marshall relayed the central importance of breed registries in eliminating uncertainty in the market place and advancing the cause of purebred husbandry. Marshall commended the development of the breed registries over the previous century, starting in England, for removing doubt about the ancestral integrity of livestock. Thus, buyers and judges no longer relied on verbal confirmation of purity, but instead breeders offered certified proof in the form of a pedigree. For the importation of livestock from the United Kingdom, farmers needed proper certification to avoid paying a tariff. The United States exempted the importation of purebred livestock for breeding purposes. The animal, however, needed to be recognized by a proper registry, have a registration paper and a pedigree, and fall into the recognized categories of purebred animals provided by the United States government.

Even in domestic trade, this proof, for Marshall, served a lubricating function by eliminating "confusion and intentional or unintentional misrepresentation," which helped stimulate purebred sales. Plumb agreed with this evaluation, and he expanded on the benefits of these papers. Not only did certified papers help this process, Plumb argued that the ability to trace ownership and verify livestock purity after the sale, exchange, or breeding of an animal created conditions for amplified use of purebred stock. Most registration papers had a section on the backside allowing for information related to the sale, which needed to be recorded by the registry for the successful transfer of ownership whether sold privately or at a public auction. Also, if a female was pregnant at the time of sale, the breeder of the female was required to formerly document the mating for the proper registration of the offspring under new ownership. See C.S. Plumb, "Purebred Live Stock Associations and Their Methods: The Transfer of Purebred Stock," (1907), Vol. IV, CSPP.

The structure of the International itself normalized purebred thinking and required the work and guidelines of the breed societies. Within each breed, like Shorthorns in cattle, Cheviots in sheep, or Yorkshires in pigs, breed managers at the International divided classes based on sex and age.[70] The format for competition at the International relied on assurances from the associations that these animals authentically represented their breeds. Documenting ancestry was essential to the important work of studying heredity by both breeders and progressive agriculturalists. The pedigree charts created by the registry allowed farmers to recall the sires, dams, grand sires, and grand dams of the animals they owned, which informed mating decisions. On the charts, the publishers placed the identification and name of the sire on the top line and the dam on the bottom line. Figure 8 illustrated the ancestry of Alice, a Poland-China sow. Victoria M was the sire of Alice's sire, and when read correctly, Duchess H was the dam of Alice's dam.

[70] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1918). The cattle department hosted breed shows for Shorthorns, Aberdeen-Angus, Herefords, Red Polls, Galloways, and Polled Durhams. The sheep department included shows for Shropshires, Hampshires, Oxfords, Lincolns, Cotswolds, Dorsets, Southdowns, Cheviots, Leicesters, and Rambouillets. The swine department offered purebred representation to Berkshires, Poland-Chinas, Duroc-Jerseys, Chester Whites, Hampshires, Yorkshires, and Tamworths.

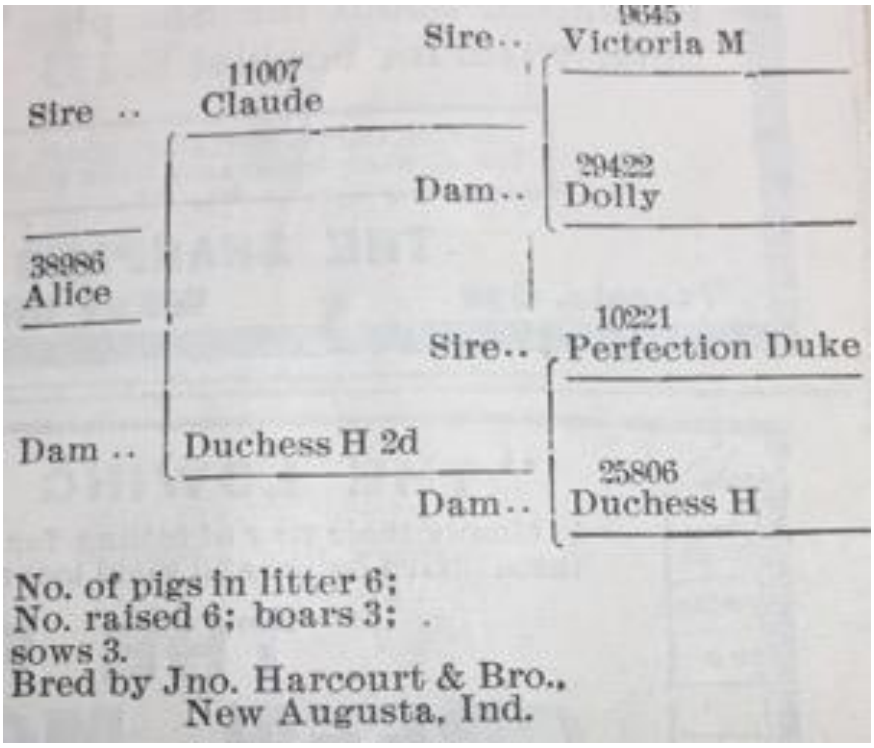

FIGURE 8. Alice's pedigree from the Central Poland-China Record. *Source*: C.S. Plumb, "Purebred Live Stock Associations and Their Methods: The Herd, Flock and Stud Book," (1907), CSPP.

Many of the associations also included known data on the individual animals to give farmers a sense of potential productivity. Duchess H 2d, Alice's dam, farrowed (birthed) a litter of six piglets, split evenly between boars and sows—three boars and three sows—and she raised all six piglets. For farmers, good sized litters with good mothering ability to raise live offspring correlated with maternal strength in genetics, and thus, a trait worthy of reproduction. This valuable information helped farmers make informed decisions—a fundamental service provided by breed associations.[71]

[71] C.S. Plumb, "Purebred Live Stock Associations and Their Methods: The Herd, Flock and Stud Book," (1907), Vol. IV, CSPP. For additional information on the importance of pedigrees, animal name, and identification, see Marshall, *Breeding Farm Animals*. Marshall meticulously described the significance of animal name to track ancestry. Like human surnames, he argued, well-bred animals required names associated with their lineage to indicate both purity

Breed associations linked genetic purity to physiological uniformity and created guidelines for the approximate body size and aesthetic markers of each animal. The board of directors of the American Cheviot Sheep Society created a rubric to manage and assist the association's goals of breed homogeneity. The Cheviot scorecard helped farmers develop weighted preferences and priorities in breeding. On a 100-point scale, the association placed the most value, 40 points, on "Constitution and Quality." This section indicated the ideal type of Cheviot, which included a broad back, full thigh, deep chest, full flank with skin soft and pink in color, and "prominent eyes, but mild, with healthful countenance." Cheviots with "fish back" and deficiency of brisket were to be penalized by the breeder. The scorecard dictated that fully matured Cheviot rams weighed at least 200 pounds, while ewes weighed 150 pounds. The association emphasized the construction of the body, especially body type, symmetry of form, and the prominent front end of the breed. It also weighted heavily standards for color, head shape, and ear placement. The "Head" received its own descriptions. It should be wide with medium

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and quality. However, unlike many cultural traditions among humans, Marshall added, breeders utilized prominent female names to demonstrate the origination of high-quality genetics, physiological type, or production value. Often the "foundress," or stud female, was as important to a genetic line as the sire. For the female offspring of that "foundress," Marshall advised producers to keep the female name instead of the male. In particular with imported females, he believed that it would be an err in judgement to dismiss the female line because the imported female carried invaluable prestige.

Like the animal name, the breeder name provided the animal worth as well. Each pedigree and certificate of registration required the breeder and owner, in case the breeder and owners were different people, to indicate to buyers and competitors the farm from which the animal came. Breeder name carried with it certain assumptions about quality, standards, and genetic families. For defamed breeders, the name carried negative value; for successful breeders, their name improved the prestige of the animal. Each animal advertised for the breeder the goals and quality of stock from their farm. Also see "Individual Records," *The American Society of Animal Production: Record of Proceedings of the Annual Meeting, November, 1914* (The American Society of Animal Production, 1915), 38-39.

length, erect ears. For the association, similarity in aesthetic markers correlated directly to distinct purebred animals and, for the Cheviots, the dark, black nose pad, the erect ear set, and the white hair on the face and legs tied the breed together in terms of visual similarity.[72]

Group classes at the International complemented these conformity goals. Breeders exhibited a group of animals and judges compared all the different competitors' groups. In the swine show, breeders showed a boar and three sows—divided by age—and the judge ranked each group by overall quality and similarity.[73] Group classes encouraged the breeding of like animals with standardized features and parts. In the sheep department, exhibitors showed a flock against other flocks that included one ram, two yearling ewes, and two ewe lambs in addition to a group class devoted to four lambs of either sex. Both the flock class and group lamb class encouraged breeders to orient their production towards more than the propagation of a singular great animal—that is, toward the diffusion and reproduction of ideal traits throughout a herd or flock based on the breed standards.[74]

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[72] *Flock Register of the American Cheviot Sheep Society* (Fayetteville, New York: American Cheviot Sheep Breeders' Association, 1901).

[73] C.S. Plumb, "Greatest of Its Kind," *Wool Markets and Sheep* XI, no. 7 (1900): 11. Plumb penned this article as a retrospective on the first International Livestock Exposition. He declared it a great success, to be sure, but the goals of uniformity still needed to be met, he reminded readers. Plumb had seen more consistency in type at livestock shows in England, a worthy goal for the International to address as it moved forward. Nevertheless, Plumb wrote that the International held the distinct honor of being the preeminent livestock show in the United States. See C.F. Curtiss, "Most Gratifying," *Wool Markets and Sheep* XI, no. 7 (1900): 11; F.B. Hartman, "Never Grow Old," *Wool Markets and Sheep* XI, no. 7 (1900): 11.

[74] *A Review of the International Live Stock Exposition*, 1918.

These criteria created by breed associations governed the shows at the International Livestock Exposition. The International required exhibitors to produce certificates of registry provided by the breed associations; the rules specified that animals at the International must be included in the current herd or flock book of the associations. The International published rules that reflected the standards of the breed society, which dictated the type of animal shown by exhibitors. The rules of the show also gave latitude to the International's general manager to demand certified proof of breed purity. Interestingly, the International did not require the sanctioned American breed society to be the certifying association for the exhibitors. In the Shorthorn breed, for example, the International recognized the official registries of 5 different countries: United States, United Kingdom, Canada, New Zealand, and France. Nevertheless, the International became the great gathering grounds for domestic breed associations to meet annually. By 1917, nearly all the major American purebred registries held their meetings at the International—31 in total.[75]

Better Sire Campaign

The prevalence of inferior animals on commercial farms in the United States posed a perennial problem for the livestock improvement movement. Charles S. Plumb of

[75] Ibid. Also see C.S. Plumb, "Purebred Live Stock Associations and Their Methods: Part VI," (1907), Vol. IV, CSPP. Not only did many breed associations hold annual meetings in Chicago during the International, but the Exposition provided the space to feature breed societies' top sales—a showcase for the best the breed had to offer. Many of the sales, Plumb commented, were not open to all breeders; instead, agents of the associations often selected animals to enter in the sale to ensure top quality livestock, which avoided the "scalawag type." For more on the role of breed associations in livestock improvement, see "The Gospel of Improvement," *Chicago Livestock World*.

Ohio State University lamented that "a very large percentage of our breeders use only grade or scrub sires, which…explains why one sees so many inferior animals on American farms." The International founders along with constructive breeders and the USDA developed a strategy that focused on the use of purebred males, not females, to address this limitation. The focus on males was a rational choice made by agriculturalists to improve the statistical and financial impact of improved animals. Of course, agriculturalists preferred that purebred males and females filled the herds and flocks of each farm. But reality constrained this idealism, which forced reformers to create strategies that maximized the benefits garnered from investments in improved livestock. Each sire represented half of the genetic composition of a crop of calves, lambs, or piglets, and a bull could breed nearly 20 cows and that ratio increased for rams and boars. Strategically, spending additional capital on a single male rather than 20 or more females had the same statistical genetic outcome while allowing the farmer to reduce initial input costs.

The use of these purebred sires reversed the degrading impact of scrub genetics by generationally "grading up" undesirable herds. The USDA printed a diagram to assist in the "breeding up" campaign that detailed the incremental, percentage-based reorientation of a herd or flock's purebred genetics (Figure 9). In the first mating on the left side, the fictional breeder mates a purebred sire with a grade female with half unknown traits and half known. After one generation of this mating, the grade animal

improved to 75 percent known genetics, and by the fifth generation only a small fraction of the grade animal consisted of scrub or inferior genetics.[76]

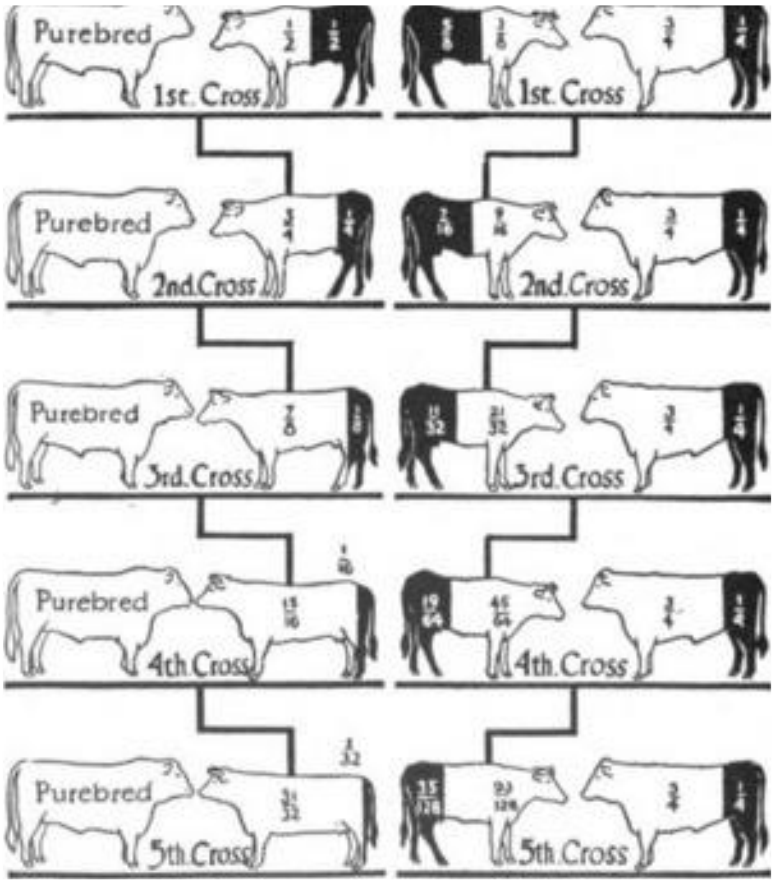

FIGURE 9. The influence of a purebred sire on improving grade stock over five generations. First published by the USDA. *Source*: C.S. Plumb, *A Study of Farm Animals*, 1922, 40.

[76] Plumb, *A Study of Farm Animals*, 38-47. Agricultural colleges and breed associations also urged producers to "grade up" with purebred genetics. The Iowa experiment station conducted research on the value of purebred sires in grading up dairy cattle, and it measured increased milk production to convince breeders to adopt new breeding practices. To do this, the researchers selected "very inferior scrub cows in a section of country where the people had never used pure-bred sires." In the first cross with purebred sires, the experiment station recorded a significant increase in milk production; but in the second cross, the researchers found much more startlingly results. They secured an increase of 194% milk production and 138% butter fat. This evidence substantiated Plumb's claims, and he wrote that "whatever merit we have in our herds and flocks to-day, we need not hesitate to say is due to the careful work of men who have used pure-breds only."

The International instituted a competition for land-grant universities, the Demonstration in Mutton Improvement, to illustrate the generational value of purebred sires. In this class, schools bred purebred mutton rams to grade or crossbred ewes and compared results.[77] The ewes, the International specified, lacked the ideal form for meat production, or more simply put, they represented a conventional crossbred or grade ewe. But the ram was supposed to be the best example of a purebred meat sheep. In the exhibit, the competition necessitated a display of mothers and the sire in an enlarged picture that accompanied the offspring. Exhibitors placed placards over the animals in the pens that detailed the average weights and ages of the lambs and the inputs for raising the animals, such as feed. For the mothers' pens, the colleges printed, on a separate placard, the age, weight, weight of fleece, and market grade of the fleece in addition to information, even if limited, regarding ancestry.[78] The offspring competed in different classes based on age and sex like the other portions of the International, but unlike the purebred classes, the mutton competition normalized the principles of "breeding up" scrub livestock.

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[77] Genetic selection and reproduction of purebred animals limited the biological outcomes of food-producing animals—a eugenic trope that directly influenced the curriculum of land-grant universities well into the second half of the twentieth century. Land-grant universities provided a unique home for eugenics by offering courses specifically targeted at the usefulness of eugenics. The International served as a collecting ground and a hub for these interests, which included USDA officials, land-grant university professors, and the agricultural press, to disseminate a "master race" ideology to transform the nation's farms. For more on eugenics in these agricultural networks, see Leland L. Glenna, Margaret A. Gollnick, and Stephen S. Jones, "Eugenic Opportunity Structures: Teaching Genetic Engineering at U.S. Land-Grant Universities since 1911," *Social Studies of Science* 37, no. 2 (2007): 281-296.

[78] *A Review of the International Live Stock Exposition*, 1918.

To increase the productivity and profitability of the farm, as R.J.H De Loach wrote, producers had two practical avenues. As director for Armour's Bureau of Agricultural Research and Economics, De Loach argued that farmers could either produce more animals to increase the quantity of livestock in the United States, or they could improve the level of productivity of each animal to ensure quality. Progressive agriculturalists encouraged the latter through the genetic improvement of herds and flocks. Farmers gained greater economy in meat production by utilizing well-bred animals because of their ability to convert grain and roughages at high rates into quality meat, instead of bone, hide, and waste like the scrub.[79]

Indeed, the initial costs were higher for constructive breeders, but these investments returned to breeders by increasing revenue. Conversely, the retrograde impact of inferior animals bred by destructive breeders undermined their monetary needs, meat supply, and national food output.[80] De Loach argued that the income potential in

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[79] De Loach, *Armour's Handbook of Agriculture*; De Loach, "Beef Cattle." See also "How to Increase Pork Supply," *The Berkshire World and Cornbelt Stockman* 10, no. 1 (1918): 43; T.F.B. Sotham, "Building Meat on the Beef Model," *The National Provisioner* XXVI, no. 3 (1902); "Beef Cattle Breeding," *Prairie Farmer* LXVII, no. 15 (1895).

[80] In a volume published by Armour's Bureau of Agricultural Research and Economics, *Progressive Hog Raising…* (Chicago: Armour's Bureau of Agricultural Research and Economics, 1922), Edward Norris Wentworth outlined the meaning of "breeding up" in the hog industry and the central role of purebred genetics. For Wentworth, "breeding up" and "grading up" were synonymous and interchangeable terms. To breed up, first, a livestock producer needed to understand the broader influence that purebred genetics had on herd uniformity and performance. As opposed to "unselected hogs" or pigs with unknown heritage, "selected," purebred hogs, Wentworth argued, transmitted physiological traits with more certainty and regularity. With uniformity being the broad benefit of purebred hogs, Wentworth linked the successive use of purebred animals, generation after generation, with the goal of "breeding up." Wentworth believed that the fewer number of crossbred animals in an offspring's ancestry the more likely that offspring would carry in its body and genetic makeup the desired characteristics for meat production. Thus, like the "scrub" steer, with a transgenerational approach to the use of purebred hogs, the progressive farmer would eliminate the "razorback" pig or the inferior hog.

marketing higher grade animals with better yielding carcasses outweighed increased input costs.[81] The market rewarded producers who sent purebred animals to the Chicago Stockyards. From 1895 to 1899, farmers made 20 percent more revenue on average because they sold improved animals. This price difference stemmed from increased consumer demands for better quality meat, but it also resulted from the greater value of the entire carcass due to a higher percentage of edible products per animal.[82]

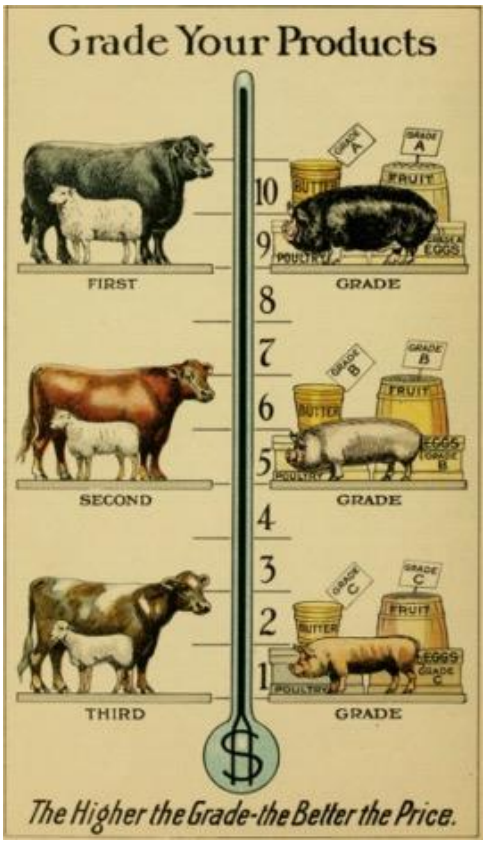

FIGURE 10. An illustration of the value of grading in livestock products. *Source:* R.J.H. De Loach, *Armour's Handbook of Agriculture*, 1921, 12.

[81] De Loach, *Armour's Handbook of Agriculture*; De Loach, "Beef Cattle."

[82] "General Review," in *"Our Year Book:" Telling Tables of the Livestock Trade for the Year 1901*, 5-9; J.A. Spoor, "Tells of Great Year," 11-12.

When the USDA embarked on a "national crusade" to improve "Uncle Sam's livestock," which mirrored the central objectives of De Loach and the International's "breeding up," the livestock improvement movement's goals became the official policy of the federal government. Concerned by the low number of prime and choice meat animals sent to the Chicago market and the underperformance of dairy cattle, the USDA established the "Better Sires-Better Stock" campaign in 1919. This effort focused on the eradication of inferior sires and the ability of purebred sires to hasten improvement. The most notable participant was President Woodrow Wilson. In 1920, Wilson registered his flock of sheep that grazed on the White House lawn. Countrywide, county agents enrolled producers who dedicated herds and flocks to the sole use of purebred sires. Ownership of those sires was not required; the farmer could rent, share, or borrow as well. In return for this commitment, producers received a certificate and a lithographed sign—a metal plate—advertising a farm's commitment to well-bred stock. Hung on a barn or at the farm's entrance, the sign read "Purebred sires exclusively used on this farm," which served as a source of pride and tool for advertising for the farmer while simultaneously promoting the USDA's national crusade for better sires.[83]

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[83] D.S. Burch, *Some Tested Methods for Livestock Improvement* (Washington D.C.: Government Printing Office, 1925); John R. Mohler, *"Better Sires—Better Stock": Plan of Nation-Wide Crusade to Improve Quality of Live Stock through Use of Good Pure-Bred Sires* (Washington D.C.: Government Printing Office, 1919); "Better Sires--Better Stock: That's the Slogan of a National Crusade of Great Importance," *The Banker Farmer* VI, no. 10 (1919): 1-3; "President Wilson Enrolls Flock in Better Sires Campaign," *Weekly News Letter* VII, no. 41 (1920): 1; "Steady Progress Shown in Campaign for Better Sires," *Weekly News Letter* VII, no. 41 (1920): 1; "Campaign for Better Sires Now Includes Nearly 400,000 Head of Stock Enrolled," *Weekly News Letter* VIII, no. 26 (1921): 10. Because scrubs were seen as enemies of the state, some farmers referred to them as Bolsheviks. See "A New Name for the Scrubs," *Weekly News Letter* VII, no. 41 (1920): 2.

Even though the campaign focused on males as a rational and strategic choice, the livestock improvement movement still regarded female value as important. This tactic reflected a practical approach to improvement, but D.S. Burch of the Bureau of Animal Industry (BAI), a subdivision of the USDA, unequivocally stated his desire for this effort to include all classes of animals, including females. He claimed that BAI records showed that once farmers saw the general benefits of purebred sires that they gradually became breeders of purebred females as well. The BAI hoped to simply convince farmers to use a single purebred male and allow them to witness the results, which initiated their participation in livestock improvement movement. Burch was convinced that this results-driven tactic—a prove-it-to-the-farmer approach—manifested in producer acceptance of well-bred animals. He claimed that these constructive breeders witnessed a 50 percent increase in animal market value, and they generated 40 percent more revenue, which he believed would be all the evidence the farmer needed to continue herd uplift.[84]

Aware of farmer reluctance and price hurdles, the BAI instituted a series of county-level campaigns that allowed farmers to experiment with a purebred male. County agents hosted public pig-raising contests, dressed-carcass demonstrations, and auction exhibits. All of these events illustrated the gains made in feed efficiency, live and butchered weights, and market value. The most dramatic attempt to persuade breeders was the scrub-sire trials conducted in the 1920s. These became so popular that the BAI circulated Burch's outline for conducting a trial. These trials mirrored the procedures of

[84] Ibid.; "Tendency Shown Toward Use of Purebred Female Stock," *Weekly News Letter* VIII, no. 26 (1921): 10; Gabriel Rosenberg, "The Trial of the Scrub Sire, Or How to Use Biopolitics in Environmental History."

human trials and similarly cast the scrub as a criminal—a societal problem. Thus, this court of animal justice included a judge, sheriff, prosecutor, defense attorney, jury, and the defendant—the scrub bull, boar, or ram. As the prosecutor and the scrub's attorney made their cases, a full discussion revealed the merit of purebred sires and the drawbacks of inferior animals.[85]

However, the fix was in and nearly all trials ended by declaring the scrub guilty of vagrancy and larceny, and the scrub's victims included his owner, his offspring, and the community. Following the conviction, the judge sentenced him to execution. Then, as outlined by the BAI, the scrub was removed, and the audience heard a gunshot. Often the scrub was killed either immediately or shortly after, but the theatrical use of gun left no observer wondering about the fate of the defendant. The BAI also encouraged these trials to end with a funeral procession and oration describing to the public the case against the scrub. The trials were followed by purebred sales, music, and a barbeque—in some cases the spectators ate the guilty party.

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[85] *Outline for Conducting a Scrub Sire Trial* (Washington, D.C.: Government Printing Office, 1924); Burch, *Some Tested Methods for Livestock Improvement*; Rosenberg, "The Trial of the Scrub Sire;" "Finds Scrub Bull Guilty," *Meat and Live Stock Digest* 8, no. 12 (1928): 3; "Scrub Bull To Be Put On Trial! Why Not A Scrub Boar?," *Berkshire World* (1922): 21.

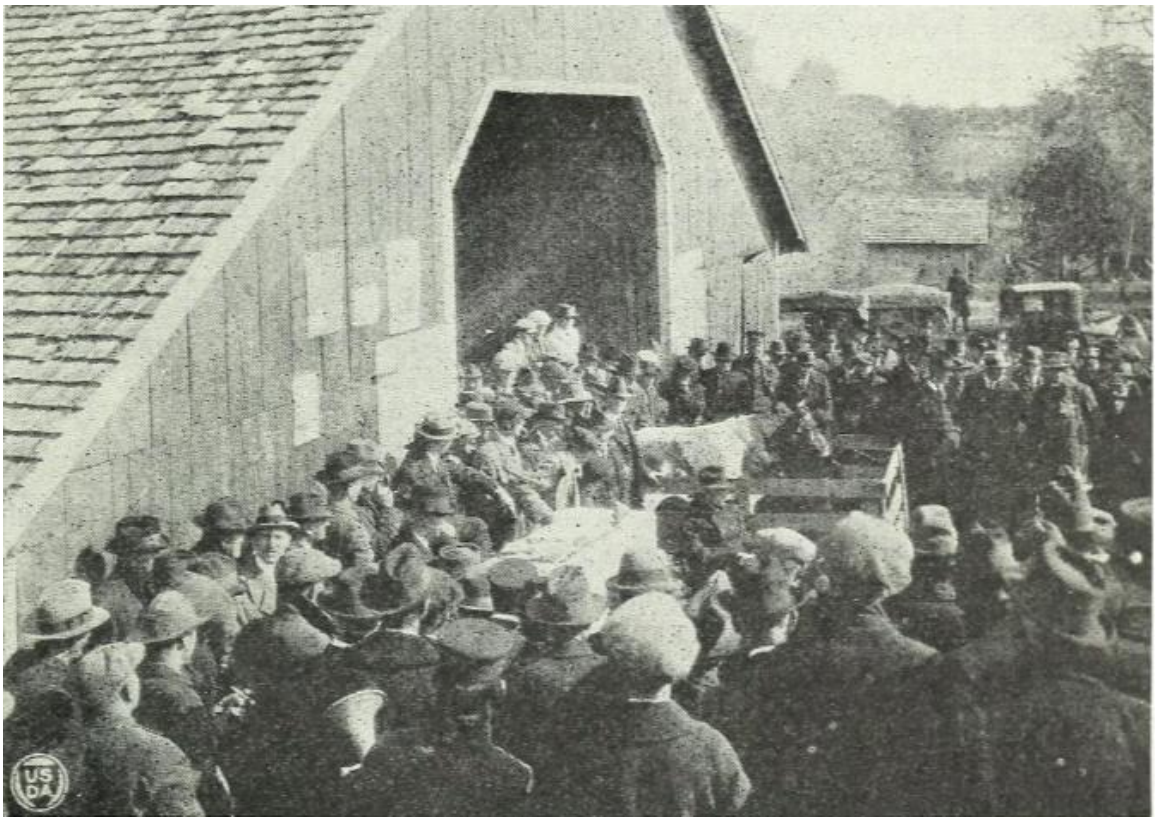

FIGURE 11. A scrub bull in court. *Source: Some Tested Methods for Livestock Improvement*, 1925, 11.

The scrub-sire trials were an immediate success, primarily in the southern states, and the BAI received over 500 requests for the mock trial outline just shortly after it was first published. However, simply convincing breeders of these advantages did not directly translate to purebred sire usage. The BAI and county agents developed a series of purebred-sire distribution plans. To defray costs, cooperative units were organized to jointly purchase bulls, boars, and rams, and then the farmers who were members of the cooperative shared the sires. These cooperative bull associations and ram rings authorized

by the BAI ameliorated cost, and the farmers retained breeding rights and thus the full benefits for their farms.[86]

Counties also established breeding associations and held county-endorsed and -managed sales to encourage the purchase and distribution of high-class sires. Perhaps one of the more creative strategies was developed with the tactical help and finances of railroad companies in several northern states. The Michigan Railroad Company and New York Central created scrub-sire exchanges. The companies sent trains throughout northern states filled with well-bred, pedigreed bulls. When they arrived at rural depots, the purebred bulls were exchanged for scrubs at sire swaps. Then the railroad companies loaded the inferior males onto the train cars designated for scrubs, often referred to as the outlaw cars, and sent them to slaughter (Figure 12).[87]

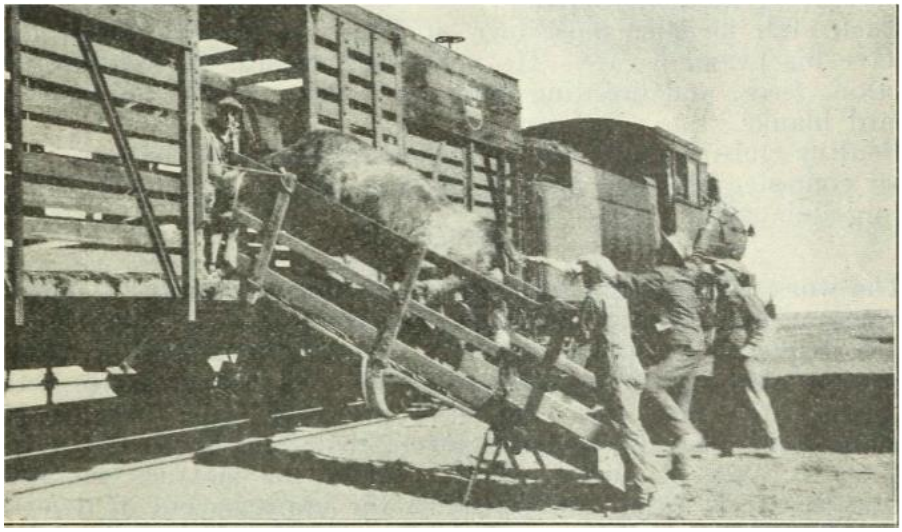

FIGURE 12. A scrub bull entering the "outlaw car." *Source: Some Tested Methods for Livestock Improvement*, 1925, 8.

[86] Ibid.

[87] Burch, *Some Tested Methods for Livestock Improvement*; "Michigan for Better Dairy Stock," *The Co-operative Manager and Farmer* XI, no. 4 (1921): 50; "'Better Sires Demonstration Train' in Michigan," *Holstein-Friesian World* XVIII, no. 33 (1921): 26; "Dairy Demonstration Tour in Michigan," *Holstein-Friesian World* XVIII, no. 29 (1921): 70.

"Breeding up" American livestock by focusing on reproductive males was a strategic choice among the early reformers at the International and the BAI in the 1920s. Considered more cost effective to focus on a single male that mated with dozens of females, buying, co-owning, or leasing a purebred sire injected "better" genetics into an entire offspring group, which was less expensive than replacing all scrub females. Not only was it more cost effective, but a single "top" female only birthed a single litter—cattle typically only having singles—whereas utilizing an "elite" male genetically impacted 50 percent of offspring on the entire farm in the first breeding year. Intact males' purpose on the farm was explicitly reproductive; they did not produce milk nor were reproductive males kept for slaughter. Thus, their value resulted wholly in their reproductive merit, and thus, the farmer retained as few reproductive males as possible, based on mating ratios, to increase genotype and phenotype consistency and to enlarge the genetic footprint of well-bred males while minimizing input costs, whether feed, time, or the purchasing or leasing of the sire. This rational, efficiency-driven tactic encouraged American livestock breeders to improve market performance by focusing on better sires.

Conclusion

At the International, Chicago meatpackers and land-grant researchers encouraged the elimination of scrubs and the adoption of purebred British livestock in their place.[88] The International normalized purebred animals and urged farmers to "breed up" their

[88] Poole, "The Twentieth International," *The Shorthorn World*.

herds and flocks. These reformers pushed livestock producers to meet the needs of the economy by applying genetic selection, which was rooted in a pseudo-scientific belief in eugenics. Secretary James Wilson, a major supporter of selection, praised this goal and the importance of genetic improvement when he heralded the erection of the Purebred Livestock Record Building as a major achievement in the advancement of American agriculture.

Breed associations provided the requisite institutional support for this goal. Registries' administrative structure and rules governed the International by certifying purebred animals and underpinning the push toward uniformity.[89] These associations connected purebred genotype to phenotypical traits; in turn, these aesthetic qualities helped producers visually identify not just a purebred animal, but a specific breed that was associated to certain specialized traits, like meat or dairy production. In this regard, phenotype also had identifiable market value, not just similar "fancy" qualities, like color, ear shape and positioning, and horns. Thus, notable phenotype included muscle shape, or sharp hipbones for the dairy cow, which correlated to farm function and enhanced performance. And to increase general performance, packers and professors linked uniformity of phenotype—standardization—to genetic homogeneity. Registries

[89] "Transfer of Pedigree," *Wallaces' Farmer*; "Question of Pedigree," *Wallaces' Farmer*; "Value of Pedigree to the Stockman," *Wallaces' Farmer*; "Selling Pedigreed Stock," *Wallaces' Farmer*; "Pedigrees of Live Stock," *Wallaces' Farmer*; "Registry and Transfer Fees," *Wallaces' Farmer*; J.W.C., "The Value of Pedigree," *Prairie Farmer*; "High Prices for Pedigree Stock," *Prairie Farmer*; "Becoming a Breeder of Pure-Bred Stock," *Prairie Farmer*; "Pure Bred Sheep," *Wool Markets and Sheep*; Marshall, "A Study in Scotch Pedigree," *The Shorthorn World and Farm Magazine*.

therefore served the vital function of affirming and systematizing purebred animal husbandry by guaranteeing the ancestral integrity of livestock.

As a result of its central importance in this movement, the people and animals involved at the International became agricultural celebrities. The genetic codes of livestock like Advance, when transmitted to offspring, represented the technological remaking, or carbon copies, of food-producing animals. Hereford breeder and promotor T.F.B. Sotham likened these animals to trademarked products that had specific characteristics resulting from the proclivities of breed and purpose. In the same way that Bakewell valued his genetic property to the point of purposely sabotaging animals rather than selling them, the genetics of superior animals were considered technological achievements. [90] Reformers created ways to share these genetic innovations to displace scrub animals with British livestock for the good of the meat industry and American society as a whole.

[90] Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association*; Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association*. Also see Ritvo, *The Animal Estate*, 68; Russell, *Like engend'ring like*.

CHAPTER THREE

Establishing the Physiological Standards of Modern Livestock

> Whatever the animal kingdom can afford for our food or clothing, for our tools, weapons, or ornaments—whatever the lower creation can contribute to our wants, our comforts, our passions, or our pride, that we sternly exact and take at all cost to the producers. No creature is too bulky or formidable for man's destructive energies—none too minute and insignificant for his keen detection and skill of capture. It was ordained from the beginning that we should be the masters and subduers of all inferior animals.
>
> —Richard Owen, 1851[1]

Only 20 years old at the first International, Fred Hartman of Fincastle, Indiana, carried the energy of progressive agriculture within him. He traveled the United States showing his well-bred sheep, with each show season ending at the International.[2] By that time, Hartman's animals knew the show ring and no longer behaved like the flighty, scared sheep in the slaughter pens on the same grounds. After being worked with all year, including grooming and careful feeding, and shown at state fairs during the summer, the animals anticipated the movements and rigors of the showman and the competition. As the judges surveyed the classes, without exception, they gave each individual animal

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[1] *Lectures on the Results of the Exhibition Delivered Before the Society of Arts, Manufactures, and Commerce* (London: David Bogue, Fleet Street, 1852), 59-98; Carl Warren Gay, *The Principles and Practice of Judging Live-Stock* (New York: The MacMillan Company, 1914), 3-23.

[2] Fred Hartman's father bought his first Cheviots from Howard Keim in 1893. Keim founded the Cheviot breed in the Corn Belt and stimulated the spread of the breed throughout Indiana. Keim purchased 68 Cheviot rams and ewes in 1891 from flocks in Otsego County, New York, which, at the time, contained nearly all the Cheviots in the United States imported from Britain. The breed considered Keim's farm the "pioneer flock of the west," and animals he produced, whether shown by him or customers, received acclaim at the Chicago's World Fair in 1893 and many state fairs with special recognition at the Illinois State Fair and Indiana State Fair. The Wild Rose Flock served as a stud farm for western Cheviot breeders and spawned many regional flocks, including Hartman's. In central Indiana alone, farmers established 8 Cheviot flocks by 1898.

close attention and scrutiny. As Hartman held his ewe, Beatrice, under the chin with his left hand, the judge approached her to feel her consumable parts.[3] Beatrice, accustomed to the close inspection, walked around the ring and stood for evaluation. Many farmers and producers saw her pictures and accomplishments in national journals; judges praised her, and Hartman's contemporaries recognized Beatrice for her long record of winning top prizes.

Hartman avidly promoted purebred livestock, especially the Cheviot breed, which originated in Great Britain. He argued that Cheviots possessed qualities necessary to the general improvement of a producer's farm value. His flock, Hartman bragged, contained "the best that money could buy or science could produce." His use of "science" held particular meaning as it related to progressive agriculture. For the modern farmer, science

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[3] John A. Craig, *Judging Live Stock* (Des Moines, Iowa: The Kenyon Printing & MFG. CO., 1901). Craig served as the editor of the *Canadian Live Stock Journal*, professor of animal husbandry at the University of Wisconsin and Iowa Agricultural College, dean at Texas Agricultural and Mechanical College, and director of Oklahoma Agricultural Experiment Station. His contemporaries recognized Craig for creating the standards and process for livestock evaluation. In *Judging Live Stock*, he established the criteria and approach for judging horses, cattle, sheep, and hogs. Craig described the proper way for judges to handle livestock. To effectively evaluate sheep, judges begin at the head looking at the teeth to estimate age, the eyes to determine relative health, and the head in general to ensure that the sheep meets the aesthetic qualifications of the breed. After which, the judge felt the neck, brisket, and chest to examine depth and muscularity.

Then, the judge looked for straightness of top and structural correctness and also at the width, length, and depth of the most valuable market products: leg/rump, loin, and rib/rack. To measure the rib, the judge handled it for condition and shape as well as width. Following the rib, the judge moved farther back on the sheep and found the last rib, which indicated the beginning of the loin, and then used his index finger to mark the beginning of the loin and found the hip bone at the end of the loin with his thumb to measure length and width. He finished this portion of the exam by reaching down to the leg and feeling the overall volume of the meat. Also see, "Prof. John A. Craig," *The Breeder's Gazette* LVIII, no. 8 (1910): 299; "Death of Prof. John A. Craig," *The Breeder's Gazette* LVIII, no. 7 (1910): 270.

correlated to improved genetic selection and the physical formation of the ideal animal.[4] Consequently, the top reviews his sheep received from competitors and judges everywhere resulted not from their genetics, but because of their actual body types. Under the farm name of Maple Grove Cheviots, Hartman's sheep won 378 premiums and 212 first place honors between 1900 and 1903. His sheep excelled in "uniformity of type…shortness of leg and quality of highest type."[5]

Judges linked uniformity and shortness of legs, or compactness, to productivity in meat-producing livestock. By focusing on distinct physiological designs, not just aesthetic traits like color but body types with a greater percent of muscle volume, agriculturalists linked animal specialization with increased food output and farmer revenue. These body types generated revenue by excelling in efficiency, which reflected a central tenet of university-researcher work. To maximize yield and revenue, the professors evaluated production based on rates. Efficiency, thus, related to carcass yields and rates of gain, or meat produced in relation to feed intake. Animals specialized in meat production had bodies that directed ingested calories toward the development of muscle. As medical doctor and animal husbandry expert Manly Miles, who worked for

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[4] *Flock Book of the National Cheviot Sheep Society* (Springfield: Illinois State Register Printing, Co., 1898); "A Good Record," *Wool Markets and Sheep* XIV, no. 1 (1904): 29; "Hartman's Cheviots," *Wool Markets and Sheep* XI, no. 7 (1901): 2; "Mr. F.B. Hartman," *Wool Markets and Sheep* XII, no. 16 (1902): 17; "Maple Grove Flock Doing Well," *Wool Markets and Sheep* XIV, no. 6 (1904): 11; F.B. Hartman, "The Cheviot," *Wool Markets and Sheep* XII, no. 10 (1902): 6.

[5] Ibid. Fred Hartman did not attend a land-grant university, but as a young farmer he enthusiastically embraced purebred livestock and adopted progressive farming. He created a reputation across the nation for being diligent and successful, and he was also known for having a strong headed determination for perfection as it related to his sheep. In 1904, Hartman put many of his sheep up for sale because of his father's death.

Massachusetts Agricultural College and Michigan State University, explained, "a high degree of excellence in two or more [qualities] cannot be obtained in the same animal; but it is undoubtedly easier to secure an extraordinary development of a single character than to obtain the same degree of excellence in two or more."[6] To achieve this goal, university and experiment station researchers set out to define ideal forms, and worked with the packers at the International to reconstruct animal bodies.

The public-funded researchers remained much more concerned about efficiency in agricultural production than the Chicago meatpackers. Although they agreed with their academic colleagues on body type, packers were more interested in how specialization encouraged product standardization and the animals' slaughter value. Single-purpose livestock with similar body types and more valuable carcasses helped the meatpackers generate more revenue per animal and also deliver consumers more consistent or uniform meat-based products. As R.J.H. De Loach, director of Armour's Bureau of Agricultural Research and Economics, put it, livestock needed to be "subjected to careful standardization from beginning to end, in order that the best product and highest prices may be obtained."[7] Thus, for both the Chicago meatpackers and university professors at the International, improvement in animal husbandry required breeders to select one commodity, not two, in which to specialize; and next to find a British breed inclined toward the uniform and efficient production of that single commodity—meat. However,

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[6] Manly Miles, *Stock-Breeding: A Practical Treatise on the Application of the Laws of Development and Heredity to the Improvement and Breeding of Domestic Animals* (New York: D. Appleton and Company, 1889), 7.

[7] R.J.H. De Loach, *Armour's Handbook of Agriculture* (Chicago: Armour and Company, 1921).

purebred animals were not already complete objects prepared for modern agriculture. Therefore, the International also incentivized the altering of physical forms to meet production goals. Exposition judges prioritized muscularity, which corresponded to valuable carcasses, to encourage the reconfiguration of animals based on the goals of specialization and standardization. At the International, the potential outcome of the carcass dictated a farmer's breed choice and modern animal form.

The Intellectual Foundations of Animal Specialization

By way of his research, teaching, and advocacy, Charles S. Plumb, experiment station director in New York, Tennessee, and Indiana, and professor of animal husbandry at Ohio State University, served as the central figure connecting university campuses and experiment-station research to the International. His animal husbandry articles and books were widely distributed and used as essential texts in secondary and post-secondary schools as well as by practical farmers. Many of his books were translated for use at foreign universities, and *Types and Breeds of Farm Animals* (1906) became one of the two most influential husbandry texts in the United States over the first decades of the twentieth century. His commitment to establishing the physiological standards of modern livestock led him to coach Ohio State University's collegiate livestock judging team at the International. His status as a pre-eminent historian, prolific author, and improved livestock reformer led to many awards, including his induction into the Saddle and Sirloin Club Hall of Fame, a citation for distinguished service by the French Government,

and honorary doctorates from Massachusetts Agricultural College, Purdue University, and Ohio State University.[8]

Following the 1893 Columbian Exposition, Plumb anticipated the packers and professors' work at the International. He penned an essay describing the importance of selecting animals based on body type. For Plumb, this required the manufacturing of animals' bodies in a sequence no different from building the ideal home. Plumb likened the process of animal selection and livestock judging to the work of a master architect. To erect a great structure, he argued, the architect first needed to have in mind, before a block was laid, the superlative building. The preconceived plan, resulting from studying form and function, provided the architect both a foundational understanding of proper construction, but also an eye toward the aspirational—the future. Plumb's metaphor compared animal breeding to architectural design and construction.[9]

In *Types and Breeds of Farm Animals*, Plumb emphasized the importance of students, breeders, and judges developing mental images of ideal animals, including the different livestock types and breeds.[10] Not all breeds of cattle produced milk and beef equally. Thus, the first step in building this breeding program was, Plumb insisted, identifying the breed of cattle, sheep, or hog that produced a single commodity

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[8] "Charles Sumner Plumb," *The American Society of Animal Production*, MSF 312, Folder 6, CSPP, Purdue.

[9] C.S. Plumb, "A Type of Breed: A Plea for Higher Attainments in the Breeding of Stock," *The Farmers' Magazine* 1, no. 1 (1894).

[10] Robert S. Curtis, *The Fundamentals of Live Stock Judging and Selection*, 2nd ed. (Philadelphia and New York: Lea & Febiger, 1920).

efficiently. In this way, selecting the proper breed differed little from the architect using the correct materials to build a sturdy home.[11]

Plumb's work detailing livestock type and evaluation was part of a broader academic and professional movement. John A. Craig, professor of animal husbandry at the University of Wisconsin, developed the first classroom adaptation of livestock judging instruction starting in 1892. First published in 1901, the demand for *Judging Livestock* was so great that the fourth edition came out just one year after the first. Along with Plumb's work, American and Canadian colleges used Craig's volume as the authoritative text until Carl Warren Gay, professor of animal industry at the University of Pennsylvania, released *The Principles and Practice of Judging Live-Stock* in 1914. This publication detailed the process of livestock evaluation and the importance of animals with specific purposes; he also deployed the phrase "The Animal Machine." No different than the mechanized parts of the farm, the animal was a tool to convert herbage to meat for human consumption, and, he argued, farmer choices should be driven by this industrial prerogative.

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[11] Plumb, "A Type of Breed: A Plea for Higher Attainments in the Breeding of Stock." See also Curtis, *The Fundamentals of Live Stock Judging and Selection*, 22-46. Curtis elaborated on Plumb's focused approach to breeding. The establishment of a production goal directed the type of animal raised; for Curtis, a "clear understanding of the purpose for which an animal is bred, a distinct conception of the type of animal adopted for the standard…are necessary for convincing, uniform, clear-cut decisions."

At livestock exhibitions in particular, Curtis believed that "modern show ring judging [was] based" on the evaluation and utility of type and form; once identifying and sorting animals based on form, then the modern judge based his placings on quality within a certain type of livestock. Only using this modern evaluation could animal production on each farm conform to purpose—a prerequisite for Curtis in the mechanization of livestock.

For Gay, standardizing physiological forms in livestock, or type, was a requisite step in the broader goal in the mechanization of biological beings. Gay hoped that modern livestock judging and the diffusion of these goals would make machines of animals. Raising improved livestock, Gay confidently claimed, required farmers to reimagine human-animal relationships; he defined the best type of domesticated animal as "the most efficient machine for making the greatest return, in its specific product, on the raw material consumed." As sources of human food, the animal worked on the farm as an industrial tool to assist the farmer. Just as coal provided fuel for the furnace, the modern animal converted rough forages, especially hay, into meat for food. By transforming these raw materials "not available to man in their present form into animal food products," he argued, "the animal machine serves a most important economic purpose."[12]

Gay cited British zoologist Richard Owen to justify not only the extraction of animal products and by-products after slaughter, but also the subjugation and redirection of animal forms. Before the Society of Arts in 1851, Owen delivered a lecture, "On the Raw Materials from the Animal Kingdom," declaring to the crowd that humans had been ordained to conquer all animals, whether big or small. The "slay[ing], subjugat[ing], and

[12] Gay, *The Principles and Practice of Judging Live-Stock*, 3-23. Gay featured efficiency as a central goal for improved agriculture, and he defined what that meant for the farmer. He referred to mechanical efficiency, a term used to understand the manufacturing of non-animal products, to extrapolate meaning for the livestock industry. Gay outlined the important attributes to be addressed; (1) the character or qualities of the materials of construction, (2) the perfection of constituent parts, (3) the accuracy of assembly, (4) operational power, and (5) the ability to control and effectively use the mechanical products. Gay correlated each of these subsets of production with animal characteristics. Thus, Gay encouraged the elementary study of histology, anatomy, physiology, and pathology so farmers could link function and parts to the mechanization of the animal body.

modify[ing]" of animals was within the domain of national interest. Humans had the ability and obligation to use them as tools whether for food, clothing, or even pride.[13]

After Gay's work, Robert S. Curtis, associate chief in the Animal Industry Division of the North Carolina Agricultural Experiment Station and Extension Service in Raleigh, published *The Fundamentals of Live Stock Judging and Selection*, which also went through several editions. Curtis reaffirmed purpose-oriented breeding and clarified the two central objectives of modern livestock production. First, maximizing yield and total output obliged farmers to raise animals geared toward a single purpose. Dual-purpose animals failed to meet the production goals of modern agriculture, and specialization allowed farmers to produce the food necessary to feed a growing class of urban Americans and improve farmer income. Therefore, the second consideration was how form or body type complemented function. Cattle, for example, bred for dairy or beef needed distinctly different bodies, and farmers had to reconfigure the actual shape of their livestock to better fit their purpose.

Curtis liberally used words that suggested a clear mindset about the key aims of improvement. Often, he referred to what the "modern judge" does, which separated him from his nineteenth-century counterpart, and, for Curtis, these judges held the "ideal" animal in mind when surveying classes—a type of livestock consistent in "form" or

[13] Gay, *The Principles and Practice of Judging Live-Stock*, 3-23; *Lectures on the Results of the Exhibition Delivered Before the Society of Arts, Manufactures, and Commerce*, 59-98; J.R. Piggott, *Palace of the People: The Crystal Palace at Sydenham, 1854-1936* (Madison: The University of Wisconsin Press, 2004), 1-30.

"type" that correlated to "purpose."[14] This litany of constructive-breeding catchwords linked this network of agricultural reformers to a singular goal—the importance of type in directing the market performance of meat-producing animals. Curtis encouraged farmers and judges to select "an animal bred specifically for a purpose" to produce the best quality meat.

Dairy cattle had the same, but inverse, relationship with meat and milk; the production of milk from a dairy cow served as the specialized function and meat would be the by-product. In his audacious recommendations for animal purpose and type, Curtis undermined the alleged value and utility of the dual-purpose animal by discrediting their performance. He pointed to the yield drag to disparage these animals; this injury to output resulted from the splitting of consumable calories and the breeding of animals with body types intended to serve multiple purposes—a distraction that manifested in arbitrary or undefined animal form. Specialization thus obliged farmers and judges to define the functional goal of their farm or the class they evaluated, respectively, and select a body type based on that aim.[15]

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[14] Curtis, *The Fundamentals of Live Stock Judging and Selection*. See C.S. Plumb, "Judging Stock at the Colleges," *Farmer's Guide* (1901). Plumb argued that collegiate judging was central to the education of future breeders, especially in the important task of correlating animal body type, or the exterior qualities of livestock, to the performance of the animal at the slaughterhouse. Colleges prioritized, Plumb argued, the ability to link exterior characteristics of meat-producing animals to carcass yield and quality—a primary benefit of courses and competitions related to animal selection and livestock judging. Plumb wrote, "at Purdue we endeavor to impress upon the student in studying judging the fact that an intelligent knowledge of the exterior animal gives something of a basis for understanding the flesh-producing capacity of the animals under consideration."

[15] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 24-28. Over the first two decades of the century, for example, the displacement of "the original long-horn steer with the symmetrical, deep-set, well-developed, compact form of the modern bullock," Curtis argued, marked considerable progress in the link between animal type and market function. This

Echoing Plumb's metaphors of architectural design, Curtis also insisted that British purebreds served as the building blocks of this single-purpose regime. He argued that establishing production goals and learning about the different types of animals available would improve "conformity of purpose."[16] Breeds, Curtis wrote, "have been developed along specialized lines for performing definite kinds of work...[and] [p]ractically all of them may be grouped into certain standard types."[17] As a result, purebred animals, and their breed proclivities, provided farmers choices by establishing a transgenerational reputation for certain feed, soil, climatic, and work needs and possibilities.

These canonical texts in livestock evaluation directly influenced the preferences of official judges and constructive breeders and the education of agricultural students. Paired with the proceedings of the International, they essentially defined the procedures for the selection of modern livestock. To be sure, the International offered incentives to change farmer behavior and provided practical displays of improved livestock, but these academics did the professional and grassroots work of labeling, describing, and disseminating this information about form and function, which started with identifying meat-producing breeds.

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contention reflected two overlapping conversations among agriculturalists. First, the advancement of animal agriculture required a mechanical understanding of animal form and function. Second, these mechanical animals, for the constructive breeder, took on specific characteristics, which necessitated the alteration of livestock breeding and animal body type. The form most ideal for the market in meat-producing animals was a smaller-statured, compact animal with a square-like appearance from the side and from the back.

[16] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 25.

[17] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 82-83.

In the beef industry, Shorthorn, Hereford, and Aberdeen-Angus became the most prominent breeds in the early twentieth century. All three breeds originated in Britain, and breeders and meatpackers alike fancied them for producing the choicest meat. Shorthorns technically were dual-purpose and had a strong genetic line inclined toward milk production. But class setup and judge preferences required breeders to clearly define and separate meat-producing livestock, including Shorthorns, from animals geared toward dairy production. Although both lines came from the breed, in reality Shorthorns included two different types of cattle under the umbrella of one breed. Shorthorns, at the time, were the most common breed in English-speaking countries around the world and, as a result, carried the nickname "The Universal Intruder."[18] The name of the breed came from the shape and size of the horns. In contrast to Longhorns, Shorthorns carried a medium-sized horn with a curved shape forward and slightly downward. The smaller horns helped with transportation and handling, and their physical build made them useful for meat production. They possessed wide, strong backs and large bodies. They also easily put on weight and fat, which helped them mature quickly.[19]

Unlike cattle, sheep produced meat and fiber (wool), but the International did not feature the wool breeds; instead, the show encouraged the development of sheep specialized in the production of mutton. Certain breeds, however, garnered recognition

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[18] C.S. Plumb, *A Study of Farm Animals* (St. Paul: The Webb Publishing Company, 1922), 220.

[19] Plumb, *A Study of Farm Animals*, 220-225; F.R. Marshall, *Breeding Farm Animals* (Chicago: The Breeder's Gazette, 1912), 209-221; Edward N. Wentworth, *Progressive Beef Cattle Raising* (Chicago: Armour's Bureau of Agricultural Research and Economics, 1920); Lewis F. Allen, *American Cattle: Their History, Breeding and Management* (New York: Orange Judd Company, 1879), 45-61, 134-165; C.S. Plumb, "To Identify Breeds," *National Stockman and Farmer* (1922), Vol. IV, CSPP.

for their high-quality fleeces; Merinos produced valuable wool but not meat. Lincolns, Cotswolds, and Leicesters also belonged to an elite group of wool-producing breeds. However, medium-wool sheep, including Shropshires, Southdowns, Hampshires, and Cheviots, were classified as mutton types. Thus, the class setup at the International, which included only breeds tailored toward meat production, forced breeders to buy and raise sheep from the latter category.[20]

In terms of country of origin, purebred pigs in the United States contained a more diverse supply of genetics than did cattle or sheep. American hogs primarily came from southern Europe, Great Britain, and China. These different strands of hog genetics resulted in the development of two types of pigs in the United States: lard hogs and bacon

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[20] Plumb, *Beginnings in Animal Husbandry*, 77-90; Plumb, *A Study of Farm Animals*, 338-347; R.J.H. De Loach and H.A. Phillips, *Progressive Sheep Raising* (Chicago: Armour's Bureau of Agricultural Research and Economic); Henry Stewart, *The Domestic Sheep: Its Culture and General Management* (Chicago: American Sheep Breeder Press, 1900), 22-101. Stewart argued that English sheep outperformed sheep from other countries, especially France. Even at French agricultural exhibits, imported British sheep dominated continental sheep in the physiological traits necessary for meat production. Accordingly, Stewart declared, American shepherds had little to learn from French sheep breeders except "to discover the effects of ages of neglect."

Cheviots produced both commodities, as did all British sheep breeds; however, meat production in the breed greatly outpaced the value garnered from wool. From the Cheviot Hills on the border of England and Scotland, Cheviots, a hornless breed, were hardy and durable in addition to being, as Plumb observed, one of the prettiest breeds. With white hair cover on the head and legs and a black nose and black hooves, when prepared for the show ring, the Cheviot had a striking look with a regal, up-headed stature. Rams and ewes reached maturity at 200 pounds and 150 pounds respectively. Southdowns, contrasting the look of the Cheviot, possessed a wool-covered face of reddish-brown color. They had short heads and short necks; and they built a reputation in the United Stated for being a breed chiefly for mutton. Among sheep breeds, Southdowns matured the earliest and had short, blocky bodies with a thick, meaty leg. Admired by butchers, Southdowns killed a high percentage of meat with little waste, and even though they performed poorly on the range, they met the needs of the modern meatpacking industry easily on the pastures and feedlots of the Corn Belt.

hogs.[21] The former, at the time, were more popular among American breeders. Compact in form with bigger tops, more depth of body, and larger hams, lard hogs produced superior cuts of meat and more fat across their backs. Conversely, the bacon type possessed a narrower but longer body than the lard pig. The length of body, accompanied by a deep side, made for a higher-producing bacon hog.

Breeders in Ohio developed the Poland China, for example, from the crossing of many different breeds and types of pigs. Russian, Byfield, Big China, Irish Grazier, and Berkshire hogs all genetically melded together to make the Poland China. As a result of this mixture in breeding, some diversity in form often occurred in the late nineteenth century, but as the breed developed more toward a uniform type, agriculturalists categorized them as a big type or a lard hog. They accumulated fat with ease and possessed large hams and tops. In the corn-producing states, the Poland China had a reputation for being "pork-packing machines."[22]

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[21] W.A. Henry and F.B. Morrison, *Feeds and Feeding Abridged: The Essentials of the Feeding, Care, and Management of Farm Animals, Including Poultry* (Madison: The Henry-Morrison Company, 1921), 296-376.

[22] J.D. Coburn, *Swine Husbandry* (New York: Orange Judd Company, 1919), 21-80; Plumb, *Beginnings in Animal Husbandry*, 99-113; Plumb, *A Study of Farm Animals*, 389-403; Edward Norris Wentworth, *Progressive Hog Raising…* (Chicago: Armour's Bureau of Agricultural Research and Economics, 1922); Thomas Shaw, *The Study of Breeds in America: Cattle, Sheep, and Swine* (New York: Orange Judd Company, 1912), 276-300; C.S. Plumb, "To Identify Breeds," *National Stockman and Farmer* (1923), Vol. IV, CSPP.

As a foundational breed for the Poland China, the Berkshire went through a period of great popularity from 1831 to 1841: "the Berkshire fever." As a result of decreasing interest midcentury, breeders neglected Berkshires and made little improvements. Following the American Civil War, breeders began to import Berkshires from England again because of their muscularity, efficient feed conversion rate, fertility and prolific production of offspring, and uniformity in color and quality. Not unlike the Poland China, the Berkshire had a black body with white points, but their body shapes distinguished the breeds. Berkshires were not as coarse or as the compact as Poland Chinas and generally had a longer, more angular appearance. Mature Berkshire boars weighed 500 pounds and mature sows 400 pounds.

Ubiquitous husbandry texts cast modern agriculturalists as animal "subduers" and created a taxonomy of priorities that underpinned farm specialization. The "animal machine" was central to these reform efforts; modern livestock were vital to the broader industrial sequence in food production. Not only did these reformers see animals as objects or cogs in the manufacturing of goods, but even beyond the use of prized British purebred genetics, livestock were overtly constructed or reconstructed to efficiently transmute feed calories to standard cuts of quality meat. In this regard, selecting a breed that correlated to the farmers' commercial purpose was only the first step in this taxonomy; breed simply served as a foundational tool in building the modern animal.

Livestock Shows and Animal Form

When the International began in 1900, the founders set out to redirect the size, scale, and market age of American livestock. At the St. Louis World's Fair in 1904, the agricultural exhibits still included range cattle of the West that little resembled the "improved" animals at the International. Kansas State Agricultural College's display—the "Red Bovine Mastodon"—offered observers the most visceral juxtaposition between the goals of the International and the older-style market animal. An older-style steer named Sampson was massive and drew crowds of spectators and both positive and

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Yorkshires, however, directly contrasted the body type of Berkshires and Poland Chinas. Often referred to as Large Yorkshires, this breed fell into the bacon category. Originally from England, the Yorkshire came from the oldest line of breeding. Yorkshires had large frames with a narrow body. The head inclined forward, longer than the lard types, with erect ears. The body of the Yorkshire possessed considerable length and depth with smooth sides—an advantage in bacon production; and, the back and ham were narrower and less defined than the Berkshires or Poland Chinas. Many other popular breeds existed in the United States, including Chester Whites, Duroc-Jerseys, Hampshires, Tamworths, Cheshires, Victorias, and the Essex.

negative attention. He was four years old, weighed 3,500 pounds, and stood at over 6 feet tall and nine feet long. His height and weight were remarkable compared to nearby purebred cattle and the human spectators.[23]

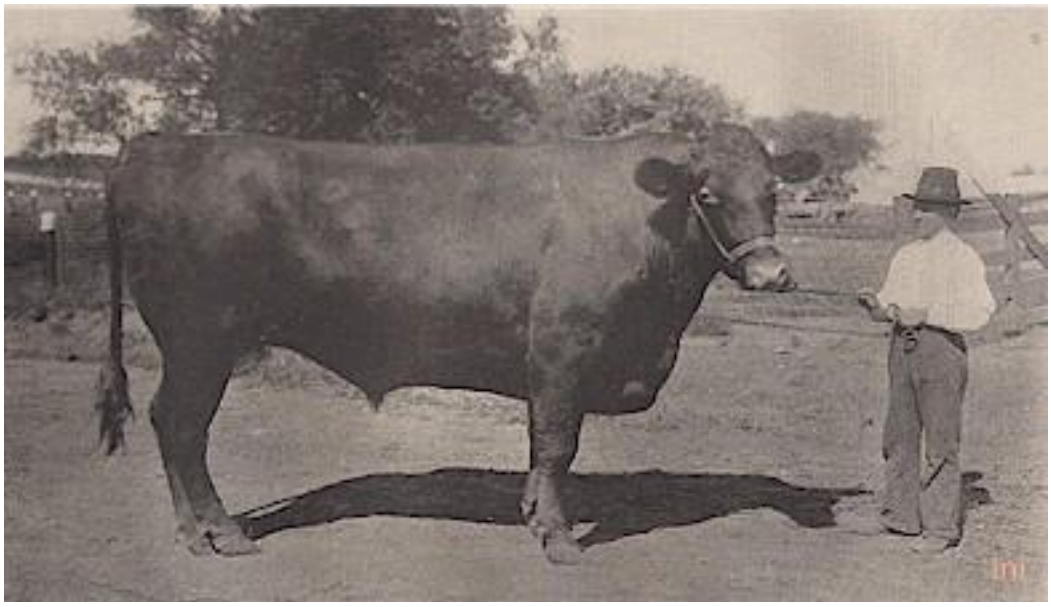

FIGURE 13. Sampson. *Source*: Lyndon Irwin, "Agricultural Events at the 1904 St. Louis World's Fair," *Missouri State University*.

Sampson's sheer size mirrored nineteenth-century show-ring fads. Predating the International, Chicago had hosted a livestock exposition that focused on market animals. In 1878, the Illinois State Board of Agriculture had organized and held the first Fat Stock Show in the Inner-State Industrial Exposition Building. Like the International, the Fat Stock Show focused primarily on the carcass characteristics of meat-producing animals. Nevertheless, bound by transatlantic trends, the Fat Stock Show underscored the persistence of the "bigger is better" dogma that had driven nineteenth-century exhibitions in the United States and Great Britain.

[23] Lyndon Irwin, "Agricultural Events at the 1904 St. Louis World's Fair," *Missouri State University*, http://www.lyndonirwin.com/1904fair.htm.

These show animals exhibited impractical bodies, which reflected a broader trend among producers who preferred old, extremely heavy livestock. Exhibitors commonly showed cattle at four or five years old and at weights as high as 2,500 pounds.[24] In fact, the animals' physical features sometimes included large, awkward developments of fat on foreheads and legs; the excessive leg fat even necessitated special wagons at British shows to transport some livestock to the show ring given their limited ambulatory abilities.[25] The biological limitations of these animals offered critics of nineteenth-century livestock the most obvious objections. The absurd size and fat cover of show stock reduced health and productivity, which created real problems for commercial agriculture. British critics argued that expositions had an unfortunate influence on commercial livestock breeding by standardizing highly undesirable traits. These negative qualities associated with excess fat, age, and size had ruinous effects on agriculture and by extension the food source of the nation.

In Britain, the stated goal for showing sheep, cattle, and swine was to improve meat production. However, the reality of purebred livestock production, especially as the

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[24] Alvin H. Sanders, *The Story of the International Live Stock Exposition: From its inception in 1900 to the Show of 1941* (Chicago: International Live Stock Exposition Association, 1942), 8-9; James E. Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World* IV, no. 18 (1919): 13-14. Poole was a renowned expert on the Chicago livestock market and served as a journalist for *The Breeder's Gazette*. At the end of the nineteenth century, Poole remembered, the amount of fat and overwhelming size of the show steers presented obstacles to quality and efficiency on the farm. Showmen exhibited steers that weighed over a ton at old fat stock shows, and the first International consisted of, Poole wrote, "aged steers freighted with fat." Both overly-conditioned steers and aged steers limited agricultural productivity and the ability of farmers to increase the quality of marketed products and, as a result, their potential earnings.

[25] Harriet Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Age* (Cambridge: Harvard University Press, 1987), 75.

ego-laden show ring pushed producers to excess, conflicted with this rhetorical aim. In the production of portraits, for example, breeders instructed painters to purposely embellish the height of the animals and to shrink the size of the showmen—an intentionally exaggerated artistic representation of the greatness of scale and overall magnificence of show livestock. British producers and showmen sought to create an animal that dwarfed in prestige and in confirmation the livestock of their chief competitors; aristocrats, in particular, touted these over-sized and "noble" animals as a sort of biological representation of their own elite status.[26]

Because of this broader trend, breeders raised large, expensive-to-produce animals guided by non-commercial goals. Like these British expositions, the American Fat Stock Show had limited success in moving show animals toward more practical and away from fanciful traits. Indulgence trumped standards of efficiency and productivity. When it came to selling an animal, whether privately or publicly, the more exaggerated the price the better. Being the buyer or seller of these high-priced animals, prices that topped any reasonable market value, represented a process of conspicuous consumption that moved animals from the realm of agriculture to the aristocratic practice of collecting precious items inaccessible to the average person. To merit this type of honor and sale value, these animals had to push the limits of size and scale to the point that the physiological qualities became unattainable and undesirable for the normal producer.

Before the Fat Stock Show disbanded in 1893, it did inaugurate a competition that reflected the production concerns of an emerging class of land-grant university

[26] Ritvo, *The Animal Estate*.

researchers who urged farmers to calculate cost and yield to define what efficiency meant. The Cost of Production challenge necessitated the collection of feed input and weight data in comparison to animal age. This information allowed agriculturalists to calculate the amount of weight gained per pound of feed given to steers.[27] They learned that younger steers converted feed more efficiently. For the average steer at the show, gaining one pound cost $3.21 in his first 12 months, when the steer gained the most weight. The cost rose to $4.56 in his second year, and in the third year the cost to produce a pound was $7.60, when the steer gained the least weight. Steers that were provided good quality feed typically made remarkable gains through 24 months; as the animal aged, the daily gains decreased, and the cost soared.[28]

This cost-of-production analysis defined efficiency for reformers. Editor at the *National Live-Stock Journal* Elliot W. Stewart analyzed this data and used the information to advocate for early-maturing livestock. His popular text *Feeding Animals: A Practical Work upon the Laws of Animal Growth* demonstrated that steers surpassed maximum productive efficiency somewhere near, but before, 24 months, and older steers diminished in their value relative to cost. This model for the efficient production of livestock drove reformers a decade later at the International to prioritize early maturity. But in the 1880s, Stewart admitted that this model was only in its "infancy." He complained that the questions of age rarely informed show-ring evaluation, and instead

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[27] Elliot W. Stewart, *Feeding Animals: A Practical Work upon the Laws of Animal Growth*, 4th ed. (Buffalo: Baker, Jones & Co., Printers and Binders, 1888), 528-534; and Alan L. Olmstead and Paul W. Rhode, *Creating Abundance: Biological Innovation and American Agricultural Development* (New York: Cambridge University Press, 2008), 271-273.

[28] Ibid.

judges and showmen disregarded "the most economical beef animal" for "the heaviest beef animal."[29]

The ideal steer at the International little resembled these nineteenth-century livestock. There was a shift in preference for animals that would achieve a finished weight in a shorter period of time in order to be more economically efficient.[30] This attempt to redirect animal form forced breeders to also make mating decisions not just based on animal ancestry, but also function. In the cattle industry, the dairy type had very different bodies from beef cattle. The former possessed long, wedge-shaped bodies. Often the dairy cow had a thin neck, prominent hip bones and a full, square udder—an indication that the animal would produce large quantities of milk, but little beef. Conversely, beef cattle were short and blocky. In areas where dairy cattle lacked "fill" (muscle and fat), the beef animal excelled. Beef cattle, ideally, had broad backs, prominent loins, and full rumps.

The 1913 Grand Champion Aberdeen-Angus Bull, for example, offered many of the ideal traits of the modern animal. He was deep in his rump and rib—an indication that he carried flesh in great amounts where the highest and most desirable cuts of meat were located on the animal's body—and possessed condition (fat) evenly across his body providing a smooth appearance. Even more, as a potential stud intended for reproduction,

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[29] Ibid.

[30] In Bulletin no. 78 (1902), University of Illinois Agricultural Experiment Station, Herbert W. Mumford outlined the different types of cattle and categorized them by quality and desirability. This bulletin demonstrated to producers the shift in animal husbandry toward young, more efficient market livestock. Mumford included ideal weights and ages necessary to minimize cost and maximize value.

this bull demonstrated masculine sex character, which provided visual cues that he would be an effective breeder.

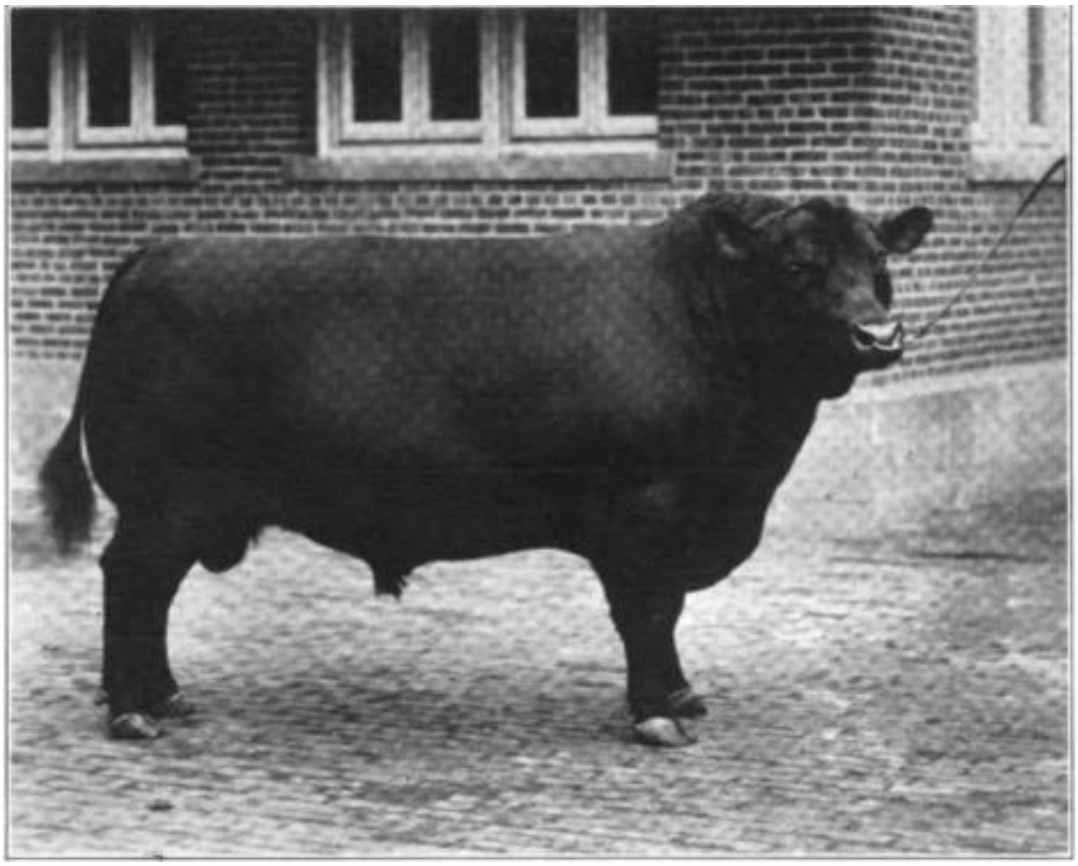

FIGURE 14. "Erwin C," Grand Champion Aberdeen-Angus Bull in 1913, W.A. McHenry, Denison, Iowa. *Source: A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1913, 46.

To standardize these characteristics, the organizers of the International depended on the credibility, knowledge, and reputation of the judges who placed the cattle, sheep, and swine.[31] The International needed the participants, urban

[31] R.R. Benson, "The Mental Processes of a Stock Judge," *The Breeder's Gazette* LXXIV, no. 3-1,912 (1918): 81. Judges came under scrutiny and criticism in the show ring no different than the animals they evaluated. The judges influenced breeders with their perspective; and, their function went beyond mediating or arbitrating shows like a referee. They had tastes, preferences, and priorities that could differ with exhibitors or observers. Often onlookers and farmers disagreed with the opinion of the judge, but for the judge to maintain credibility,

spectators, and foreign observers to recognize that, even though the judges used their own discretion in prioritizing observable traits, the slate of judges at the Exposition recognized the same set of core ideals. Otherwise, the show ring would seem irrational or unscientific. And, to improve the reputation of the show, the International featured judges from countries with similar tastes for purebred animals, such as Britain, Canada, and Argentina, and the organizers parlayed these judges' compliments and positive observations into advertisements to aggrandize the show's importance. At the first International, for example, J.B. Ellis of Walsingham, England, judge of the fat cattle classes, argued that it would be difficult to compare English shows with the International, but "Shorthorns, Polled Angus, Galloway, Red Polled, and…the Polled Durham…made me loath to confess that the best exhibits in these breeds could not be excelled anywhere."[32]

In 1916, the International expanded its foreign delegation to include Argentine cattlemen. The Honorable Carlos M. Duggan of Buenos Aires, Argentina, judged the grade and crossbred class and champion steer competition. Inviting "Distinguished Foreign Judges" to the International offered a veil of credibility signifying its importance. The organizers worked to enhance the reputation of American livestock in comparison to their international competitors.[33] The International founders wined and dined the

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promoters of progressive agriculture argued that the judges should uphold, in a strict and open way, their honest opinions and to do so required the judge to avoid favoritism or bias.

Even though judges' decisions in the show ring was indeed a matter of opinion, for the International to standardize body type and cuts of meat, the evaluation of livestock needed to be systematized and standardized.

[32] *Review of the First International Live Stock Exposition* (Chicago: The Union Stock Yard & Transit Company, 1900), 55.

[33] *A Review of the International Live Stock Exposition: A Great Movement for*

Argentine delegation, which included Ambassador Rómulo Sebastián Naón, at the famous Saddle and Sirloin Club. The Argentines repaid their gracious hosts with rousing appreciation of American livestock. Judge Duggan exclaimed, "I consider the grand champion steer, California Favorite [the name of the steer], the best I have ever seen and honestly think he would be a winner at any show in the world."[34] The steer's "great evenness, quality and wealth of flesh could not be beaten and to sum him up I would say that I think the most critical judge would find it a tough job to pick a fault in him."[35] Duggan went on to rank the International first in the world among all shows.

Each year, the judges sorted through the cattle, sheep, and swine classes identifying desirable traits among the animals and used those traits to place the classes.[36] To be sure, no animal possessed the perfect form. Judges often had the responsibility of evaluating livestock with a number of undesirable or less desirable traits. Good judges nevertheless kept their preferences in mind as they examined each animal using the ideal as the best possible example of animal form. Then, they identified the most desirable parts, or the picture of the ideal animal that the judge kept in mind, and compared those parts to the animals in the ring and found similar parts. After identifying useful parts in the imperfect animals, the judges prioritized characteristics to determine which animal possessed the most complete set of physiological traits.

Improvement of the Domestic Animals of the United States (Chicago: The Union Stock Yard & Transit Company, 1916), 88, 150-154, 182-186.

[34] *A Review of the International Live Stock Exposition*, 1916, 85.

[35] Ibid.

[36] Benson, "The Mental Processes of a Stock Judge," 81; *American Breeders' Association: Report of the Meeting Held at Columbus, Ohio, January 15-18, 1907* III; C.S. Plumb, "Ohio Livestock Improvement," *Ohio Farmer* (1922), Vol. IV, CSPP; C.S. Plumb, "Feeding Baby Beef," *American Agriculturalist* (1915), Vol. IV, CSPP.

This process, "balance of points," required deeper thought and consideration than any other aspect of livestock evaluation. As Robert S. Curtis, associate chief in the Animal Industry Division of the North Carolina Agricultural Experiment Station and Extension Service in Raleigh, complained, many animals in the show ring "differ greatly in merits and faults" both as an overall unit, but also "in the correlation of parts within the individual." Hypothetically, he argued, if all animals differed in their same component parts and if those parts possessed a fixed value related to function, then judging would be simple. But that was never the case. The variation among animals in merits and faults and the location of those differing characteristics on the animals required judges to keep in mind a set of priorities. In the end, balancing points, for Curtis, obliged the judge to find the "relative value" of the animals based on "principles fixed entirely on utility requirements and the comparative value of correlated parts or units." Thus, for example, when a judge evaluated a class with two steers with several faults, the judge needed to know whether "a low back, scantily covered with flesh" in a steer represented a larger demerit than "one with a drooping rump, thin thighs, and high or open twist" based on the probable performance of the carcass.[37]

To make these correlations of parts to the final product, Carl Warren Gay, professor of animal industry at the University of Pennsylvania, provided an "index" that gave breeders, buyers, and judges a sense of market performance for each animal, which he called "the law of correlation." Ideal market animals possessed "broad, flat backs…low set, broad, deep, and…thick-fleshed." And the opposite indicated inferiority,

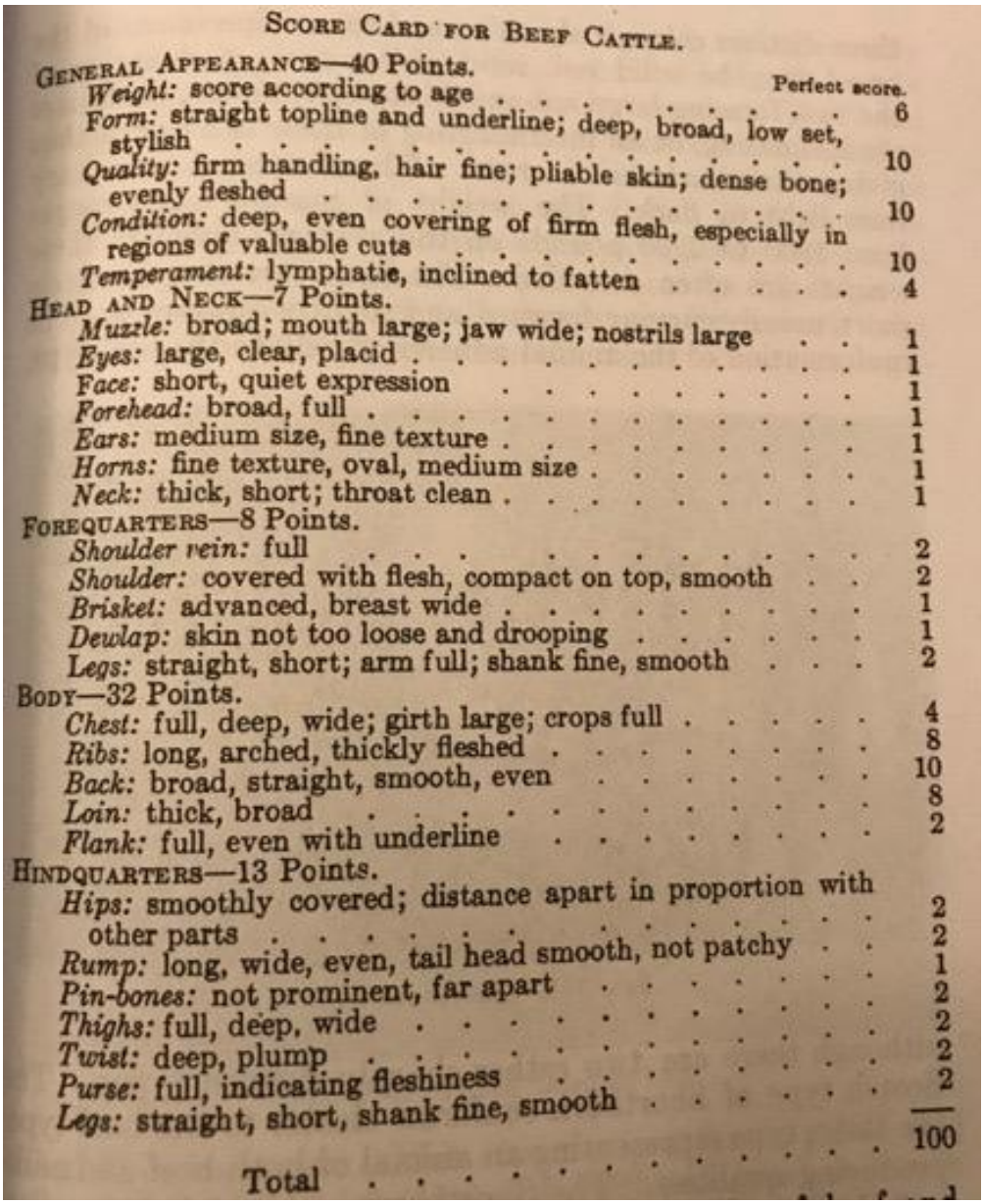
[37] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 43-45.

such as a long, narrow body and frame. These relationships of parts, whether narrow and shallow or deep and broad, prompted Gay to provide a useful, albeit clunky, dictum for judges: "As a rule, longitudinal dimensions of all parts are alike long or short and are inversely related to transverse and perpendicular dimensions." Gay's maxim directly linked long vertical and horizontal features, like leg and body length when viewed from the side, to narrow—the inverse—perpendicular traits, like shallowness of rib or thinness of rump when viewed from behind. Conversely, shortness of leg and body corresponded to a wider and thicker animal. Gay extended this logic beyond the individual animal and argued that the same contradictory features of types applied to livestock in general; "milk and beef…are opposed to each other by this same law."[38]

To assist in correlating "form to function" in making selection decisions, judges and breeders used two broad approaches. First, the analytical approach, which aligned most closely with finding the "ideal" animal, required evaluators to score each animal independently from the other animals and also independent of the one's own biases—scorecard judging. Through analytical assessment, judges applied to the show ring a scientific approach that allowed them to rate each animal by prioritizing certain parts. After scoring livestock by their constituent parts, the judge added all the points from each section on the scorecard to find a total. The highest point total won the class. Scorecard judging was a means to an end; this approach provided the best educational outcome for

[38] Gay, *The Principles and Practice of Judging Live-Stock*, 58-59.

students by requiring them to learn the various parts of the animals and the principle values of those parts.[39] Scorecard evaluation left "a mental impression of the ideal."[40]



SCORE CARD FOR BEEF CATTLE.

	Perfect score.
GENERAL APPEARANCE—40 Points.	
Weight: score according to age	6
Form: straight topline and underline; deep, broad, low set, stylish	10
Quality: firm handling, hair fine; pliable skin; dense bone; evenly fleshed	10
Condition: deep, even covering of firm flesh, especially in regions of valuable cuts	10
Temperament: lymphatic, inclined to fatten	4
HEAD AND NECK—7 Points.	
Muzzle: broad; mouth large; jaw wide; nostrils large	1
Eyes: large, clear, placid	1
Face: short, quiet expression	1
Forehead: broad, full	1
Ears: medium size, fine texture	1
Horns: fine texture, oval, medium size	1
Neck: thick, short; throat clean	1
FOREQUARTERS—8 Points.	
Shoulder vein: full	2
Shoulder: covered with flesh, compact on top, smooth	2
Brisket: advanced, breast wide	1
Dewlap: skin not too loose and drooping	1
Legs: straight, short; arm full; shank fine, smooth	2
BODY—32 Points.	
Chest: full, deep, wide; girth large; crops full	4
Ribs: long, arched, thickly fleshed	8
Back: broad, straight, smooth, even	10
Loin: thick, broad	8
Flank: full, even with underline	2
HINDQUARTERS—13 Points.	
Hips: smoothly covered; distance apart in proportion with other parts	2
Rump: long, wide, even, tail head smooth, not patchy	2
Pin-bones: not prominent, far apart	1
Thighs: full, deep, wide	2
Twist: deep, plump	2
Purse: full, indicating fleshiness	2
Legs: straight, short, shank fine, smooth	2
Total	100

FIGURE 15. Beef cattle scorecard. *Source:* Robert S. Curtis, *The Fundamentals of Live Stock Judging and Selection*, 1920.

[39] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 40-42.
[40] Gay, *The Principles and Practice of Judging Live-Stock*, 64-65.

The second method considered the need to compare animals; practicality often forced judges to use the comparative approach as a result of the imperfections in each animal. Thus, judges assessed characteristics in direct contrast to other animals in the same class.[41] Even judges or educators who preferred the ideal/analytical approach often resorted to comparisons to settle disputes in their own preferences as the classes proceeded. Consequently, the ability to balance productive capacity compared to the other animals in a class removed the scorecard from being the best method and necessitated the consideration of relative value.[42]

To ameliorate potential conflict and communicate their preferences and priorities, the International required judges to provide reasons for their placings. At smaller shows, judges would sometimes simply talk to the audience from the ring, but at the International many judges published explanations or general observations regarding the classes they evaluated.[43] At the 1918 International, Frank Brown of Carlton, Oregon judged the Shorthorn division and the organizers praised him for taking seriously the new tastes of the era.[44] Many judges and breeders had different preferences, but for Brown the perfect animal possessed very specific attributes. He wanted a bull or a cow that carried plenty of flesh on the skeletal structure. Brown desired cattle intended for meat production to have distinctly different body types than dairy animals.[45] For example, the

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[41] Benson, "The Mental Processes of a Stock Judge," 81.

[42] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 40-42; Gay, *The Principles and Practice of Judging Live-Stock*, 86-90.

[43] Benson, "The Mental Processes of a Stock Judge," 81.

[44] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1918), 22-23.

[45] Frank Brown, "From the International Judge," *The Shorthorn in America* (1919): 19.

bull he selected for champion, Lord Rhybon, had "depth of body." He carried this voluminous flesh down his broad back and deep into his lower quarter.

These features differentiated this bull from the skinnier, shallower-made range bull or dairy sire. Through poor placing, the International penalized breeders in an effort to create separate dairy and beef cows. Judge John Lewis commented on the Beef Shorthorn's lack of prominent hooks—an overwhelmingly important feature for single-purpose meat animals. The hooks or the hipbones visible on the topline became less visually noticeable when meat livestock possessed a carcass with the desired condition or fat; dairy cattle in particular had prominent hooks (Figure 16), but so too did beef cattle with limited muscle shape or fat cover, as seen in range cattle.[46] The judges, therefore, made a point to distinguish the purebred Beef Shorthorns from milking cattle and range animals by commenting on the hooks.[47] In this regard, the visibility of the hooks was shorthand or euphemistic for these two different purposes in the Shorthorn breed. Judges utilized these visual cues to evaluate the probable productivity of carcasses and economic competitiveness of meat-producing animals.[48]

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[46] Orren Lloyd-Jones, "What is a Breed?," *The Journal of Heredity* VI, no. 12 (1915): 531-537. Mamie's Minnie specialized in milk production, not beef. This cow produced high rates of milk; she generated 14,838 pounds of milk in 1913 and 16,201 pounds in 1914. The picture showed her with a prominent hipbone, unlike the ideal beef-producing cow, because her calories were diverted from the production of meat and fat to milk.

[47] *Review of the First International Live Stock Exposition*, 1900, 47.

[48] Ibid., 1900, 45.

FIGURE 16. Mamie's Minnie, a Milking Shorthorn. *Source:* Lloyd-Jones, "What is a Breed?," *The Journal of Heredity*, 1915.

In the first two decades of the International, the grand champion animals underwent remarkable physiological changes, which effectively demonstrated the influence of both the judges and the show ring, through awards and penalties, on livestock producers' priorities in animal breeding and culling choices. The physiological differences between Ruberta, the junior champion Shorthorn female in 1900, and Goldie's Ruby, the winner in 1918, clearly illustrates these changes. Ruberta had a smooth-made body with even flesh and a nicely laid shoulder; she did not possess the

prominent hooks of the dairy cow.[49] She had a deep, but not noticeably wide, body from front to rear—a type of cow that had great balance and evenness.

In contrast, in 1918, Goldie's Ruby embodied the shift in preference that the International institutionalized. Before she won grand champion Shorthorn cow, Judge Brown selected her for first place in the "Cow or heifer 2 years old and under 3" class. As a two-year-old, she demonstrated many qualities of the improved animal. Goldie's Ruby embodied the Baby Beef fad, meaning her body type was not as tall, big, or upstanding as the thinner-made range cow or even the typical Beef Shorthorn of previous decades.[50] She was much shorter and thicker than Ruberta, and carried an extreme amount of muscle and condition. She had a thick, broad back and round, deep rib shape. In fact, in the picture advertising her success, her chest, fore flank, rib, and rear flank barely cleared the straw bedding in which she stood—a clear illustration of what distinguished the beef-producing cow from both range and dairy cattle (Figure 18).[51]

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[49] *Review of the First International Live Stock Exposition*, 1900, 47.

[50] Goldie's Ruby was pictured to appear deep bodied with her brisket, chest, and stomach barely clearing the straw bedding. The photograph itself demonstrated the goals of the International. As with the nineteenth-century animals dwarfing the person standing beside them—the goal being raising cattle of enormous size—this picture also depicts the animal's body to demonstrate "perfection." By eliminating the space between her underside and the ground, almost appearing to have no legs at all, the photographer was emphasizing the ideal body type.

[51] *A Review of the International Live Stock Exposition*, 1918, 27; Alvin H. Sanders, "The Golden Age of Shorthorns," *The Shorthorn in America* (1919): 10.

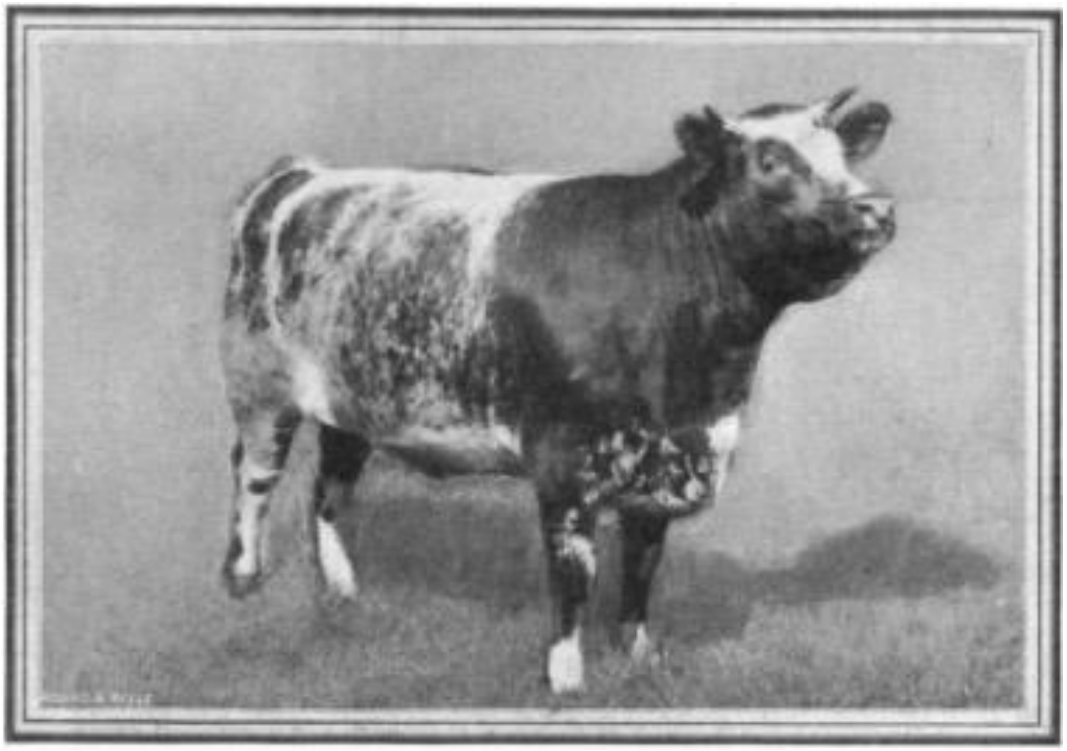

FIGURE 17. Ruberta, J.G. Robbins & Sons, Horace, Indiana. *Source: Review of the First International Live Stock Exposition*, 1900, 50.

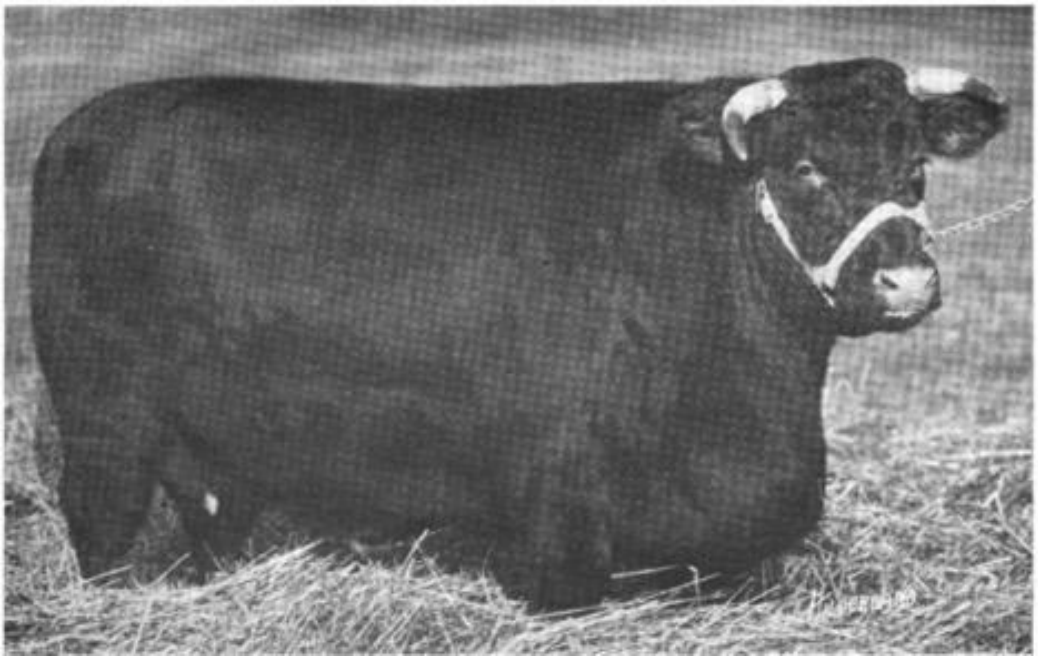

FIGURE 18. Goldie's Ruby, Reynolds Bros., Lodi, Wisconsin. *Source: A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1918, 27.

Alvin Sanders saw this shift as a linear progression, and in 1918 argued that the Shorthorn breed, along with the International, had finally reached a place "free from fads." He had complained about fads, follies, and fancies limiting or even prejudicing qualities in animals that prevented the march toward progress in animal husbandry. In reaching this zenith or "Golden Age," Sanders gave credit to the "sanity of procedure" and "generosity of valuations"—a major improvement from the limited understanding of animal type and evaluation along with the irrationality of decision-making of previous generations. The International helped standardize traits and create, among the nation's agriculturalists, a "rational," "scientific approach" to the reproduction and the manufacturing of the country's food source.[52]

But two different and sometimes competing ideas often created a conflict over preferences between physical traits, associated with probable productivity, and fanciful or visual characteristics that had only an aesthetic value. With the prioritization of purebred animals that required certain breed standards, such as color, head shape, ear set, and horned or polled (no horns), judges often made decisions between competing priorities; they tried to balance the aesthetic standards of purebred associations with the pragmatic demands of muscling and carcass yields. No single judge nor commentator ever resolved this conflict. Sanders likewise oscillated on the importance of breed standards and the visual appearance of the animal's head. Nevertheless, he resolved, the most important evaluative measure should be what he called "probable efficiency."[53]

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[52] Sanders, "The Golden Age," 10.
[53] Ibid.

The idea of "probable efficiency" often ran counter to the aesthetic requirements of purebred animals. Judges tried to estimate the value of each animal by analyzing and comparing individual parts, and in doing so, they joined potential outcomes with phenotypical traits. For progressive agriculturalists, rib and rump shape and width of top on the animal correlated to higher yielding carcasses and, at times, that meant that judges would ignore aesthetic qualities. Sanders warned that putting too much stock in aesthetic qualities prevented the transformation of cattle, sheep, and swine.

This dialectic about the need for the modern animal became a "crusade" to reshape animals' bodies. Language typically reserved for religion infiltrated the enthusiasm, belief, and missionary zeal of agriculturalists. R.R. Benson of Arizona, a contributor to *The Shorthorn in America*, argued that good judges devoted to modern agriculture and science were "prophets" of a new age, often unrealized by average farmers because their standards for animal form seemed unusual. These "prophets," he continued, could see in the bodies and blood (genetics) of animals the short-term value for the farmer, but also the idealized animal needed to improve agriculture. And, by avoiding the "dictates of fashion," the judges at the International engendered long-term credibility in the transformational value of the Chicago show ring.[54]

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[54] Benson, "The Mental Processes of a Stock Judge," 81. Also see Alvin H. Sander, "Are You Doing Your Part?," *Shorthorn in America* (1916): 3-4, Box 4, File 32, AHSP. The religious language related to spreading ideas or changing beliefs permeated the discourse. However, people were not only the disciples of modern agriculture, so too were animals. Alvin Sanders wrote an article detailing the advantages of improved livestock. His publication featured the work of Shorthorns in revolutionizing the agricultural community wherever they were bought, bred, and raised. Shorthorns in the United States, he argued, had a solemn responsibility to the general welfare of the state and to the farm to cast aside the "heathen" Longhorns of the range in the west. In doing so, Shorthorns, as a breed, served as missionaries of "modern" agriculture. Sanders wrote that Shorthorns certainly would improve the "bovine heathens of the earth" on typical

Indeed, International judges altered nineteenth-century livestock types, embodied by Sampson, and selected livestock with shorter legs with greater muscle volume. These compact animals manifested in a dramatic shift in weight preferences. Decreased finish weight had a compounding impact on quality and condition; thus, there was a strong correlation between weight and value. Top-quality steers were rated as prime and they weighed from 1200 to 1600 pounds; both choice and good steers weighed 1150 to 1600 pounds; and common rough steers weighed 900 to 1200 pounds. The lower end weights fluctuated, but the ceiling on top weights was dramatically less than Sampson at 3,500 pounds.[55] Consequently, a shift occurred in favor of early-maturing animals with a smaller skeletal frame.[56] This change in body size resulted from the depreciated value and the unwanted qualities of big carcasses. The excess age and size produced waste, which caused lower yields, and also required additional feed. Ultimately, these older, bigger

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"Mexican haciendas…on Australian stations…[and] African veldts," and without a doubt, the "richest large agricultural area in the world—the American corn belt."

Sanders utilized photographs in the article to compare the "heathen" Longhorn cattle bought and sold in El Paso, Texas, to the "modern" example of livestock—the Shorthorn. In one transaction by an El Paso speculator, a gentleman sold Longhorns for $35 a head, and the animals ranged in age between five and 10 years old. He compared a steer from that sale with a steer that was only 14 months old. The 14-month-old steer's owners raised him on the range like the Longhorns, but genetically, the steer came from purebred Shorthorn parents. And at that young age, the Shorthorn weighed 25 to 50 pounds more than the older Longhorns and was worth $150 more. For Sanders, raising these improved animals, especially Shorthorn cattle, offered the breeder additional revenue and also provided a service—of the missionary sort—to the public.

[55] Ibid. Another category was baby beef. This was the type of steer that were either choice or prime in quality and condition with good scores on confirmation; but these steers were even smaller in size and weight. Baby beef steers were between one and two years of age and weighed between 800 and 1,000 lbs.

[56] In Bulletin no. 78 (1902), University of Illinois Agricultural Experiment Station, Herbert W. Mumford demonstrated to producers the shift in animal husbandry toward younger, more efficient market livestock. Even though Mumford argued that weight was less of a concern than quality and condition, the decrease in finish weight had a compounding impact on quality and condition; thus, there was a strong correlation between weight and quality.

animals resulted in high production costs and, pound-for-pound, were worth less on the market.[57]

Standardization and Carcass Performance

To analyze the exact relationship between animal form and market performance, this active group of university researchers developed land-grant curricula and International competitions around animal carcass and meat cuts. In January of 1907, Charles S. Plumb addressed this functional need when speaking to a large gathering of agriculturalists that included Charles Davenport, C.F. Curtiss, and F.R. Marshall; they met at the American Breeder's Association's annual meeting at Ohio State University—Secretary James Wilson served as president of the organization but could not attend the meeting. In addition to presiding over the annual meeting, Davenport served as the secretary for the Animal Section of the conference, and he invited Plumb to lecture on the increased importance of prioritizing commercial value in animal selection.[58]

Plumb's paper covered the essential role of land-grant universities in this educative process. He heralded John A. Craig, who taught at the University of Wisconsin and also held a membership with the ABA, as the foremost leader in the academic

[57] C.S. Plumb, "Big Type," Vol. IV, CSPP. Not only did this trend directly impact the cattle industry, but sheep and hogs also dramatically changed. For Plumb, the ideal market sheep weighed between 80-85 pounds, and the model market pig weighed 225-250 pounds. Thus, in all meat-producing livestock, the International provided the mechanism to orient breeding toward the "profitable type." For example, feeding a hog for 18 months to the market weight of 615 pounds was unprofitable despite the larger size. Feeding a hog to 220 pounds for 5 months made a profit; the extra days of feeding not only cost more, but the additional age and weight eventually decreased the value of the carcass as well.

[58] *American Breeders' Association: Report of the Meeting Held at Columbus, Ohio, January 15-18, 1907* III.

community in the development of curricula on livestock judging standards for land-grant institutions. In the first portion of his lecture, he covered issues specifically relevant to educational institutions, like faculty training and updating facilities. But, after dealing with issues directly pertinent to higher education, he shifted to the broader conversation on animal selection that the International addressed—developing discriminating tastes among current and future breeders. For Plumb, the foundational knowledge required for good animal judgement was the understanding of types.[59]

Once students understood the broader function, ideal, or goal related to the general purpose and performance of the animal at the macro level, then they needed to learn the constituent parts of each species and the specific utility of those parts in constructing the general physiological makeup of livestock. As a judge himself, Plumb emphasized the study of observable body traits. On a beef cow, for example, the students and judges would analyze the most important cuts of meat on the back and on the rump.[60] In a textbook intended for students of agriculture, including young breeders, Plumb illustrated beef animal parts and their retail values. Within the animal body were compartments of meat, including the loin, rump, and ribs (Figure 19). Not all steers weighing the same amount were worth the same. Plumb wanted farmers to see that the distribution of that weight mattered, and the location of muscle and fat cover impacted the market value of the animal. Retail value correlated with body parts. The back

[59] Ibid.
[60] Ibid.

contained the most valuable cuts of meat; the sirloin and porterhouse topped the chart in retail value.[61]

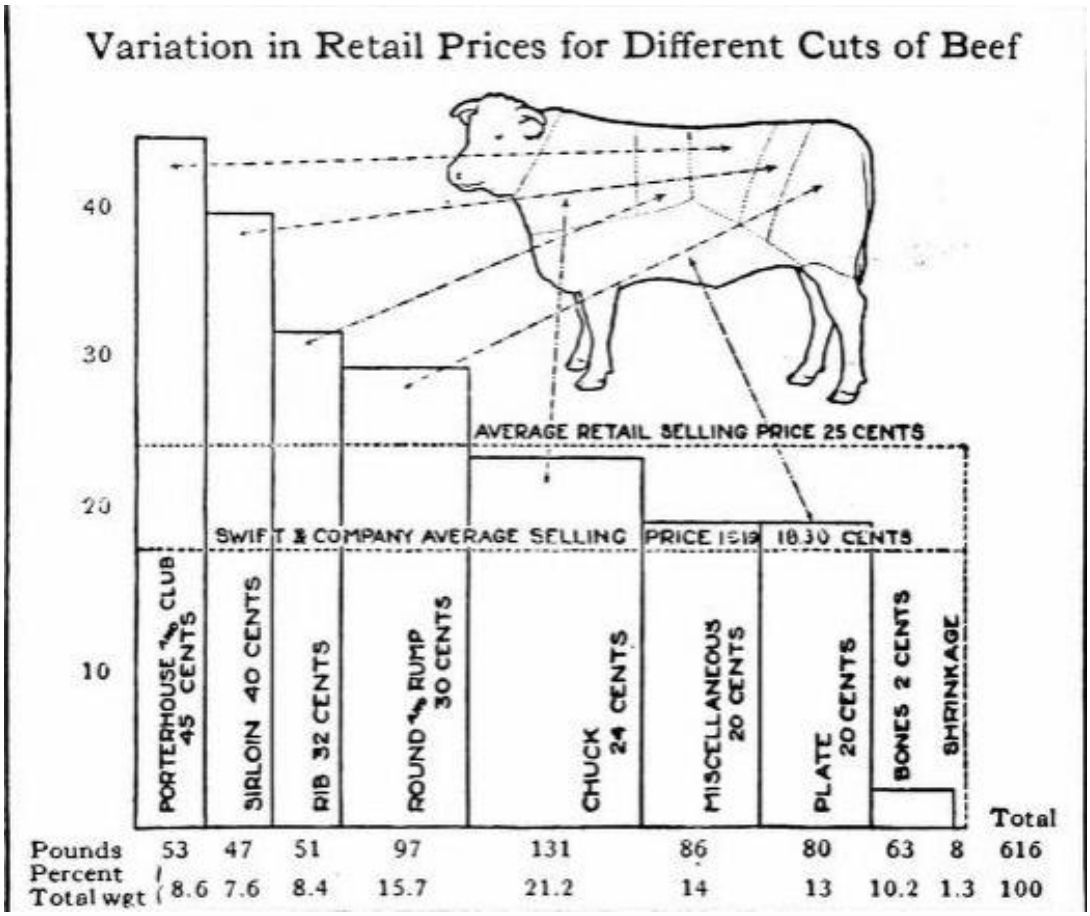

FIGURE 19. Retail value of meat cuts in the beef animal. *Source:* C.S. Plumb, *A Study of Farm Animals*, 1922, 236.

Robert S. Curtis added to Plumb's work by providing more thorough diagrams and illustrations. He believed that "capacity" provided husbandmen a useful conceptual tool for modern selection. Similar to the capacity of a barrel, ship, or wagon, the core of the animal body needed to be rotund and full of space for blood flow to aid health, constitution, and reproductive vigor and, even more, for good-quality meat. Evaluating

[61] C.S. Plumb, *A Study of Farm Animals*.

the chest, the guts, the rump, or the back of a steer, for example, based on capacity, shape, and volume meant looking for "a beef animal …[with] power to consume feed and convert it into proper material for body maintenance and development." This beef animal lent itself, according to Curtis, to a higher percentage of dressed carcass. He argued that if every animal just gained an additional one pound of quality meat, the American consumer could see as much as 173 million pounds more in edible product. These "square, low set, deep, broad in the body, compact and smooth" steers possessed a "large amount of weight placed in the regions which sell for the highest market price."[62]

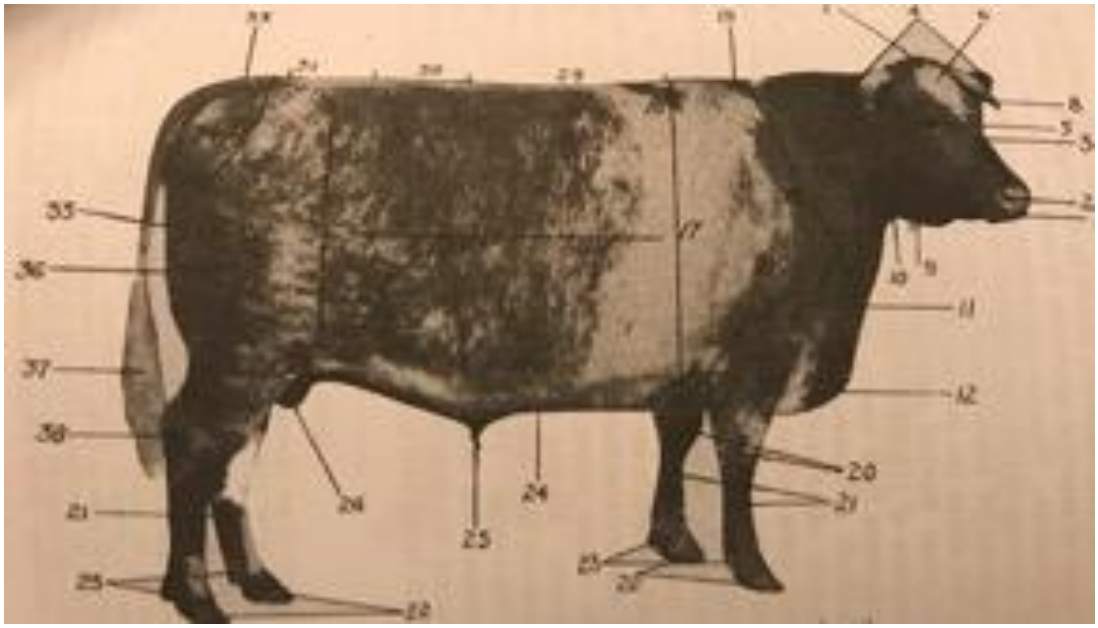

FIGURE 20. Location and names of the exterior parts of beef cattle. *Source:* Robert S. Curtis, *The Fundamentals of Live Stock Judging and Selection*, 1920, 223.

Curtis linked the basic anatomy (Figure 20) with the slaughter animal's body hanging on the rail (Figure 21). He labeled the cuts to assist the student and breeder in making connections to the observable body parts on live animals to retail meats. Linking

[62] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 22-46.

the breeder to the butcher's viewpoint was the essence of modern animal selection and breeding. Curtis argued that 56 percent of the modern steer came from the rump, rib, and loin, and those cuts possessed the highest retail value as well. In this regard, the overall weight of the animal when butchered mattered less than the location of the weight; "animals making the highest dressing percentage conform to the block or rectangle" in body type. These animals with a "low set broad, arched rib, [and] deep-bod[y]" carried, relative to their nineteenth-century predecessors, "a…large amount of the weight placed in the regions which sell for the highest market price."[63]

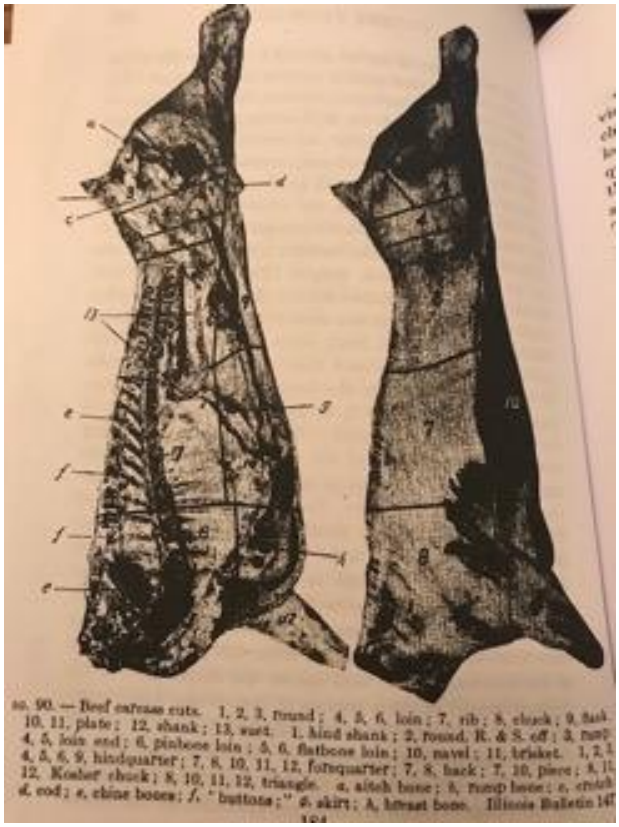

Figure 21. Beef carcass cuts. *Source:* Robert S. Curtis, *The Fundamentals of Live Stock Judging and Selection*, 1920, 235.

[63] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 222-273.

In their publications for students, judges, and breeders, Plumb, Curtis, and Gay's priorities regarding the transformation of body shape in mutton sheep and hogs differed little from the beef steer. The most valuable cuts on the sheep's body were in the same areas as the steer. Plumb highlighted three places: the muscle right behind the shoulder on top of the rib (the rack), the loin, and the leg muscle. In selecting for these parts, a broad back and a wide body correlated with high levels of production. Different than cattle, all sheep breeds shown at the International produced fiber in addition to meat. Plumb placed some value on fleece and provided standards for evaluation. A judge spread the locks of fleece with his hand to evaluate the quality of staple and the length, consistency, and density of wool on the shoulder, back, and thigh.[64] Despite the information he offered students and breeders on wool selection in this textbook, other reformers at the International worried little about wool production or the overall output of fleece in the sheep industry; meat production really drove the International's standards for sheep.

Warren Gay's recommendations, for example, regarding the development of a mutton type of sheep mirrored the advancements Plumb and Curtis pushed for in beef cattle. Butchers rarely quartered sheep when slaughtering as they did with cattle; instead they normally halved the sheep horizontally between the saddle and the rack—a breaking point on the lamb's body between the twelfth and thirteenth rib. The back half of the lamb was the saddle, which included the loin, hip, and rump of the sheep. Two of the most valuable cuts of meat from the lamb came from the saddle: the leg of lamb and the

[64] Plumb, *A Study of Farm Animals.*

loin chops. In the other half, or bottom half when on the rail, the lamb carried the short rack and the breast. The short rack, or the rib chops, was worth as much as three-quarters of the value of the whole rack.[65]

For that reason, Gay insisted that livestock evaluation should reflect the retail value of meat cuts in mutton sheep. The judge at the International, whether in the student competition or in the show ring, needed to prioritize the volume and width of the sheep from the top of the shoulder down the back to the tail set. These features included the two most valuable cuts, the rack and the loin, and the judges were to "handle" them—grab these parts with their hands—to determine their merit relative to the other animals in the class (Figure 22). After handling and measuring the top, the judge finished their close inspection by handling the leg muscle. Because showmen groomed the fleeces for the show ring, the wool limited the judges' visual appraisal and required them to place additional emphasis on handling and the knowledge they gained from measuring the length and width of each sheep's rack, loin, and rump in a way that was not customary for cattle or hogs.[66]

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[65] Gay, *The Principles and Practice of Judging Live-Stock*, 239-267. According to Gay, a good sheep could yield between 45% and 63% of meat.

[66] Curtis, *The Fundamentals of Live Stock Judging and Selection*, 51-57, 366-428. To evaluate wool on a live animal, the breeder or judge parted the fleece with their hands. In general, there were three types of wool: fine wools, medium wools, and long wools. The majority of mutton breeds were medium wools. Regardless of wool type, the judge parted the fleece to examine the staple, but with the different wool types the judge evaluated them based on their unique characteristics. The fine wools possessed the highest-quality fleece with a fine character, sometimes shorter in length with a tight crimp and yoke. Each strand of wool had grooves, known as the crimp, and each type of fleece had different crimp requirements. The medium-wool breeds yielded fleeces with greater length and was typically coarser to the touch. These breeds produced fleece that corresponded to greater durability when used in textiles. The long-wools had a more open fleece with less crimp than the mediums and the fines but possessed a substantial amount of yoke. The yoke related to the oil in the fleece and produced a color that was visible to the judge.

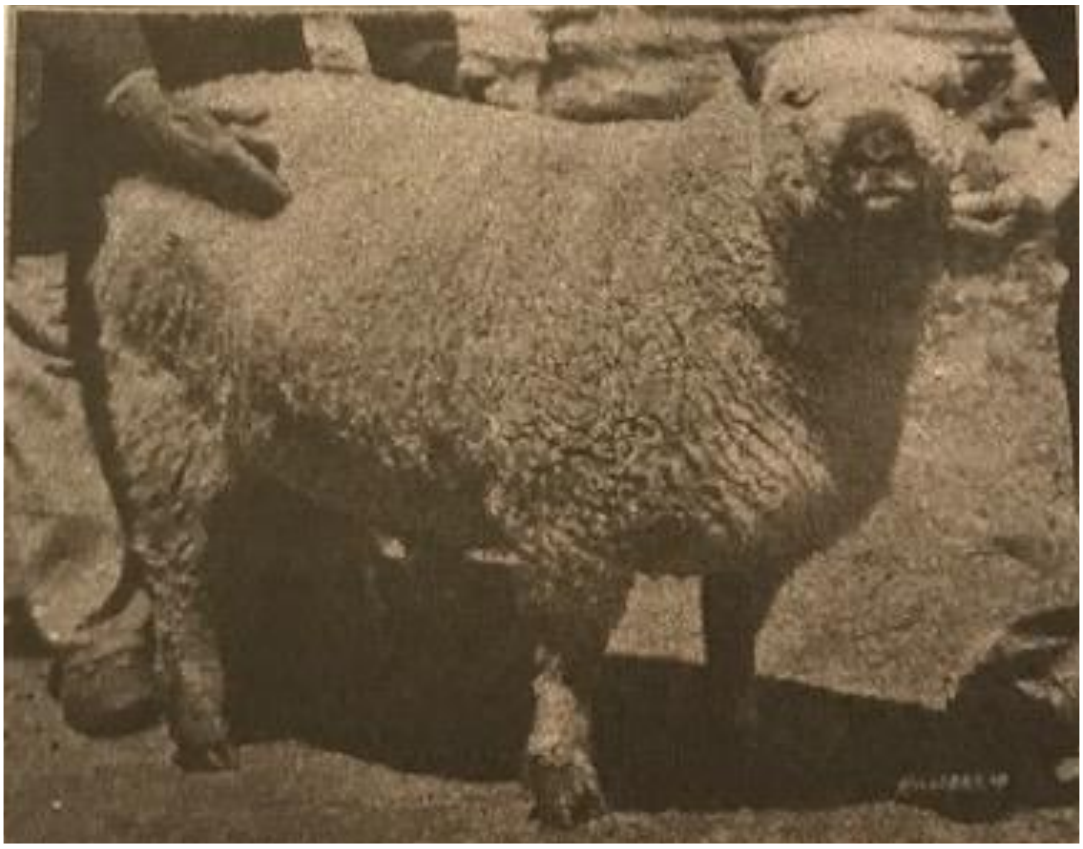

FIGURE 22. Judge handling sheep to determine the width of loin. *Source:* Robert S. Curtis, *The Fundamentals of Live Stock Judging and Selection*, 1920, 373.

With pigs, farmers had to use different standards depending on whether they raised lard hogs or bacon pigs. Like cattle and sheep, the marketing purpose of the lard hog dictated the body parts most important to selection (Figure 23). The scorecard for evaluating lard hogs weighted heavily the development of the forequarters, the back, and the hindquarters. The best lard hog had a wide, level, and square top that carried its muscle shape down into the ham region. The ham should include muscle definition all the

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Regardless of type, judges looked for uniformity and consistency of wool across the entire body. This demonstrated a higher-yielding and higher-quality fleece. A judge had to balance quality, quantity, and uniformity to gauge the overall rating of the fleece produced by both wool and mutton sheep.

way down to the leg to ensure the largest possible size on the animal's skeletal frame. The bacon hog differed on these points. Plumb's scorecard for the bacon type levied zero points for the development of the forequarter or the hindquarter, parts which correlated little to the overall value of this type. However, evaluating a bacon pig required a focus on the development of the overall structure, body, and side of the animal. Instead of being compact, level topped, and wide, the bacon hog was long, with an arched back, and narrower made.[67]

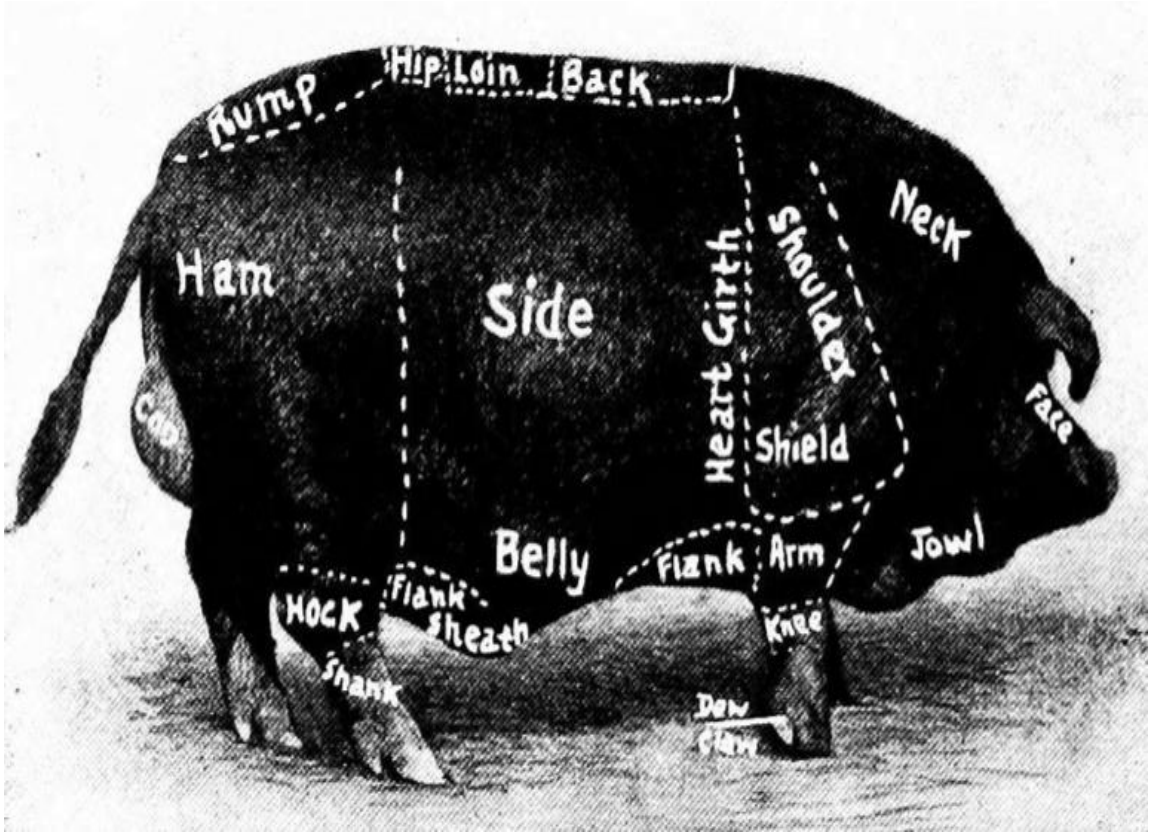

FIGURE 23. Illustration of pig body parts. *Source*: C.S. Plumb, *A Study of Farm Animals*, 1920, 406.

[67] Plumb, *A Study of Farm Animals.*

To encourage this specialization, the International featured classes that pitted animals against one another to award the best meat-producing carcass. The market classes focused on castrated animals or non-breeding livestock, like steers, wethers, or barrows—spayed and martin heifers competed with steers.[68] In the Carcass Cattle Test, organizers divided the fat steer show into two sections that gave special attention to purebred steers, but also included a second portion that allowed grade or crossbred steers with purebred ancestors to compete. In each division, judges selected champions, and then they picked a grand champion steer out of the representatives from the purebred and crossbred champions; judges had a nearly universal bias in favor of the purebred winner.[69] These single-entry awards demonstrated to the audience and producers the most desirable characteristics of an individual animal; but, for the International to thrust agriculture into a new era that focused on the slaughter goals of Chicago, the organizers created group classes and carcass classes to encourage standard phenotypes among several different animals.

Chicago meatpackers introduced the carload class to urge breeders to consistently produce high-quality animals, which would decrease product uncertainty for the slaughterhouses. The International challenged stockman to bring a carload of uniform animals, which proved more difficult than exhibiting a single great animal. The single-

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[68] Steers, wethers, and barrows were castrated cattle, sheep, and hogs, respectively. In the cattle category, steers also competed against spayed or martin heifers. Martin (freemartin) heifers were sterile females with masculine features that resulted from being born as a twin with the other twin being a bull calf.

[69] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1917), 88, 150-154, 182-186.

entry steer, for example, could simply be an aberration or a "freak" and, thus, was not indicative of consistency in the production of market animals.[70] Alongside the carload, the Union Stockyards heavily emphasized the importance of the block class. This class allowed judges, participants, and spectators to examine the quality of the carcass on the rail. Typically, the animals would be examined and placed while alive. After the judges ranked them, the livestock were killed and judged again.[71] This allowed the students and breeders to see the product and learn how to evaluate a live animal for market production.[72]

While the International faced some criticism, it undoubtedly encouraged breeders to bring to the show ring the qualities important to predicting performance. Observers in the livestock world well understood the International's aspirational function, and the importance of pushing agriculture forward toward new types of animals, even if those animals in the show ring were expensive to purchase and raise. Through the standardization and dispersion of better types of animal, the Exposition reshaped animal form according to market value. Showing the best animals from each farm presented a sort of futuristic display of the next iteration or model of technological development akin to the demonstration of new machines at a world's fair.[73]

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[70] *Review of the First International Live Stock Exposition*, 1900, 51.

[71] *Review of the First International Live Stock Exposition*, 1900, 150-152, 165.

[72] *Review of the First International Live Stock Exposition*, 1900, 7-9; C.S. Plumb, "International Live Stock Exposition," *Home Journal* (De. 13, 1900), Vol. III, CSPP.

[73] Ibid.

Conclusion

To improve both farm profitability and national agricultural productivity, land-grant university researchers worked at their home institutions and at the International to educate breeders about animal form and function. Reformers attempted to denormalize animals like Kansas's gigantic steer, and they aspired to reconstruct animal form around a new set of ideals. Plumb contended that this new type of meat animal, for example, was a steer between 18 and 24 months old; and, he argued, the market rejected the older type and rewarded the breeder who sold younger, quicker-maturing, higher-quality animals. The International, in partnership with experiment stations and land-grant colleges, provided the "finest example" for breeders in search of "facts that will assist them in prosecuting their work at home better and more economically." They flocked to Chicago to learn the "wisest way" to raise livestock; no man could feed and sell to the greatest benefit of his farm "who is unfamiliar with the butcher beast, a model of fitness in the show ring, or who is a stranger mid the pens of the yards, where quality and character make values."[74]

James Poole, livestock market expert who wrote for *The Breeder's Gazette* and articulated the packer perspective, confirmed Plumb's assessment of the International's educative function by reflecting on some of the ways it redirected farmer behavior. He lauded the International for eliminating aged steers, and judges' preferences discouraged showmen from exhibiting two-year-old steers, even though they were not considered aged. Judges, in this regard, placed a de facto ban or disqualification on two-year-olds.

[74] C.S. Plumb, "Value of the International," *Farmer's Guide* (1904), Vol. III, CSPP.

They selected grand champions almost exclusively from the yearling classes. By 1919, these tastes had become normalized as a result of the standards set by the International judges, and Poole declared that "in recent years by common consent the yearling has held undisputed sway."[75]

Concepts of the "future" and the "modern" pushed by agriculturalists related to the physical bodies of animals; the modern steer possessed a tight-built, stocky-made, deep-chested body marketed at a young age, under two years old, with evenly distributed fat and muscle. These modern animals re-sequenced food production by ameliorating the conflict between the seasonality of farm life and the regular demands of industrial production. In this regard, animals were not just commodities, but they performed labor and generated positive net returns from the aggregate value of their disassembled parts.[76]

Animals performing this economic function recast the farm as a commercial business intended to generate a profit from off-farm exchanges. The farmer could not eat

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[75] Poole, "The Twentieth International."

[76] "Union Stockyards," *Chicago Daily Tribune*, Oct. 10, 1904; "Farmers of the Middle States Must Do," *The Breeder's Gazette* (1882): 494. This article appeared next to an advertisement in *The Breeder's Gazette*. The author of the article, unknown, argued that western ranges had an advantage over eastern and middle states due to seemingly unlimited pasture and vast numbers of animals that poured into the Chicago market. However, by shifting breeding practices, the scrub, or the Texas steer, could be replaced through the adoption of improved breeding and genetic selection. As a result, Midwestern farmers could produce animals by feeding them corn and provide the Chicago market with a better product—an animal that "ripened" at a younger age and with a higher yielding carcass. The efficiency gained through improved breeding and grain feeding offered the producer, the author asserted, an economic advantage over farmers utilizing "scrubs" because input costs, primarily because of age, would be reduced and carcass quality would increase. See also J.A. Spoor, "Stock Raising Far the Greatest Farm Industry," *Chicago Daily Tribune*, Nov. 27, 1904; J.H. Shepperd, "Breeding For and On the Range," *Proceedings of the Annual Meeting/American Breeders' Association* 1 (1905): 88-92; Rudolf Alexander Clemen, *The American Livestock and Meat Industry* (New York: The Ronald Press Company, 1923); George William Lambert, *A Trip through the Union Stock Yards and Slaughter* Houses (Chicago: Hamblin Printing Co., circa 1900, exact date unknown).

the animals; livestock had to be sold for the farmer to benefit from the value generated by the animals' harvested parts. As such, the revenue benefits the farmer garnered from modern livestock resulted from the animals' ability to add value to crops consumed and the land and labor used; when sold, the livestock created surplus revenue, ideally, by carrying in their bodies more valuable products than they consumed. These modern animals served as nonhuman specialists in this growing network of agricultural experts—a mutually dependent set of actors that reoriented farm production and organization. Simply put, modern meatpacking needed and relied on animals doing their part in the industrial chain by converting field corn to meat. This industrial progression shifted livestock toward the realm of technology through the direct management of their physical shape.

CHAPTER FOUR

The International's Pedagogical Function

> The novel feature of the Exposition was the entrance of the agricultural college and its students…It means a new agriculture. The old is moribund; it will die in time. The new has taken root so deeply in the young heart of American agriculture that its future is fixed. Feeble in its beginnings, the butt of jests and jibes scarcely a decade ago, the college of agriculture has projected a force into farm life that is working revolution.
>
> —W.R. Goodwin, Jr., 1900[1]

In 1915, Purdue University, a perennial participant in Chicago, held its first Little International for students, faculty, and the public to witness the successes of "modern" livestock breeding.[2] John H. Skinner, dean of the School of Agriculture, sent out an open invitation, the Livestock Judging Pavilion housed it, and spectators filled the stands to observe and enjoy Purdue's up-to-date livestock and animal husbandry practices. Skinner carefully choreographed every minute, wanting the Little International to capture the attention of attendees and to mimic the rigors of the Chicago International, in order to prepare the students and animals for the big show.

The Purdue University band performed, and in between the showing of cattle, sheep, and swine, student organizers offered spectators sideshow acts that included fainting goats, greased-pig contests, and horse-hitch competitions. The event closed with

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[1] W.R. Goodwin Jr. lived in Chicago and served as the associate editor of *The Breeder's Gazette*.

[2] "The Little International," Communal Accessions 6, 16D1, Folder 10, College of Agriculture, Department of Animal Sciences records, addition 2, Purdue University, West Lafayette, IN (henceforth CADAS); Frederick Whitford, *For the Good of the Farmer: A Biography of John Harrison Skinner* (West Lafayette: Purdue University Press, 2013), 265-267. Purdue's Department of Animal Husbandry hosted the event with the undergraduate-run Hoof and Horn Club.

the capstone grand parade of livestock.[3] For Skinner, the Little International, despite the smaller scale, replicated the enthusiasm and pageantry of the Chicago Exposition, unveiled modern animals to the public, and served as a rehearsal for both students and livestock. Yet the Little International also advanced a curriculum and pedagogy of its own. As an intermediary between the national show circuit and the ordinary farmer, Purdue connected the public to university advancements on its farm, to discoveries at the experiment station, and to the methods of modern husbandry taught in the classroom.

This energy and enthusiasm consumed many other land-grant campuses as well. Ohio State University's Saddle and Sirloin Club, for example, hosted a Little International starting in 1912, and two years later, Iowa State College started its own in Ames. Collegiate agricultural clubs, like Saddle and Sirloin, Block and Bridle, and Hoof and Horn, proliferated across the United States, engaging students in livestock improvement. All these campus clubs instituted student activities in fitting, showing, and judging livestock in preparation for the year's International in Chicago.

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[3] "The Little International," Communal Accessions 6, 16D1, Folder 10, CADAS; Whitford, *For the Good of the Farmer, 265-266*. Also see "Program: Little International Livestock Show and Fitting Contest, 1925," Box 1, Saddle and Sirloin Club publications, North Dakota State University Libraries, Fargo, ND (henceforth SASC); "Fourth Annual Little International Livestock Show and Fitting Contest, 1926," Box 1, SASC. The Saddle and Sirloin Club at North Dakota Agricultural College launched Fargo's version of the Little "I" shortly following World War I. Similar to Purdue, the hosts advertised the importance of this campus event in training students and livestock for the most important show of the year—the International. And, the club wanted to instill the values of the International in college students and share those goals with the public. As such, the fanfare and spectacle of the Purdue Little International was not isolated to West Lafayette. Students at North Dakota Agricultural College provided musical and theatrical shows in between the showing and placing of cattle, sheep, pigs, horses, and poultry. To entertain crowds in 1926, the school's Gold Star Band played, and the Alpha Gamma Rho Quartette sang, and a small cast of students performed "The Little Red Mare," a one act play.

Chief among the clubs' responsibilities was hosting each school's Little International and nearly every land-grant school had a Little "I," from Pennsylvania State College and the University of Wisconsin-Madison, to the University of California, Davis. These Little Internationals advertised the advances made within each school's emerging agricultural program and offered spectators the opportunity to familiarize themselves with the roster of animals.[4] For the universities, these events also served as a direct means to a specific end—success at the International.

Despite their educational and altruistic goals, university officials, with students and animals in tow, went to Chicago to beat or best the other colleges. In the Exposition's first year, schools from Iowa, Indiana, Minnesota, Michigan, Wisconsin, and Ohio participated. By the end of World War I, many others joined the competitions from as far away as California, sending students and animals by train to gain from this educational experience. Land-grant universities competed, hoping to outperform one another and to improve their status within the livestock industry. Winning at this major show also served a public relations function by offering agricultural institutions the opportunity to advertise scientific accomplishments. This visceral interest in beating rival universities often led schools to usurp the goals of pure science to gain an edge in the show ring. For example, many universities bought animals from private livestock producers and showed them to advertise the school's genetic and nutritional advances, even though the university did not breed nor birth these animals. Nevertheless, the schools garnered the

[4] C.F. Gobble, "Indiana and Purdue Win Again," *The Purdue Agriculturalist* XIV, no. 4 (1921): 139-140.

desired acclaim, and success at the International raised the profiles of the universities and their agricultural departments.[5]

Land-grant officials also organized agricultural associations at the Exposition.[6] International Founder C.F. Curtiss, for example, devoted his career to animal improvement at Iowa State College and the International. As an animal husbandry expert and dean at the school, his contributions to agricultural reform exemplified the many roles filled by university officials.[7] He served on the board of directors for the eugenics-oriented American Breeders' Association, and he presided over the American Society of Animal Nutrition, which provided guidelines for modern feeding. He parlayed experiences from the former association into the development and administration of purebred livestock associations, including registries for Shropshire sheep and Berkshire pigs, where he served as the president of both, and he also worked for the National Society of Livestock Record Associations.[8] His resume included many additional honors at the state level where he advised government efforts on livestock improvement and agricultural productivity; his lengthy list of experiences in the movement reflected the

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[5] "The Little International," Communal Accessions 6, 16D1, Folder 10, CADAS; Whitford, *For the Good of the Farmer*, 274-276.

[6] C.F. Curtiss, "Brief History of the American Society of Animal Production," Box 1, Folder 2, P.S. Shearer Papers, Special Collections Department, Iowa State University Library, Ames, Iowa (henceforth PSSP); C.F. Curtiss, "Some Foundations in Agricultural Education," Manuscript call number: LB2543 C947s, Iowa State University Library, Ames, Iowa.

[7] Campbell, "He Put the 'A' in Agriculture," *Iowa Agriculturalist*, Box 1, Folder 8, CFCP; Beckman, "Dean C.F. Curtiss," *The Berkshire World*, Box 1, Folder 8, CFCP; Randolph, "C.F. Curtiss Dies," *Iowa State Daily Student*, Box 1, Folder 1, CFCP; Pammel, Letter to President Calvin Coolidge, Box 1, Folder 8, CFCP.

[8] Ibid.

broader commitment among many land-grant professors to organizations and activities centered around Chicago.

Meatpackers depended on the efforts of these university researchers. In addition to their extensive catalogue of publications, professors served as official judges, superintendents, and show managers; they did the daily work that made the International possible. And they instilled the meatpackers' standards in the minds of college students in the classroom and in extracurricular activities. This partnership at the International between government-funded land-grant universities and the Chicago Stockyards relied on the meatpackers' facilities and money. But the professors and university researchers did the grassroots work at the International and at their home institutions.[9]

University students and animals filled the show rings, and the professors judged, coached, and directed International demonstrations. Many official judges at the International taught their students about the modern animal and improved farming as livestock judging coaches. Students competed with rival schools to win the judging competition. Collegiate judging was one of the most prestigious events. Students worked year-round practicing and honing their skills, so they could edge out classmates to make the university team. Each team had a coach—a university expert and official judge. The coaches trained students by the International's standards. These animal preferences influenced generations of students, who raised livestock and judged shows throughout the United States following graduation. In sum, the International utilized advocacy,

[9] C.F. Curtiss, "Some Foundations in Agricultural Education;" C.S. Plumb, "Who is the Scientific Farmer?," *Rural New Yorker* (1915), Vol. IV, CSPP.

education, and exhibition to reorient production practices toward single-purpose, grain-fed animals by giving specific attention to students.

The universities themselves also participated in animal contests. The land-grants competed in the same classes as improved farmers and wealthy businessmen who invested in stock breeding as a hobby, like the Pabst family who brewed beer or the pharmaceutical giant Eli Lilly. With public money backing them, hordes of student workers, professional herdsman employed by the colleges, and their own grain farms and research institutes, these universities often dominated International competitions with their animals. Ideal body types and genetics were central to success for the schools, but they also developed regimented, precise feeding standards for their animals. In this regard, agricultural specialization in production was not limited to animals.

Urging corn-based diets became a priority for the professors. At first, the International organizers simply advertised the diets of International champions like the famous Advance (1900). He was lauded for his constant access to grain, which included oats, corn, and oil-meal three times a day leading up to the show—a full-feed diet. But simply publicizing animal diets like Advance's delayed the effectiveness and limited the impact of the International's grain preferences. Land-grant colleges therefore created displays that detailed the revenue and yield advantages of feeding grain to livestock. In a large hall, each school focused on one aspect of this specialization to present research and emulate the ideal farm. Finally, the International instituted a grain show modeled after the

goals and desired impact of the livestock competitions and applied the same rates-based metrics to grain production as animal husbandry experts did to livestock.[10]

The grain contest focused producers and spectator attention on per acre productivity, gross national food output, and the marginal costs and returns of production. Improving corn yield was the first goal, and this cohort of professors believed that grain was most advantageous when livestock converted it to meat. Thus, they worked to transform crop husbandry based on the same principles as livestock production. Training students to select the "right" type of cattle, sheep, and pig was necessarily underpinned by scientific-oriented crop production and the use of commercial animal feeds. These land-grant interests wanted farmers to see input costs as a ratio that determined the potential yield advantages of increased grain consumption. Training students and future breeders in animal selection—leading them to raise purebred animals with single-purpose forms—also meant maximizing feed conversion efficiency on the farm, which demanded the marriage of purebred livestock production and the use of properly reared and formulated grains.

Collegiate Livestock Judging

As the superintendent of the International Judging Contest from 1906 to 1938, John H. Shepperd believed in the central importance of classroom and extra-curricular

[10] G.I. Christie, "The New Agriculture," (1916) [An address delivered before the National Fertilizer Association], MSF 89, Folder 2, GICP; G.I. Christie, "Agricultural Extension Work," [A paper presented before the second Pan American Scientific Congress, Washington D.C., December 27, 1915-January 8, 1916], MSF 89, Folder 2, GICP.

instruction of livestock evaluation at land-grant universities that embodied the standards of breed associations and the International. He worked as a professor and dean at North Dakota Agricultural College, and in 1929, he became the president of the school. To be sure, the canonical works of John A. Craig, Charles S. Plumb, Carl Warren Gay, and Robert S. Curtis provided the intellectual foundation and served as the primary texts for students and breeders. But Shepperd also thought that the schools needed to actively train young judges and participate in student competitions at the International. His support for the Exposition and the utility of teaching animal selection to college students was absolute. In 1922, he published a history of collegiate judging contests and placed the International at the center of this broader web of agricultural pedagogy.[11]

Shepperd credited John A. Craig, professor of animal husbandry at the University of Wisconsin, with developing the techniques and the standards for twentieth-century animal evaluation.[12] When Craig moved to Madison to work at the University of Wisconsin in 1890 and then to Iowa several years later, he challenged older methods of livestock evaluation. Early livestock evaluation provided little structure and relied on the judgment of local tradesmen and breeders. Craig shifted the terms of evaluation from a local craft to a specially researched and formally taught skill with consistent standards nationwide. Shepperd lauded the work of Craig; they were colleagues in the animal husbandry profession and worked together in support of the International's goals.

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[11] J.H. Shepperd, *Livestock Judging Contests* (Agricultural College, North Dakota: Agricultural Experiment Station, The North Dakota Agricultural College, 1922).

[12] See John A. Craig, *Judging Live Stock* (Des Moines, Iowa: The Kenyon Printing & MFG. CO., 1901).

Shepperd's favorable opinion of Craig also demonstrated a broader collaboration among agriculturalists at land-grant universities who shared a belief in the scientific improvement of animal agriculture. This movement rejected the provincial mores and preferences of nineteenth-century breeders and the state and county fairs that had dominated livestock evaluation.[13]

Instead, land-grant university professors sought to instill methodological selection to a new generation of breeders by teaching livestock judging. One of Craig's most important contributions to systematic evaluation was the creation and teaching of the scorecard. At the International and universities, whether with professors or breed association officials, the scorecard became a leading tool in standardization—an official, rational scoring system meant to transcend fads, regions, or subjective leanings. Craig's "scale of points" and the "philosophy [he created for] explaining their requirements," Shepperd wrote, gave university students "a practical and scientific basis" for this larger effort.

Craig's primary contribution to the field was systematizing a methodology for animal selection; his emphasis was less on the single-purpose animal. He created standards based on university science that eliminated the proclivities of region and local farmers, which helped make livestock judging an occupation with national standards. Craig worked for ten years on this project before publishing *Judging Live Stock* in 1901. The book became an instant success—a fourth edition appeared only one year later, and a sixth edition was printed in August 1904. Nearly all the agricultural colleges in the

[13] Shepperd, *Livestock Judging Contests*.

United States and Canada offered judging courses by the turn of the century, and Craig's volume provided these schools with their only text in the field for over a decade.[14]

Henry William Vaughan was a land-grant graduate and the first International student participant to contribute to these canonical texts on animal husbandry.[15] Unlike Craig whose career in the United States and Canada predated the International, Vaughan competed in Chicago as a college student. He received training at Ohio State University in stock judging, and as a result of his skill in selection, Vaughan served as a prominent member of the school's judging team in 1907.[16] After finishing his master's degree in 1909, he served as an instructor at Ohio State until he took a job as an animal husbandry professor at Iowa State College in 1913. Later in his career, he also served at University

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[14] Ibid.

[15] Henry William Vaughan, *Types and Market Classes of Livestock* (Columbus, OH: R.G. Adams & Co., 1915).

[16] Shepperd, *Livestock Judging Contests*. Shepperd was a graduate of Iowa Agricultural College in 1891. When he attended school, livestock judging classes did not exist, and the school provided little instruction in the area of animal selection. During his study in Ames, Shepperd lamented, "scientific agriculture was at a low ebb" among students, and he had the distinction of being the only agricultural student at the university. Following graduation, he went to the University of Minnesota for graduate study. The same condition prevailed there. Then, Shepperd went to the University of Wisconsin where J.A. Craig taught. Shepperd devoted the entire calendar year of 1892 to the study of livestock. Gleefully, Shepperd remembered, the University of Wisconsin developed a course in stock evaluation under the direction of Craig. Craig mimeographed a scorecard prototype for students to fill out while evaluating livestock. Shepperd recalled Craig's constant revision of the scorecard from year to year until it was in publishable form. Interestingly, Craig focused nearly as much attention to the form of the scorecard as the substance. Craig finally settled on a card that was 4x10 inches so that the judge could slip it in his pocket when he needed to use both hands to evaluate an animal.

In doing so, under Craig's direction, Wisconsin became foundational campus in the development of collegiate judging and courses on animal selection. In 1892, the University of Wisconsin held the first student judging contest on its campus—the Wisconsin Winter Short-Course Judging Contest. Following which, collegiate animal selection became a popular course and activity in Madison and at other land-grant institutions. Colleges enhanced the short course instructional format and subsequently developed two- and four-year collegiate judging programs.

of Minnesota and Montana State College in the same role and as the editor of the *Duroc Jersey Digest*.[17]

Vaughan represented an important generational shift. Whereas Craig was most concerned about the judge's approach and the use of standard methods, Vaughan was more specific about animal types and forms. His preferences started with the "terminal" standard and worked backward to breeding from there. When agriculturalists mentioned "terminal" animals or standards, they were referring to the killing or the slaughter of animals for human consumption. Often, researchers or journalists wrote about the importance of "terminal" sires in improving offspring for the market. "Terminal" possessed a reflexive meaning among breeders that suggested the animals produced by that sire were intended for slaughter and not breeding. Vaughan, however, believed that breeding programs needed to reverse engineer animals, beginning with the butcher's block, to determine not only what market animals should look like, but also all livestock, including breeding stock. Vaughan's position, which began with the abattoir—the slaughterhouse—provided breeders an updated perspective on judging from the work of Craig, an all-consuming, focused approach on the butcher's perspective to determine the standards of livestock evaluation.[18] In this regard, the International was not simply the

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[17] H.W. Vaughan, *A Picture of the Live Stock Industry* (Chicago: The American Institute of Agriculture), 1-2.

[18] Vaughan, *Types and Market Classes of Livestock*; Shepperd, *Livestock Judging Contests*.

See also Herbert W. Mumford, "Market Classes and Grades of Cattle with Suggestions for Interpreting Market Quotations," *University of Illinois Agricultural Experiment Station*, Bulletin no. 78 (1902); William Dietrich, "Market Classes and Grades of Swine," *University of Illinois Agricultural Experiment Station*, Bulletin no. 97 (1904); Rufus C. Obrecht, "Market Classes and Grades of Horses and Mules," *University of Illinois Agricultural Experiment Station*, Bulletin no. 122 (1908); W.C. Coffey, "Market Classes and Grades of Sheep," *University of*

recipient of university ideas and students and animals for competition, but the International shaped the direction of academic literature, the education of students, and the types of animals produced on public campuses.

Collegiate livestock judging at the International provided agriculturalists the opportunity to teach students ideal animal types and develop the prestige of the judge. The meatpacking companies and organizers of the International relied on the judging competitions to create a new type of judge. Following graduation, student judges dispersed around the country and took with them new understandings of animal husbandry; they not only bred their own animals, but they also established the standards at other expositions and disseminated the goals of "modern" agriculture. These "jurors" had the responsibility to categorize and prioritize the most desirable genotype, phenotype, and carcass characteristics.

Students, along with their university advisors, practiced all year for the competition. Many teams traveled to farms around their home states, and they went to other judging competitions leading up to the International to prepare for the biggest contest of the year. The International required students to have a great deal of knowledge and experience with horses, cattle, sheep, and swine. At the International, each university had five students on a team. All the individuals from the teams judged three classes from each species, and each class had five animals. Depending on the year, the participants were allotted either 20 minutes or 30 minutes to judge each class before moving on to the

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Illinois Agricultural Experiment Station, Bulletin no. 129 (1908); Louis D. Hall, "Market Classes and Grades of Meat," *University of Illinois Agricultural Experiment Station*, Bulletin no. 147 (1910).

next. In that time, not only did the students rank the class, but they also prepared written reasons detailing the different observations they made and their rationale for placement.[19]

The College Livestock Association, an external umbrella organization composed of agricultural colleges, sponsored the competition for the first four years of the show. Despite creating an enthusiasm by way of collegiate rivalry, the contest received serious criticism amongst the most notable agriculturalists in the United States, including John A. Craig, Charles S. Plumb, and John H. Skinner, with the latter two serving as officers of the contest as well. Many on the collegiate judging committee had concerns about the process of scoring participants, as well as the competitors' penchant for cheating. The criticisms were directed at the format, not the goals of selection. Their disagreements became destructive, nearly causing the collegiate competition to collapse.[20]

In 1903, the fierceness of disagreement prompted the International to strip the college men of their responsibilities in overseeing the contest, and to appoint International superintendents to fill the vacancies.[21] The committee also met in 1904 to create rules to prevent cheating among college students. Some concerned observers alleged that students from the same universities communicated and even handled animals from each class before the time started for evaluation. As it related to scoring

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[19] C.S. Plumb, "Students' Judging Contest," *The Breeder's Gazette* XLV, no. 4-1,157 (1904): 152-153. The format of five animals per class and five students per team changed over time to finally becoming four animals and four students as it is in current competitions. Livestock judging competitions also evolved to the presentation of reasons orally.

[20] Ibid.

[21] Shepperd, *Livestock Judging Contests*. Despite the changes in format, the 1904 contest also was heavily criticized. The professional judges and International superintendents, although competent in animal selection and management, became the targets of negative feedback revolving around their limited ability to work and communicate with college professors and collegiate competitors.

participants, the impartiality of grading also became a serious issue in the early years of the competition.

With all these concerns mounting, the International created the office of a standing superintendent to oversee the competition in 1905—a position with the same level of power and prestige of a specie superintendent. The first in this position was William John Black, professor of animal husbandry, deputy minister of agriculture in Manitoba, and first president of the Manitoba Agricultural College. Under his direction, the contest stabilized and grew in strength. But he quit the following year and Shepperd himself took over, staying on as the perennial superintendent. To ensure the credibility and legitimacy of the program, he established a strict protocol for contestant behavior and evaluation. Shepperd required students to maintain a "strict military formation" throughout the day of the competition. Shepperd believed that militaristic methods of maneuvering and systematized scoring improved the efficiency and credibility of the contest.[22]

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[22] Shepperd's determination and detailed focus on improvement made an immediate impact on the protocol for the annual event—a format copied and mimicked by other events for years to come. The judging contest, consequently, grew in terms of participation rate, popularity, and prestige. However, Shepperd quickly learned that criticism, justified and not, became an ongoing problem regardless of the precautions he took. In the 1920s, Shepperd received letters from coaches and college staff informing him of impropriety at other contests and warning him of potential problems at the International. J.H. Skinner, Purdue University, wrote to Shepperd on November 19, 1924, informing him of alleged cheating among college students and coaches.

At other contests, especially the Kansas City competition, Skinner thought that management played a role in allowing unruly behavior. Skinner heard secondhand from Purdue's livestock judging coach that the "loosely conducted" event led to students overhearing official places and that large, poorly-run groups of students allowed teammates to share information. These offenses, Skinner argued, would not be a problem at the International because Shepperd put safeguards in place. He urged Shepperd, nevertheless, to take further action and establish stricter procedures. Skinner pushed Shepperd to ensure that the coaches did not influence or cheat to gain an advantage.

INSTITUTION		OHIO						
HORSES		1st ring		2nd ring		3rd ring		Total
Student	11	30	38	40		50	42	200
"	32	42	39	44		37	30	192
"	53	45	37	50		50	47	229
"	74	45	39	46		50	45	225
"	95	45	39	50		50	45	229
TOTAL		207	192	230		237	209	1075
CATTLE								
Student	11	30	29	27		45	40	171
"	32	50	39	45		50	49	233
"	53	37	39	45		37	40	198
"	74	40	34	45		37	38	194
"	95	30	29	45		45	45	194
TOTAL		187	170	207		214	212	990
SHEEP								
Student	11	50	48	50	38	50		236
"	32	50	50	50	44	50		244
"	53	36	38	50	44	46		214
"	74	50	46	46	45	46		233
"	95	50	48	50	39	50		237
TOTAL		236	230	246	210	242		1164
HOGS								
Student	11	25	35	38		50	43	191
"	32	22	40	40		45	38	185
"	53	35	40	35		45	45	200
"	74	44	44	25		50	40	203
"	95	20	36	44		25	45	170
TOTAL		146	195	182		215	211	949
GRAND TOTAL		776	787	865	210	908	632	4178

FIGURE 24. Ohio Team's Scores, 1921. *Source*: John H. Shepperd, *Livestock Judging Contests*, 1922.

Skinner clearly stated that not only did the International need to avoid cheating, but the alteration or expansion of existing rules would help limit "the appearance of unfairness." To do so, Skinner advised him to prevent coaches from selecting livestock for the contest. And, if they do, the coaches should have no knowledge of the numbering on the animals. Finally, measured distance, codified by rules, should be maintained between groups of contestants with students from the same institution being kept separate; these formalized barriers, Skinner hoped, would reduce or eliminate information sharing among teammates. See J.H. Skinner, Letter to J.H. Shepperd, (1924), Box 14, John H. Shepperd Papers, North Dakota State University Libraries, Fargo, ND (henceforth JHSP).

In a follow-up letter on November 26, 1925, Skinner's advice went from helpful suggestions to conspiratorial. He reiterated the goal of maintaining the integrity of the contest by ensuring that the competition be "absolutely straight and clean." He alleged that coaches plotted grand schemes to communicate placings to students. Coaches, many of whom had military training, could mark or label through code, Skinner argued, to communicate the class order to his students. See J.H. Skinner, Letter to J.H. Shepperd, Box 14, JHSP.

Two years later, Shepperd actively pursued a case of cheating at the International against the Oklahoma Agricultural and Mechanical College. In response, the president of the school, Bradford Knapp, conveyed to Shepperd that the student in question would be immediately expelled if the investigation unveiled a legitimate attempt to cheat at the International. However, Knapp also argued that there had been many attempts to undermine his school because of its recent successes. These false allegations, he contended, amounted to attempts to injure the rising agricultural program by rival institutions. Nevertheless, Knapp assured Shepperd that a thorough hearing would be held and that the school would take appropriate actions to prove to the International its seriousness in competing at the "highest and most manly contest." See Bradford Knapp, Letter to J.H. Shepperd, (1927), Box 14, JHSP.

Shepperd created several scoring rubrics that cross-referenced scores to ensure accuracy and eliminate errors. For example, the clerks tallied student scores horizontally and the ring scores vertically as with the members of the Ohio State judging team, which won the top team award at the International in 1921 (Figure 24). Of the 12 classes placed, eight were so-called "reasons" classes. On this tally sheet, students were not required to provide reasons in the rings possessing a blank score column. In the end, each student could score as much as 1,000 points in the judging contest and a perfect score for the team would be 5,000 points.[23]

Following the conclusion of the reasons portion, the entire staff, under the direction of Shepperd, gathered together to make final tabulations that often continued into the early morning hours. This team of clerks assessed, scored, and ranked each individual and team, which required the officials to finalize and publish the ten highest-scoring individuals. When completed, Shepperd and his staff posted the results in the lobby of the Stock Yards Inn between one and four in the morning. Shepperd recalled that most of the coaches eagerly waited for the results—a sleeplessness provoked by anxiety and excitement resulting from the potential thrill and honor of winning the

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[23] Shepperd, *Livestock Judging Contests*, 14-15; *Official Catalogue: International Live Stock Exposition* (Chicago: Union Stock Yards, 1910), 373-377. Students received points for the placing of each class and the reasons for their rankings, which created a two-fold dilemma. First, many university professors did not trust that practical agriculturalists grading written reasons. To solve this problem, the committee assigned a college-trained expert to partner with the practical officials to grade the written portion. Second, the organizers debated how much credit they should afford students who placed a class correctly and provided poor reasons in comparison to the competitors who placed the class poorly and turned in good reasons. In response, they established a set of standards and a point system to evaluate each separately and then add the results. See Plumb, "Students' Judging Contest," 152-153; C.S. Plumb, "Students' Judging Contests Again," *The Breeder's Gazette* XLII, no. 6-1,080 (1902): 208.

prestigious event. Top teams and individual contestants would immediately send telegrams to their schools and families.[24]

Shepperd bragged about the International's success in training young judges when he recalled seeing two former contestants judging at the North Dakota State Fair. Shepperd approached the two judges and asked if they remembered placing animals in Chicago. The judges, H.H. Kildee and Howard J. Gramlich, who represented the Iowa and Nebraska judging teams, told Shepperd that they could recall the classes of animals and the reasons they gave as "though it were yesterday." Consequently, Shepperd argued that the International judging contest and the rigor of the competition "fastens ideas and ideals in the minds of young men," and they carry those standards with them when judging future shows or when "[they] will be stockman." Shepperd even admitted that disagreements between officials and contestants "matters little." Instead, what counted was the "impression" on the mind and judgement in animal selection left on the student—the future judge and breeder. [25]

In 1916, Shepperd conducted a study to record and analyze the career trajectories of former collegiate judging participants to measure their broader involvement in the agricultural community. He determined that 614 college students and approximately 100 farmers' sons (non-collegiate) had participated in the contest. Of these participants, 439 responded to Shepperd's inquiries: 44 percent taught or conducted research at agricultural intuitions in the United States and Canada, 41 percent became farmers and breeders, just

[24] Shepperd, *Livestock Judging Contests*, 20.
[25] Shepperd, *Livestock Judging Contests*, 8-9.

over 7 percent worked as agricultural editors, secretaries of breed associations, or livestock commission men, and less than one percent worked in nonagricultural professions. With this data, Shepperd concluded that the judging contest provided an unparalleled service for universities, "an educational factor" that "assures its continuance as one of the strong features of agricultural education in North America."[26]

These students, however, were not only sons, but also daughters. While World War I amplified to consumers and producers the importance of food production, it also pushed the door open to the formal participation of women in university agricultural courses and activities.[27] In 1917, Edith Curtiss competed on the livestock judging team for Iowa State College, where her father, C.F. Curtiss, served as dean of the College. The younger Curtiss performed among the top of her peers. She demonstrated a knack for evaluating animals, ranking highly at the International and receiving recognition for

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[26] Shepperd, *Livestock Judging Contests*, 10-11.

[27] Because of increased labor needs, the role of women in industry grew during World War I. However, the question remained, would women be enticed or compelled to vacate their positions following the War? As a matter of fact, by 1920, women made up a smaller percentage of the labor force than in 1910. See David M. Kennedy, *Over Here: The First World War and American Society* (New York: Oxford University Press, 1980); William L. O'Neill, *Everyone Was Brave: The Rise and Fall of Feminism in America* (Chicago: Quadrangle, 1969); William Henry Chafe, *The American Woman: Her Changing Social, Economic, and Political Roles, 1920-1970* (New York: Oxford University Press, 1972).

According to these authors, the war and suffrage were highpoints in the role of women in public life, and following the war, the existing spheres assigned to men and women reconstituted themselves. Former suffragists were fragmented by differences of opinions on political and cultural issues. Kennedy used the Sheppard-Towner Act of 1921 to demonstrate this shift. The measure provided federally financed instruction for maternal and infant care and was supported by feminist groups. However, Kennedy notes, it was not intended to push women into industry, instead the bill tried to secure women in the prewar domestic sphere.

For a conversation on labor force demands during the war, especially in the "battle of materials," see Eric Hobsbawm, *The Age of Extremes: A History of the World, 1914-1991* (New York: Vintage Books, 1994).

being the best student on her team, as well as fifth placed individual overall. She also won a medal for placing first among all students in the evaluation of Shorthorn cattle. Curtiss, an esteemed student of agriculture in Ames, became the first woman to take animal husbandry at Iowa State College, and she completed her degree with honors in 1918. Following her graduation, she worked for the federal government as a scientific assistant in animal husbandry. William H. Pew, head of the Department of Animal Husbandry, lauded her long record of achievement and success. He predicted that women would be entering the field replacing men as animal husbandry experts at universities even though in that field "women have been shunned until rather recent."[28]

Curtiss was not the sole woman participant. In 1917 and 1918, women from three different land-grant universities enrolled in the judging contest.[29] As superintendent of the livestock judging contest, Shepperd acknowledged the accomplishment of the women's involvement at the contest in his annual report. Shepperd wrote that the contest has been "thrown wide open and has even been made co-educational."[30] Eva Ashton of

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[28] "Women as Animal Husbandmen," *The Breeder's Gazette* LXXIV, no. 3-1,912 (1918): 85. It is important to note that women played a major role in political activities from abolition and suffrage to community reform and political demonstration. In fact, prior to the entrance of the United States into the World War I, Fanny Garrison Villard, Carrie Chapman Catt, and Jane Addams, with many others, formed the Woman's Peace Party. This organization, joined by the League to Enforce Peace and the American League to Limit Armaments, attempted to prevent American military build-up and protect the gains made by women in the political sphere. These organizations feared that the masculine and virile overtones of war could usurp the progress and goals of the feminist movement. For more on these anti-preparedness organizations, see Kennedy, *Over Here*. For a broader discussion on the diversity, complexity, and vocabulary of feminism and political activism, see Nancy F. Cott, *The Grounding of Modern Feminism* (New Haven: Yale University Press, 1988).

[29] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1918), 258.

[30] Ibid.

Nebraska, for example, earned special recognition from the American Shropshire Registry Association for ranking in the top five of all collegiate participants in 1918. Yet Ashton pushed back against the notion that women suddenly burst onto the animal-husbandry scene.

Instead, Ashton argued that women played a significant role in animal husbandry prior to the Great War and that women would shape animal husbandry practices and agriculture more broadly following it. Ashton graduated from the University of Nebraska in 1919 and began working on the editorial staff of *The Breeder's Gazette* in Chicago. While serving on the staff, she published an article in *The Shorthorn in America*, "Animal Husbandry: A Vocation for Women," arguing for a bright future for women working in the field. To be sure, the demands of American engagement in the war had required women to fill occupations vacated by men. But not only did women take on new roles, which led to them to participate in collegiate activities for the first time at the International, but they also performed beyond the expectations of many observers. Ashton announced to the cattle industry that "[a]ny question as to the propriety of a woman's having a vocation is obsolete, a condition which lies at the feet of the great war."[31]

Women had actually been active in agriculture before the war and made many contributions to the advancement of animal husbandry even though they did not receive formal recognition by the International or many universities. In a brief historical section,

[31] Eva Ashton, "Animal Husbandry: A Vocation for Women," *The Shorthorn in America* (1919): 13-14.

Ashton mentioned the shepherdesses, milkmaids, and women gleaners of centuries past that made agriculture possible.[32] Even before direct American involvement in World War I, Ashton exclaimed, many women owned, bred, and sold elite purebred Shorthorn cattle. In 1914, the Coates' Herd Book listed 71 women as owners of Shorthorn cattle, a statistic Ashton used to demonstrate that women had previously played an active part in animal husbandry.

Women agriculturalists like Ashton proved that they could handle the physical activity of working cattle and that they could manage a business. Ashton's use of "vocation," and others called animal husbandry a "profession," represented a shift from the Country Life Commission narrative of the state of agriculture and rural life. This change in language and perspective coincided with the goals of the International and land-grant universities in applying contemporary science to make agriculture an efficient, modern industry. Ashton picked up on this narrative when simultaneously making the case that animal husbandry merited respect as a career that required executive, managerial, and business expertise and also that women could effectively perform those

[32] Previous scholars have investigated the role of women on the farm and the impact of women's labor and systems of knowledge on production. Judith Carney, in *Black Rice: The African Origins of Rice Cultivation in the Americas* (Cambridge: Harvard University Press, 2001), argues that more than labor was forcibly shipped across the Atlantic from West Africa. Slave women brought with them knowledge directly related to the cultivation of rice, which included sophisticated irrigating and clearing techniques for different types of land like upland (good soil, good climate), inland swamp (requiring the planting of rice on ridges and the forced flooding of the ground), and tidal cultivation/mangrove system (requiring complex hydraulic and land management principles). The specific knowledge these West African women possessed drove prices up equal to the male slave, because, beyond cultivation, they were experts in harvesting different types of rice. In the minds of West African women were sophisticated understandings of land management, seed cultivation, and crop harvest that alter previous scholarly understandings of European- and male-oriented agriculture.

tasks. In addition to the technocratic and commercial acumen needed, women, she argued, had the talents necessary for practical or "in the field" animal husbandry. Breeding and raising elite purebred animals required business skills, a breeder's intuition, and intimate knowledge of animals that women developed through toiling on the farm and caring for livestock.[33] Ashton concluded that as democracy expanded so too did the cause and credibility of animal husbandry in American society and the role of women in both practical and academic agriculture.[34]

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[33] Ashton, "Animal Husbandry," 13-14. After describing the historical and contemporary importance of women in agriculture, Ashton reminded readers of the educational and career-related limitations women faced in the field. First, Ashton believed that women had beneficial skills that applied to agricultural research and teaching at the secondary and post-secondary levels. She argued that women teach many of the nation's children in traditional disciplines like Latin, but with the expansion of agricultural education under the Smith-Hughes Act of 1917, women should be agricultural educators as well.

[34] Ashton, in her own life experiences, demonstrated the contributions made to agriculture by women both in their care for animals and contributions to the farm, but also in the public sphere at land-grant universities and major livestock expositions. Also see the life work of Virginia Claypool Meredith, in Frederick Whitford, Andrew G. Martin, and Phyllis Mattheis, *The Queen of American Agriculture: A Biography of Virginia Claypool Meredith* (West Lafayette: Purdue University Press, 2008), who was a renowned agriculturalist, writer, and speaker. After the death of her husband in 1882 (she was 33 years old), Meredith managed a large farm and raised and showed a famous herd of Shorthorn cattle and Shropshire sheep. At the Chicago World's Fair in 1893, she was the Indiana representative on the Board of Lady Managers of the World's Columbian Exposition. In 1921, she was appointed to the Purdue University Board of Trustees; she was the first woman to hold that position. The fame and influence she attained resulted from her experiences and successes as a prominent and knowledgeable crop and animal producer. Her understanding of animal exhibition and the production of quality livestock did not just allow her to stand out among women, but also among all participants.

Meredith's level of success in crop and animal husbandry certainly was unique; however, her practical experience with plants and animals among women was not unusual. As Ashton argued, women played an important role in the agricultural community that went beyond the doldrums of farm labor and extended to the acquisition and advancement of husbandry regimes and systems of knowledge related to improvement. In this regard, Ashton demonstrated that even though the recognition that she received and the level of fame that Meredith acquired was extraordinary, the practical experience and knowledge of agricultural production among women was not uncommon.

See Gabriel Rosenberg, *The 4-H Harvest: Sexuality and the State in Rural America* (Philadelphia: University of Pennsylvania Press, 2016). Rosenberg certainly never suggests that women were not capable, but instead that agricultural organizations and livestock exhibitions—

Like other pundits devoted to scientific agriculture, Ashton also believed that growth in research and innovation, as it related to animal breeding and feeding practices, directly benefited the state and the goals of the federal government. As a former student at a land-grant institution and competitor at the International, Ashton recognized the importance of scientific research on animal husbandry practices. As such, she concluded that women could contribute to the reformative spirit of the age. Ashton died from cancer in 1921 just two years after graduating from Nebraska, but she left a request for policymakers and educators to help overcome barriers to participation for women.[35] For Ashton, women capably performed in these occupations, whether breeding and feeding on the farm or competing in judging contests at the International; but unequal participation in education from the youngest of ages limited vocational opportunities for

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such as the 4-H youth organization, the focus of his study—as a part of the biopolitical state, organized young men and women into gender-specific spheres, such as livestock production for men and home economics for women. Rosenberg's contention that home economics curricula was aimed at young women stands without question. As a matter of fact, one of Meredith's greatest legacies among agriculturalists was the development of home economic programs at the University of Minnesota along with her insistence that Purdue also create this same curricular space for women in higher education.

However, to suggest a limited role or influence of women in the production and even exhibition of livestock understates the enormous contributions women agriculturalists made to the development of the nation's food source. As Ashton argued, women made incalculable contributions and decisions in on-the-farm animal husbandry, and despite the imbalance in participation rates between men and women, young women often showed animals at the county and state fair level as well as the International in Chicago. For example, in 1938, the Grand Champion steer was awarded to Irene Brown of Aledo, Illinois. Brown was a girl active in her 4-H Club and won the same honors at the Illinois State Fair prior to the International. Both Brown and her steer, "Mercer," became famous for the win because they beat out the entries made by land-grant universities. The Reserve Grand Champion steer went to Oklahoma A&M. This young 4-Her went up against well-funded, state-run land-grant institutions to win this prestigious award. Also, in the junior steer show, the reserve award went to a girl showman. Thus, the junior show champions were won both by female contestants, and Brown, with her steer Mercer, went on to win the overall award.

[35] "Deaths," *The University Journal* 17, issue 2 (1921): 32.

women in agriculture. She argued that women urgently needed access to schooling to achieve levels of success at higher rates.[36] Notably, as she pressed her contemporaries to imagine the benefits that women provided the community in general, she also consistently promoted the vision of the International.

Despite the limitations of the International and land-grant universities in offering equal opportunity for women with experience in agriculture, Ashton advocated for the same standards in livestock body type and animal husbandry as her male counterparts. For these students, the International was a school without classrooms, which helped reformers normalize and disseminate these preferences. The judging competition served a cyclical function; as college students competed to win the prestigious judging championships, they had to evaluate livestock by the standards set at the International.

As these young men and women left college and entered the livestock industry, they set the standards for other livestock competitions; to win shows and have successful breeding programs, producers oriented their farm decisions around the standards outlined in Chicago. As the finale or last stop for student judges, the International held particular sway as the ultimate contest—or test—in finding a champion student judge and judging team in the United States and Canada. International organizers—and universities by extension—were obliged to properly train students and crown animals suited to more productive farming practices and consumer products.[37]

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[36] Ashton, "Animal Husbandry," 13-14.

[37] Carl Warren Gay, *The Principles and Practice of Judging Live-Stock* (New York: The MacMillan Company, 1914), 3-23.

University Livestock and the Grain Competition

For universities, winning at the International raised the profile of the institution, made their livestock celebrities, and drew attention to the officials and practices that hailed from their agricultural department. John H. Skinner, dean of the School of Agriculture at Purdue University, received many speaking invitations, accolades from university trustees, and authorship requests after Purdue University had windfall successes at the 1917 and 1918 Chicago Internationals. The highlight of those prosperous years was the back-to-back winning of grand champion steer. Merry Monarch won in 1917, and Fyvie Knight won in 1918. Merry Monarch, once winning the International, became a national sensation with his picture and biography appearing in countless agricultural journals. Consequently, herdsman Jack Douglas, born in Scotland, became a celebrity in his own right. Following the success of Merry Monarch, the International Livestock Exposition Association awarded him a medal for being the steer's herdsman, and the American Shorthorn Breeders' Association awarded him a medal for service to the industry.[38] Following the show, the American Shorthorn Breeders' Association donated the proceeds from the sale of Merry Monarch to the Red Cross. Skinner even bragged to Indiana Governor James P. Goodrich that through this donation, Purdue and Merry Monarch might help "to do something to 'lick the Kaiser.'"[39]

[38] Whitford, *For the Good of the Farmer*, 274-276; H.E. McCartney, "Merry Monarch a Great Steer," *The Field Illustrated* (1918): 19, 60, 62; Gobble, "Indiana and Purdue Win Again."

[39] Whitford, *For the Good of the Farmer*, 276.

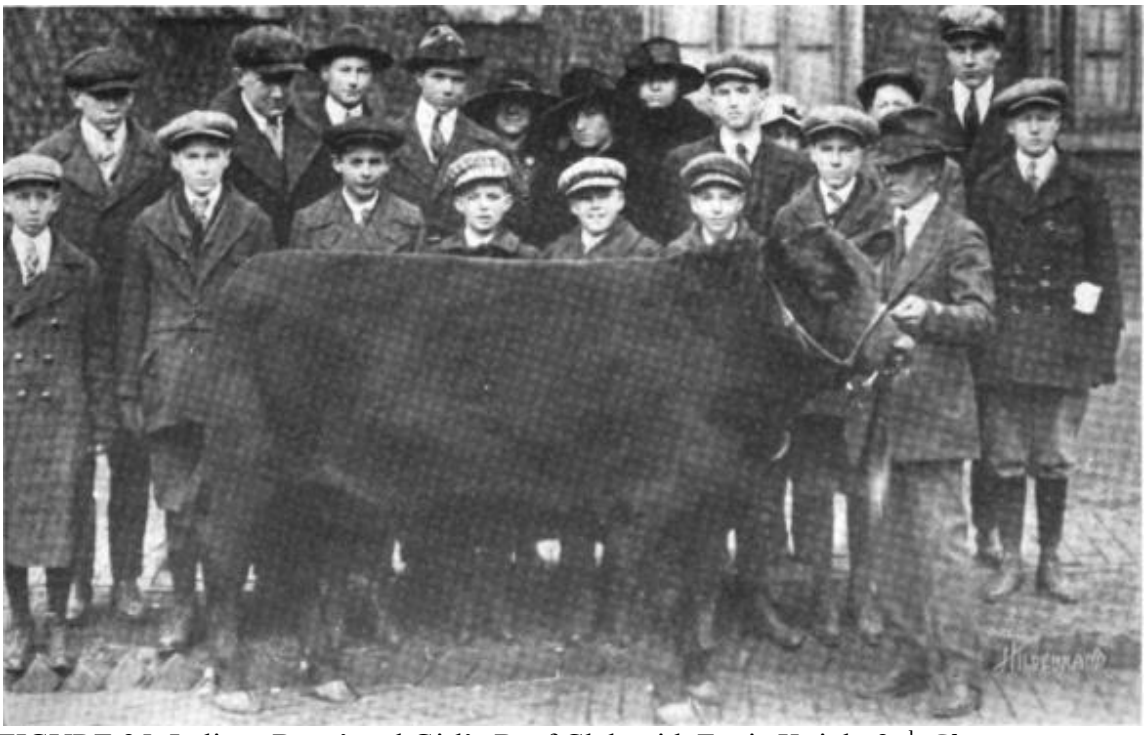

FIGURE 25. Indiana Boys' and Girl's Beef Club with Fyvie Knight 2nd, Champion Aberdeen-Angus Steer in 1918, Purdue University. *Source: A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1918, 79.

After winning the International in 1918, Fyvie Knight also became a star. This steer represented elite genetics, a kind of aristocratic breeding. A relative of Fyvie Knight, of the same name, had won the International in 1908. The university later purchased the older Fyvie Knight from Milton Fross of Burrows, Indiana; Purdue did not breed him.[40] Skinner argued to anyone who would listen that the younger Fyvie Knight embodied the best practices of animal husbandry and feeding demonstrated by Purdue University. In Chicago, while at the show and even after being butchered, Fyvie Knight maintained the status of a celebrity. He weighed 1,340 pounds and sold to Wilson and

[40] Whitford, *For the Good of the Farmer*, 272.

Company for $3,350. They displayed Fyvie Knight's carcass at the Biltmore Hotel in New York City. They served steaks from the steer, rumor had it, to the delegation involved with the Paris Peace Conference at Versailles following World War I.[41]

As universities campaigned upon the elite status of their animals, they simultaneously advertised diets to urge the adoption of better feeding practices. Land-grant universities hoped to demonstrate that the type of animals produced on university farms and the feeding programs they utilized could also be replicated on commercial farms in their regions.[42] Professors wanted farmers to believe that their successes did not depend on large university budgets. These breeding and feeding practices, they argued, placed value on practicality and efficiency useful to the average farmer.[43]

Universities often published the process of rearing livestock that won at the International, as Purdue did with Fyvie Knight, to encourage farmers to adopt the same practices. Skinner and Douglas weaned Fyvie Knight, born in February, after nine months of nursing. Handlers fed him cracked corn, oats, and clover hay in an open lot with a dozen other calves until December of 1917. Between December and June of 1918,

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[41] Ibid.

[42] For Rosenberg, in *The 4-H Harvest*, 4-H simultaneously normalized systems of agriculture—capital-intensive crop and animal husbandry regimes, in particular—and "the gendered production of desirable bodies through heteronormative family farms." This intersection of farm production and the state control of gender and sexuality manifested in the impact of 4-H education. Thus, Rosenberg argues, "proper" gendered labor and farm management tied together American nationalism, civic duty, and white, commercial family farms. The International, like 4-H, worked to normalize behavior and preferences and tastes for the type of cow, sheep, or hog suited for the modern farm. This change in preferences needed to seem like more than a fad; instead the organizers wanted it to be perceived by students and breeders as constitutive of good farming and patriotic agriculture.

[43] "Management of Purdue's Angus Herd," Communal Accessions 6, 16D1, Folder 10, CADAS; "The Little International," Communal Accessions 6, 16D1, Folder 10, CADAS.

they continued with the same ration and added some corn silage in the place of clover hay and some cooked barley. Until September, they slightly increased his corn intake, but they never pushed him hard. They fed him all he could eat from September until the show in December, and they added beets and linseed oil into the ration leading up to the show. Beets or beet pulp provided the steers fiber and stretched their stomachs, which gave them more "fill" or "spring of rib" from the perspective of the judge. Linseed oil provided the steer a finished look by aiding in the development of a glossy haircoat and enhancing fat cover and muscle development. Skinner emphasized that Purdue fed show steers feed elements that could be made from grains grown in Indiana, and thus, the Purdue regimen could be easily simulated on the average farm.[44]

To spread this knowledge, a group of reform-minded professors met at Cornell University to charter the American Society of Animal Nutrition in 1908 with a second meeting at the International in the same year. It subsequently became the American Society of Animal Production in 1915 and then, in 1961, the American Society of Animal Science. The founders were directly involved with International; C.F. Curtiss helped establish the group and became the first vice president.[45]

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[44] Ibid.; Whitford, *For the Good of the Farmer*, 279.

[45] Animal nutrition researchers met at Cornell University on July 28, 1908, to initiate the organization of this association. H.P. Armsby, dean of the School of Agriculture at Pennsylvania State College led the group; he was the leading animal nutritionist in the United States. Also, W.H. Jordan, director of the New York State Agricultural Experiment Station, H.J. Waters, director of the University of the State of Missouri Agricultural Experiment Station, H.R. Smith, animal husbandry expert at the Nebraska Agricultural Experiment Station, and J.H. Skinner, dean of the School of Agriculture at Purdue University, attended this first meeting. Representatives from the USDA and 13 experiment stations also met with Armsby.

The organization formed to orchestrate cooperation among experiment stations and to address imperfections in nutritional knowledge. H.P. Armsby, for example, president of the American Society of Animal Nutrition and director of the experiment station and dean of the School of Agriculture at Pennsylvania State College, lamented that little scientific work had been done on nutrition as it related to the specific demands of breeding, age, and condition of animal used. Even though a lot of farmers wanted to use grain and maximize production, little was known about how feeding and feed elements should be adjusted based on livestock purpose and developmental stage, which necessitated studies in animal type and their responses to grain, to be sure, but also grain elements. In the end, the trials aimed to optimize grain conversion and the types of grains used to target specific commodity production goals. For example, feeding rations ought to differ, the researchers contended, between milk-producing dairy cows and fattening beef steers.

The association met in 1909 in the Livestock Exposition Hall at the International to hold its first annual meeting to give papers and suggestions for future research. Armsby confirmed the central concern among professors and experiment-station researchers when he associated their work at the association and the International with the urgent need to solve the food supply problem stoked by demographic changes and soil fertility concerns. His address urged maximum yield strategies in crop production, and the effective feeding of those grains to animals for human food. Armsby argued that feeding a dense American population hinged on the farmer's ability, led by researchers at land-grants, to convert "grain…not adapted for direct consumption by man" to meat.

Livestock, he contended, served man's nutritional demands by transmuting the "stored up energy of the sun's rays" in the plant. Maximizing conversion rates and efficiently transferring the sun's energy to human food was the basis of modern agriculture and the role of the farm animal.[46]

This rates-based understanding of production defined efficiency for the reformers. Of course, national food output was a gross measure, and increasing supply was the ultimate goal. But improving yield per unit did not directly correlate to the largest carcass or the biggest animal. These animal nutritionists wanted to measure, with control groups at experiment stations, the relative benefit of certain levels of feed intake and grain elements with different nutritional compositions and protein levels. These researchers hoped to improve the relative value of animals and maximize their growth rates by measuring and defining optimum feed intake levels. For example, the Association's Committee on Terminology of Feeding Experiments introduced the concept of *coefficients of digestibility* to members. This coefficient held in balance the relative value of the quantity and quality of feed rations and grain elements to determine the peak marginal return on feed inputs in relation to daily gains in livestock. Essentially, there existed a qualitative difference in inputs and a feeding quantity that hindered or improved digestibility, which could be measured by analyzing leftover or wasted feedstuffs in fecal matter.[47]

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[46] H.P. Armsby, "The Food Supply of the Future," *The American Society of Animal Nutrition: Record of Proceedings of Annual Meeting, November, 1910* (1911).

[47] "Report of the Committee on Terminology," *The American Society of Animal Production: Record of Proceedings of Annual Meeting, November, 1914* (1914).

Simultaneously considering digestibility and weight gains, although cumbersome, was necessary to improve not only food output but farm profit. In this regard, measuring rates of gain, inputs, and returns encouraged farmers to control for cost while pushing animals to maximize yield. Animal need also served as an important element to this nutritional campaign. Age, specie, and purpose defined the feed ration that farmers provided livestock. Sheep, for example, had vastly different needs and utilization capabilities depending on these factors. New born lambs started drinking milk from their mothers, but between 10 and 20 days later, they were able to digest grains specialized for them. This grain-focused regime encouraged young lambs, as well as young cattle and hogs, to eat grain as soon as possible. Young lambs required more protein to boost energy levels, health, and growth rates than did yearling or aged sheep. Mature ewes did not need the constant access to grain that young and fattening lambs did. To stimulate estrus—the period in female mammals' reproductive cycle when their sexual receptivity was optimal for conception—breeders often "flushed" ewes with grain, which was not a health requirement but a biotic stimulant to encourage breeding. Mature ewes survived on grass, hay, and silage throughout the year except during late gestation and lactation. During these critical periods, the late development of the lamb and the health of the mother necessitated the incorporation of feed in their diets, but at a lower protein level than for fattening lambs. These sorts of nutritional specifications based on the animal's role on the farm applied also to cattle and hogs. Mature animals' feed requirements

differed from young and fattening livestock.[48] The Committee on Terminology of Feeding Experiments coupled this physiological approach that included type, form, and function with feed rations, climate, and seasonal influences.

The USDA and experiment stations, member institutions to the American Society of Animal Nutrition, used displays at the International to define and label the types of animals and feeding regimens characteristic of the modern farm. These demonstrations instilled new ideas in the minds of participants, college students, and visiting breeders. Exhibits by the USDA included the title "Feed Your Crops," and the University of Illinois espoused the merits of "Mixed Farming" and "Livestock Farming"—both were accompanied by model farms. In the latter, the university showed producers the value of livestock in maintaining soil fertility, of feeding grains to livestock to improve productivity and profits, and of building modern facilities that suited animal purpose. Many land-grant universities in the Corn Belt participated in these annual exhibits; they advertised the value of cash crops and the pairing of those crops, by feeding them, with improved livestock.[49]

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[48] Henry Stewart, *The Domestic Sheep: Its Culture and General Management* (Chicago: American Sheep Breeder Press, 1900); W.J. Clarke, *Fitting Sheep for the Show Ring and Market* (Chicago: Draper Publishing and Supply Co, 1900), 75-79; R.J.H. De Loach and H.A. Phillips, *Progressive Sheep Raising* (Chicago: Armour's Bureau of Agricultural Research and Economics, c1918); Edward Wentworth, *Progressive Hog Raising…* (Chicago: Armour's Bureau of Agricultural Research and Economics, 1922); Edward Wentworth, *Progressive Beef Cattle Raising* (Chicago: Armour's Bureau of Agricultural Research and Economics, 1920); Howard R. Smith, *Profitable Stock Feeding: A Book for the Farmer* (Chicago: Regan Printing House, 1906); W.A. Henry and F.B. Morrison, *Feeds and Feeding: A Handbook for the Student and Stockman* (Madison: The Henry-Morrison Company, 1920); J.D. Coburn, *Swine Husbandry* (New York: Orange Judd Company, 1919); Herbert W. Mumford, *Beef Production* (Urbana, Illinois: Published by the Author, 1907).

[49] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard &

FIGURE 26. Feed Your Crops: Beef Cattle Use Them Efficiently. *Source*: *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1921, 301.

The university displays were rudimentary in design and information provided, but the demonstrations upended assumptions about feeding regimens and the possibility of increasing yields. By planting this idea or shifting the preferences of farmers, university professors denormalized farmer behavior and filled the void with new practices. This of course was the first step, but then they coupled these ideas with university curricula, research, and publications that explained how farmers should build their farms and feed

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Transit Company, 1913); *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1916); *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1917); *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1921); *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1922).

their livestock. Universities even offered short courses for older farmers. Professors bragged that many farmers enthusiastically demanded practical courses after being influenced by the ideas circulated and demonstrated at the International. In a reflection on the International's early days, C.F. Curtiss contended that Iowa State College's success in Chicago stoked farmer demand for short courses. In 1902, when Iowa won grand champion steer and the student livestock judging team earned top honors, the news spread around the state and fueled farmer interest in animal husbandry curricula. Even at this early stage, the International's prestige and goals influenced conversations among farmers who did not attend the contest nor a land-grant university as regular, full-time students.[50]

At the campus in Ames, the school put on a two-week course, and 300 farmers enrolled in the first class—three times the number expected. The farmers ranged in age from 20 to 60 and lived in student quarters. The curriculum emphasized high-efficiency animal agriculture and expanded to corn production over subsequent years. The overwhelming success of these short courses led the university to decentralize instruction to reach farmers in more remote areas of the state. These short courses in Ames and in other local communities represented the primary educative contact between the improved livestock movement and the average farmer until extension agencies began their work following the passage of the Smith-Lever Act in 1914. These lines of service and education provided by Iowa State College linked average farmers directly to the International in an effort to reform farm practices and improve food output, which

[50] C.F. Curtiss, "Some Foundations in Agricultural Education."

stimulated, the college announced, student enrollment in agricultural fields as well. The level of knowledge required to be a modern farmer—with expertise in specialized commodity production—was highlighted by professor insistence on some sort of university support or instruction for not just students but existing farmers, which led to public-funded researchers and institutions directly engaging in and reshaping commercial farm practices.[51]

The United States' entry into World War I heightened the academics' sense of urgency to increase food production. Seed corn shortages particularly concerned officials. The Illinois legislature responded to this problem in 1917 by creating the State Council of Defense, on which meatpackers J. Ogden Armour and J.A. Spoor served. Governor Frank Lowden, who served as a director at the International after his tenure in political office, commissioned the organization. The Council coordinated its activities with the Council of National Defense and moved quickly to address food production limitations. Amour and Spoor worked on the Food Production and Conservation Committee to increase farm output by assisting Illinois farmers with the procurement of seed, implements, and labor. This committee organized a war conference of farmers and stockmen at the University of Illinois and appointed university professors to oversee soil fertility, animal production, crop health, and seed distribution. The seed shortage problem in corn production alarmed

[51] Land-grant universities and associated public-funded agricultural institutions more formally intervened in American agriculture with the passage of the Adams Act in 1906, which financially aided experiment stations in their research and innovation efforts, and the creation of a nationwide extension service that connected the government and researchers to farmers with the Smith-Lever Act in 1914. See Louis Ferleger, "Arming American Agriculture for the Twentieth Century: How the USDA's Top Managers Promoted Agricultural Development," *Agricultural History* 74, no. 2 (2000): 211-226.

this conference of reformers; it was the "most serious in history." The committee warned farmers that hording seed or overcharging neighbors for it provided "first class aid to the Kaiser."[52]

The legislature failed to appropriate funds to help this committee provide incentives or organizational assistance to farmers. In response to this problem, a group of Chicago banks, including two at the Stockyards, syndicated the Seed Corn Administration, and donated over $1.2 million to distribute seeds. The Administration resold seed corn with "germinating power" to Illinois farmers without a profit. And with the cooperation of the Illinois Seed Corn Breeders' Association, it sponsored a "mammoth Corn Show" at the 1918 International. Judges evaluated corn ears based on performance to encourage the "breeding up" of corn varieties that improved yield and that also possessed genetics that other farmers could use as seed corn.[53]

This first corn show was limited to Illinois participants, but its success and the clear need to pair livestock with grain improvement led the International to raise funds for a permanent grain show that included all farmers. G.I. Christie, superintendent of the Agricultural Extension Service at Purdue University, organized the show. The Chicago Board of Trade provided the premiums, and upwards 2,000 corn, small grains, and hay

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[52] *State Council of Defense of Illinois* I, no. 4 (1918); "Banks Form Syndicate to Supply Seed Corn," *Financier* CXI, no. 8 (1918): 659; "Food Program for Illinois," *The Swine World* 5, no. 8 (1918): 6, 13; Forrest Crissey, "First Aids to Farmers," *The Country Gentleman* LXXXIV, no. 15 (1919): 6-7, 40, 42.

[53] Ibid.

samples were submitted for competition from farmers in 29 different states and four Canadian provinces. The show included oats and wheat but featured the corn contest.[54]

FIGURE 27. Peter J. Lux, Shelbyville, Indiana. Judges awarded Lux the Grand Champion 20 ears corn. He became the first Corn King of the International. The National Association of Corn Products Manufacturers awarded him a $250 trophy. *Source*: *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States*, 1919.

Just as the International became a gathering ground for animal experts, at the end of the 1910s, commercial seed representatives and crop husbandry professors also traveled to Chicago to meet. This group met at the International in 1919 in conjunction

[54] Ibid.; *A Review of the International Live Stock Exposition*, 1918; *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1919).

with the first Grain and Hay Show to discuss and make recommendations for the "standardization and unification of seed improvement work." These experts led by R.A. Moore, agronomist at the University of Wisconsin, formed the International Crop Improvement Association—the first interstate organization chartered to solve crop uniformity and performance problems. Over the previous 50 years, confusion persisted among experiment station agronomists as well as farmers and stockman about the reliability of seeds resulting from poor breeding practices, lack of information, and intended and unintended mislabeling.[55]

At this meeting C.P. Bull, agronomist at the Minnesota Agricultural Experiment Station, presented on the formation of pedigreed or purebred seeds, which, he resolved, obliged researchers and commercial seed breeders to effectively raise seeds and label them based on cross-pollination inclinations. Thus, he called for a rigorous system of inspection to ensure purity in pedigreed seed. Others in attendance echoed Bull's suggestion for the association's improvement goals. They focused efforts on the improvement of varieties based on seed adaptation, performance, and productive capacity to ensure uniformity and to increase yields.

For these agronomists, the idea of standardization applied to quality and performance of the actual seed, but also nomenclature. States labeled seeds differently, like "registered," "inspected," or "certified," and farmers had little information about whether these words represented analogous field and seed inspection processes. Like

[55] Ibid.; J.C. Hackleman, *History: International Crop Improvement Association, 1919-1961* (Clemson, S.C.: The International Crop Improvement Association, 1961).

animal husbandry reformers, these agronomists linked language and labeling to improvement that would address organizational or structural problems in breeding and distributing seeds.

Distrust in seed purity and crop performance among farmers dampened this agenda. Therefore, they focused on creating systems of production and inspection that verified quality and guaranteed uniformity. Accompanying these organizational approaches, the association also tried to stimulate interest in elite seeds among farmers by parlaying research data into propaganda, as well as partnering with the International. During the 1920s, the association provided judges for the Grain and Hay Show and supported the Intercollegiate Crops Judging Contest and the 4-H Crops Judging Contest at the International and helped run exhibits on new crop varieties.

These late-added competitions that encouraged high-yielding grain varieties complemented the livestock improvement movement. This reform effort pushed farmers to focus on maximum output strategies. Livestock played a pivotal role by converting corn, which was largely inedible to humans, to meat. And, this division of purpose on the farm necessitated the reworking of farm structure. Packers, professors, and the USDA worked together at the International to display ideal farm setups and published and distributed blueprints to help producers remake their farms.

International founders and Stockyards president and manager, J.A. Spoor and A.G. Leonard, respectively, purchased a property in Indiana to create a utopian farm. They partnered with Purdue University, and these university professors and students constructed “The International Experimental Farm.” Purdue first outlined the model farm

in 1919, and over the course of three years students and professors created displays titled "As it was," "As it is," and "As it will be." This example of the ideal farm underwent many changes after Spoor's purchase. At the International, not surprisingly, the farm featured top-breeding livestock, but Purdue University also invested resources in permanent structures that systematized production and specialized farm commodities to achieve a profit. The university workers reshaped fields so that they were rectangular, razed old buildings and erected production-specific structures, and built permanent fences.[56] For Spoor and Leonard, these structural changes were an essential step in developing the modern farm.

Feeding production-specific grains to single-purpose animals reshaped farm infrastructure. The USDA and land-grant professors circulated suggestions for commercial farmers that linked building design to farm output goals. Barns and feedlot layout depended on the breeding, maternity, and fattening particularities of cattle, sheep, or hogs. Also, livestock purpose shaped farms and producer behavior. Cattle, for example, geared toward the surplus production of either meat or dairy had specific and different needs. The actual facilities, thus, served dissimilar chore routines, daily animal-handling requirements, and feed demands. Beef cattle even required different barn designs for a breeding herd, fattening steers, or growing and finishing operations.

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[56] *A Review of the International Live Stock Exposition*, 1922, 283; *A Review of the International Live Stock Exposition*, 1921, 299; R.H. Rogers, "Purdue's Experimental Farms," *The Purdue Agriculturalist* XVII, no. 1 (1922): 7, 18; "Indiana Leads in Winnings," *The Purdue Agriculturalist* XVII, no. 4 (1923): 63, 72; "The Fourth International Grain and Hay Show," *Nineteenth Annual Report of the Indiana Corn Growers' Association* (Indianapolis: WM. B. Burford, 1919), 59.

To address these two standards for farm buildings, species and purpose, the USDA distributed blueprints with explanations of how animal needs shaped farmer behavior and the types of facilities they should use. These blueprints confirmed packer and professor goals in the improved livestock movement, which was reflected in their own publications.[57] The USDA emphasized that no one type of barn met all the conditions of the farms. E.W. Sheets, senior animal husbandman for the Bureau of Animal Industry, and M.A.R. Kelley, barn architect for the Bureau of Public Roads, jointly published an article in 1923 that detailed these considerations.

Sheets and Kelley urged farmers to adopt certain designs based on climate, topography, and soil needs. They argued that open-sided barns or barns with doors for ventilation should be exposed to the southern horizon to protect against the cold winds and precipitation of winter weather that approached from the North and West. The dictates of climate determined the choices farmers made. Also, farmers had to find the proper site for construction to improve drainage and keep the pens free from standing water. Constructing lots and pens to improve manure collection capabilities was essential. Building concrete pads, reservoirs, or barricades to prevent runoff and maximize manure retention helped farmers in the collection, processing, and redistribution of fecal and vegetable matter on fields to maintain soil fertility.[58]

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[57] De Loach and Phillips, *Progressive Sheep Raising*; Wentworth, *Progressive Hog Raising*; Wentworth, *Progressive Beef Cattle Raising*; Stewart, *The Domestic Sheep*; Clarke, *Fitting Sheep*; Smith, *Profitable Stock Feeding*; Henry and Morrison, *Feeds and Feeding*; Coburn, *Swine Husbandry*; Mumford, *Beef Production*.

[58] Ibid.; E.W. Sheets and M.A.R. Kelley, "Beef-Cattle Barns," *United States Department of Agriculture Farmers' Bulletin No. 1350* (Washington D.C.: United States Department of Agriculture, 1923); V.O. McWorter, "Equipment for Farm Sheep Raising," *United States*

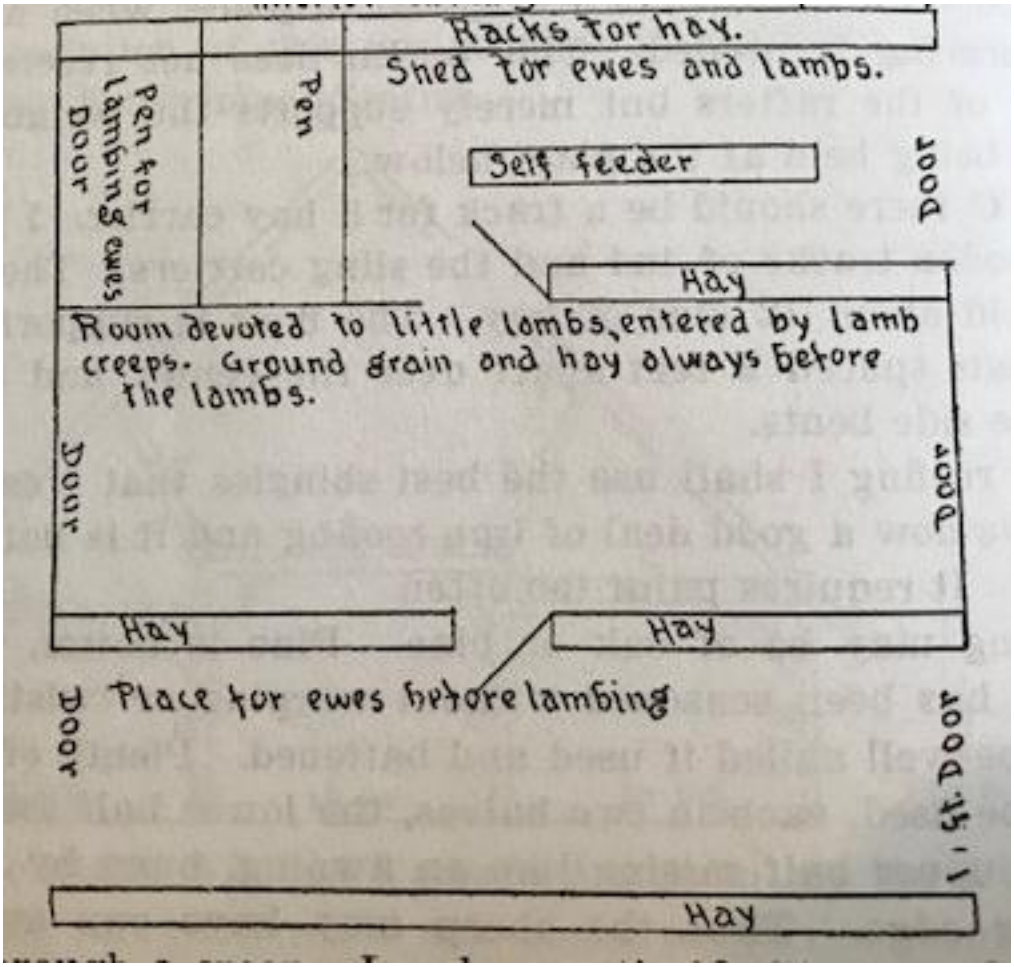

FIGURE 28. Sheep barn for lambing. This barn divides the sheep based on needs. At the bottom, the pen was designed for gestating ewes with access to an outdoor lot. The middle pen was for nursing lambs only. The mothers stayed in the top pen and a creep gate that allowed only small lambs through separated the two pens. This allowed the lambs to eat grain at rates suitable to their age and growing demands without competing with mature ewes. The top left pens were jugs, which had specifications for ewes during birth—small, tight, and warm. The small size helped keep the lamb and mother together, which encouraged bonding and nursing at that young age. The hay racks for sheep of all ages had feed bunks underneath. *Source*: Henry Stewart, *The Domestic Sheep: Its Culture and General Management*, 1900, 220.

Livestock had specie-oriented requirements. What separated cows and sheep from hogs was their digestive needs related to roughages. Cows and sheep were ruminants with

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Department of Agriculture Farmers' Bulletin No. 810 (Washington D.C.: United States Department of Agriculture, 1917).

compartmentalized stomachs that only functioned properly with the inclusion of grass, hay, or silage in their diets; roughages aided the digestion of grain. But hogs were monogastrics—animals with a single-compartment stomach—and performed well without the inclusion of roughages in their diets. As a matter of fact, hogs could live off of the left-over corn bits in cattle manure; some farmers even included a few hogs with a herd of cattle to make use of wasted corn.[59]

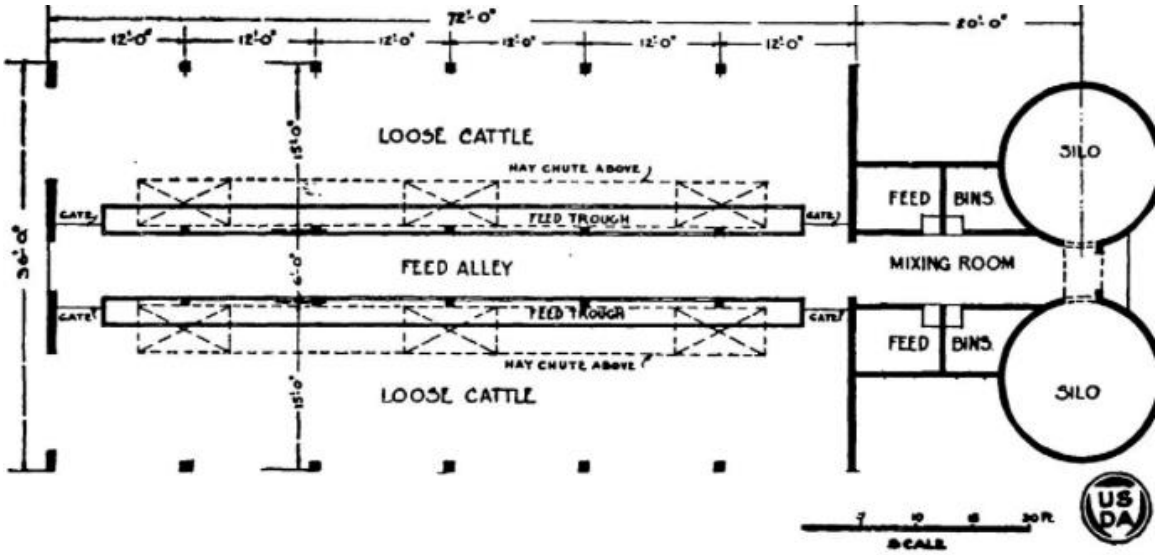

FIGURE 29. Floorplan for a cattle-fattening barn. The walls on the top, bottom, and left of the image were open to properly ventilate the barn and allow the feeder cattle access to the lot. The two loose cattle pens on either side of the middle alley allowed the feeder to access the elongated feed bunks from the middle of the barn, which connected to the hopper-bottomed feed bins, the feed mixing room, and the silos. Above the alley were access points to the hay mow. The length of the barn was variable based on the number of feeder cattle. Each animal needed 30 inches at the bunk. *Source*: E.W. Sheets and M.A.R. Kelley, "Beef-Cattle Barns," *United States Department of Agriculture Farmers' Bulletin No. 1350*, 1923.

Architecture directed farmer attention toward meat or dairy production and the particular demands of the animal. Certainly, these design elements were at an infant stage

[59] *Plans of Farm Buildings for Western States* (Washington, D.C.: United States Department of Agriculture, 1939).

when introduced, but they initiated a transition toward high-density feeding.[60] The feedlot regime that began to take shape during this period ultimately characterized cattle production throughout the twentieth century, which emphasized dry-lot fattening operations with dirt, gravel, or paved yards. For instance, the Illinois Experiment Station modelled and advertised the benefits of a paved lot. For feeders that used open-sided or door exit barns for feeding steers, the slope of the lot mattered most. The angle facilitated the drainage of water away from the building, and if farmers or workers kept the lot clean, little to no leach of manure occurred. This emphasis on paved lots related to market value for the experiment station. Animals that laid, walked, and lived in mud and muck were monetarily docked at the market. Clean-hided, healthy-appearing steers garnered a premium at Chicago as the experiment station confirmed through its own trials as early as 1904.[61]

These barn designs directed beef cattle, sheep, and hog operations toward the use of grain to optimize meat production. The genetically and physiologically ideal animal required proper caloric support and management, including farm facilities, to achieve reformer goals. The premixed, commercial feeds developed specifically for fattening and purpose-oriented facilities highlighted the specialization of farm labor and commodity

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[60] Sheets and Kelley, "Beef-Cattle Barns;" *Plans of Farm Buildings for Western States*; V.O. McWorter, "Equipment for Farm Sheep Raising;" De Loach and Phillips, *Progressive Sheep Raising*; Wentworth, *Progressive Hog Raising*; Wentworth, *Progressive Beef Cattle Raising*; Stewart, *The Domestic Sheep*; Clarke, *Fitting Sheep*; Smith, *Profitable Stock Feeding*; Henry and Morrison, *Feeds and Feeding*; Coburn, *Swine Husbandry*; Mumford, *Beef Production*.

The one difference between late-twentieth century barns and these early models was the pig facility. Architecturally, these hog-feeding barns differed from confinement operations, but the emphasis on high-population fattening programs already prevailed among reformers and progressive feeders.

[61] Mumford, *Beef Production*, 145-149.

production. For university educators, single-purpose animals paired with grain and proper facilities characterized the modern farm. They developed short courses and extracurricular activities, produced and published data on modern breeding and feeding, and they participated as organizers and competitors at the International to institutionalize this farming model. Improved or constructive farmers, from the prospective of the land-grant officials, needed to learn and apply scientific knowledge, requiring some sort of collegiate instruction, which manifested in the direct involvement of public-funded researchers and advocates in American farm life.[62]

But land-grant officials were not just selfless educators; they were also fierce competitors with the full backing of public universities, which included large financial resources, state-run farms and experiment stations, and the most up-to-date breeding, feeding, and rearing practices emanating from professor research. Although land-grant educational goals and supremacy in the ring as competitors did not always seem complementary of one another, these professors saw all these various activities, including showing animals, training collegiate judges, and demonstration work, as a requisite web of undertakings. The ultimate goal was to transmit fundamental principles about modern animal and crop husbandry, which led to an all-encompassing approach that linked modern animal forms to new feeding practices and the transformation of the farm.

[62] Ferleger, "Arming American Agriculture for the Twentieth Century."

Conclusion

The interaction between student, breeder, and expert at the International gave the show leverage over the direction of animal husbandry. Many called the Exposition the "bacon school" as a result of the education of college students in the revolutionary importance of properly selecting and feeding fat animals. In this regard, the show had a pedagogical function of its own that connected the farm to the market. Swine department representative, Ernest T. Robbins, recalled that the exhibits "gave an unparalleled opportunity for the student to gain facility in the art of scanning at a glance large numbers of porkers and recognizing their combined excellences." The exhibits, he surmised, offered college students a unique opportunity in their "quest for knowledge."[63]

The International also provided students a chance to mingle with people from different regions and industries not present in their hometowns nor on their college campuses. A journalist reminded his readers that the spectators, producers, and businessmen themselves represented a remarkable success for the International: "The millionaire…from the East touched elbows with the cowboy from the range… [and the] city folk filled the cup overflowing." This cornucopia of actors interacted with students and engaged with public-funded schools and government agencies devoted to agricultural reform.[64]

The education of the land-grant student provided progressive agriculturalists the opportunity to shift agricultural techniques and management styles toward a modern-

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[63] *Review of the First International Live Stock Exposition*, (Chicago: The Union Stock Yard & Transit Company, 1900), 165-166.

[64] *Review of the First International Live Stock Exposition*, 1900, 12-13, 156.

industrial design to keep pace with urban society. This surplus-oriented model required a shift in the farmer's mindset toward scientific farming and up-to-date business practices. Scientific approaches to animal selection and farm management were directed at improving efficiency and performance—minimizing the cost of production relative to yield—to assist the farmer in meeting the capital needs of the operation and maximize the farm family's standard of living.[65] However, minimizing expenditures was not about total expense, only marginal cost. Improving business advantages through the management of input costs did not correlate with the cheapest animal or feeding practices.

Instead, the ideal farm typically required high levels of investments in the acquisition of top-priced animals, purchasing commercial feeds, maximizing crop yields, and erecting production-specific farm buildings. Purebred animals, for example, outperformed "scrubs" not by eating less, but by converting a higher rate of feedstuffs to usable human food. Raising animals that eat the least, in this vein, limited marketing opportunities by restricting the quality and potential yield of the carcass, and thus, specialization in crop production and expertise in animal husbandry geared toward off-farm exchanges were necessarily linked. Land-grant agriculturalists did not intend the twentieth-century farm to be some sort of pastoral, subsistence-based homestead—instead, it was a commercial firm.

[65] Edward F. Adams, *The Modern Farmer in His Business Relations* (San Francisco: N.J. Stone Company, 1899), 30.

CHAPTER FIVE

The International's Mixed Results

> During its twenty years the International has…encouraged the breeding of pure-bred live stock; it has improved the quality of such stock; it has popularized the judging of livestock, and through its efforts many young men have been induced to enter this useful field…In these troublous times many would despair of the future of the Republic, if it were not for the millions of self-reliant, patriotic American farmers.
>
> —Frank O. Lowden,
> Governor of Illinois, 1919

In 1919, professors, packers, and agricultural journalists celebrated the twentieth anniversary of the International. Publications circulated amongst farmers and ranchers praising the International for making scrub livestock unpopular and unfashionable. Livestock-market analyst James Poole, for example, lauded the Exposition's success in changing farmers' preferences and transforming the industry. Regularly invited by top journals and breed associations to share his reports, Poole was the foremost authority on livestock value and the Chicago markets. He contributed to *The Breeder's Gazette* and *The Producer*, published by the American National Livestock Association.

Poole and other industry insiders celebrated the displacement of unknown or mixed genetics in favor of the "superior" blood of British livestock.[1] This tenet of

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[1] James E. Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World* IV, no. 18 (1919): 13-14; J.L. Tormey, "International Just Out of Its Teens: A Running Review of Some of the High Lights in the Greatest Live Stock Show in the World," *The Shorthorn World* IV, no. 18 (1919): 15, 139; "20th Anniversary of International," *The Shorthorn World* IV, no. 14 (1919): 80; James E. Poole, "The International Anniversary Show: A Review of the Origin and Development and an Appreciation of the Influence of the International Live Stock Exposition, Whose Twentieth Birthday Will Be Fittingly Celebrated in Chicago Next Week," *The Breeder's Gazette* LXXVI, no.22 (1919): 1147-1148; "The World's Greatest Stock Show," *The*

improved animal husbandry was born of complaints regarding scrub livestock and an unremitting devotion to British systems of production. Poole derided these scrub "mongrels" as "Mexican cattle." Late-to-mature and wild, Mexican cattle little resembled the beef-making qualities of the International's stock; according to Poole, they lacked muscle shape, docility, and fecundity. In contrast to some of the packers and professors who expected that "breeding up" with good bulls would eventually solve the problem, Poole contended that a good bull "cannot atone for the faults of angular, ill-bred Chihuahua cows." A major barrier to improvement in the industry, Poole argued, had been the "infestation" of these "Chihuahua cows" on the range—an impediment now successfully overcome by the International.[2]

Poole was overjoyed by the International's ability to reduce the presence and impact of scrubs. He lauded the Exposition for normalizing and incentivizing the use of purebred, British livestock with commercially-oriented bodies. The International did more than any other institution, he argued, in providing for an agriculture less susceptible to cycles of instability or depression. Economic disruption had plagued the era of "post-bellum reconstruction," which accompanied the passing of the open range—requiring, he believed, the reconfiguring of animal husbandry practices. The founders of the

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Breeder's Gazette LXXVI, no. 21 (1919): 1094d; "A Big Reunion," *The Swine World* 7, no. 8 (1919): 18; "International Livestock Exposition," *The Ohio Farmer* 144, no. 24 (1919); "The International Livestock Show," *Prairie Farmer* 91, no. 27 (1919): 12.

[2] R.H. Williams, "Eliminating Hazards in the Range-Cattle Business," *The Producer* III, no. 3 (1921): 5-8; James E. Poole, "Beef Production on New Basis," *The Producer* III, no. 9 (1922): 24-25.

International, he declared, had successfully "designed an institution of permanent character for the improvement of the live stock of the new world."[3]

Even though the agricultural press took this opportunity to applaud the International fairly unanimously, questions soon emerged about the unexpected consequences of livestock improvement. In the years following the anniversary, for example, Poole himself modified his stance and criticized the International. To be sure, he remained committed to the goals of the show, but he now worried about a gulf that had emerged between the body types most appropriate for the meat industry and the type of animals increasingly selected in the show ring. Beginning in the 1920s, the show-ring ideal—new-aged, moderate-framed livestock—started to become too small for commercial producers. In effect, the International had actually failed to standardize animal form in the ring, and instead initiated a long cycle of additional, even insular, physiological transformation. Judges kept selecting smaller and smaller animals, and breeders continued breeding them to win Exposition accolades.

The ongoing process of judging livestock incentivized the production of extreme animals with superlative qualities. Over the first two decades at the International, animals had moved toward more moderate forms, reversing nineteenth-century fads of excessively large animals. But the judges were not selecting for moderation. Because

[3] Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World*; "Has the International Made Good?," *The Agricultural Digest* III, no. 3 (1921): 37-38; "Experts Tell Radio World Romantic Story of Live Stock," *Meat and Live Stock Digest* 4, no. 7 (1924): 2, 4; "'Jim' Poole says the International has Missed its Calling: Has It?," *The Aberdeen-Angus Journal* II, no. 12 (1921): 9, 24-25.

they used a comparative approach for evaluation, they simply selected smaller, more compact animals, which satisfied the needs of the industry. But eventually, those show animals became quite compact indeed, and the show ring created a new suite of problems for producers. Unreasonably small livestock possessed physiological deformities, inefficient rates of reproduction, and uncompetitive carcass sizes.

Nevertheless, until its final show in 1975, the International remained the hub around which the improved livestock movement revolved. It held enormous sway over producer decisions and over the shape of animals' bodies. And the show successfully changed the priorities and the methods of American livestock breeders. Progressive producers and average farmers alike overwhelmingly adopted British livestock and marketed younger animals, and these types of animals required specialization on the farm. Modern physiological form—a transition from multiple-use to single-purpose livestock—suited the packers' industrial goals and supposedly addressed the professors' national food output and farm revenue worries.[4]

Yet because of the oscillation in animal form in the show ring, significant differences emerged. On the one hand, the International succeeded in normalizing purebred livestock specialized in meat production.[5] Farmers indeed adopted purebred

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[4] Wade Toole, "Development of Our Modern Beef Type," *The Shorthorn World* IV, no. 23 (1920): 9-11; Alan L. Olmstead and Paul W. Rhode, *Creating Abundance: Biological Innovation and American Agricultural Development* (New York: Cambridge University Press, 2008).

[5] F.M. Chandler, "Breeding for a Purpose," *The Shepherd's Criterion* XV, no. 12 (1905): 5; James E. Poole, "Young Cattle the Most Profitable," *The Breeder's Gazette* LXXX, no. 12 (1921): 407; "Has the International Made Good?," *The Agricultural Digest*; "'Jim' Poole says the International has Missed its Calling: Has It?," *The Aberdeen-Angus Journal*; Olmstead and Rhode, *Creating Abundance*, 314-329; "The Production of Baby Beef," *Chicago Livestock World* XVI, no. 73 (1915); A.S. Alexander and J.H.H. Alexander, "Farming: 'How to Make it Pay,'"

animals, marketed younger livestock, and changed production methods, which led to broader specialization in agriculture. On the other hand, the International failed to create a consistent standard in the show ring. Comparative evaluation inherent to showing itself bifurcated animal form and drove a wedge between the types of animals necessary for modern agriculture and the kinds of animals selected at the Exposition. Commercial producers increasingly bred moderate-sized livestock on specialized farms while the International showmen raised rare, expensive-to-produce animals that edged toward ever-smaller sizes, resulting in serious health and economic consequences.

Poole's Critique of the International

Poole's criticism of the International, just two short years after unabashedly praising its success, created ripples in the industry. Specifically, Poole had condemned the International for inflating the value of improved animals, which created cost barriers for the average farmer. Within this "rich man's game," Poole alleged, a small circle of breeders merely swapped or sold elite animals amongst each other with no regard for the normal farmer or their farm conditions. The only access to this fraternity of breeders was "an overwhelming desire for high-priced livestock, and a loose pocketbook." For average farmers, paying interest on mortgages and affording farm inputs while making a living

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Better Farming (1922): 5-6, 8; Jay Whitson, "Baby Beefmaking in the Cornbelt," *The Breeder's Gazette* LXXIX, no. 14, (1921): 633-634; W.B. Krueck, "Topping the Market with Baby Beef," *The Breeder's Gazette* LXXVI, no. 16 (1919): 778, 780; Rex Beresford, "Baby Beef Making Safest System for Corn Belt," *Prairie Farmer* 86, no. 2 (1914): 9, 39; Toole, "Development of Our Modern Beef Type," *The Shorthorn World*.

wage quelled "dreams of avarice." By pricing improved animals beyond their reach, constructive breeders usurped the reform goals of the International.[6]

Indeed, the show ring drove improved animal prices higher and stoked owner ego. The very process of selection—prioritizing animals with superlative qualities—created a secondary market for show livestock unattached to market fluctuations and commercial value. Because animals of extremes were desirable, they were aberrations, or immoderations as it related to animal form, and thus by definition, superlative animals were rare, and their high prices corresponded to their limited supply.

The rarity of these animals also inflated owner status. But for reasons of self-justification, these breeders cloaked self-interest and pride in public service narratives. At the Chicago Exposition, agriculturalists linked national progress to food output and modern husbandry, and for improved breeders, participation at the International demonstrated patriotism. These arguments heightened during World War I. In fact, producers started submitting cattle to a newly-fashioned contest of "war beeves." The USDA declared the International the "Food Training Camp of the Nation." The war made apparent the increased need to meet both domestic consumer demands and also feed the troops and carry out food relief missions in Europe.[7]

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[6] Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World*; "Has the International Made Good?," *The Agricultural Digest*; "Experts Tell Radio World Romantic Story of Live Stock," *Meat and Live Stock Digest*; "'Jim' Poole says the International has Missed its Calling: Has It?," *The Aberdeen-Angus Journal*.

[7] "The International Answers the Nation's Call," *The American Breeder* XI, no. 5 (1917): 16; "The Great Livestock Exposition," *Railway Journal* (1917): 8; "The 1917 'International,'" *The Agricultural Digest* II, no. 6 (1917): 727; *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1917); *A Review of the International Live*

Herbert Hoover, who ran the U.S. Food Administration at the time, heralded the International's central role in this effort. For Hoover, food was no less important than ammunition in conducting the war. Hoover applauded the work of the International and its service to the war effort. Increasing the production of meat and fat required improved economy in animal husbandry. Consumption during the war greatly outpaced supply, and thus the focus on generating more food and animal products per animal at the International appealed to Hoover. For him, the International taught farmers the way out of this problem. Better-quality, early-maturing animals ensured maximum yields at a reduced marginal cost—the solution to this broader food shortage problem. The production of meat directly contributed to the war, the International crowed, and the organizers of the show validated producers following armistice by congratulating their purebred animals for aiding in victory. These wartime arguments inflated the sense among producers and reformers that agriculture foundationally supported and propelled American prosperity and that improved livestock drove agricultural advancement.[8]

Poole conceded that because of the International, the common breeder no longer doubted the value of purebred animals. Improved and commercial breeders connected advancement to the acquisition and propagation of purebred livestock. The International convinced a generation of stockman that the persistence of "mongrel" genetics came at a cost to farm revenue and national agricultural yield. But Poole still concluded, critically, that even though farmers accepted the central tenets of modern animal husbandry, there

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Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States (Chicago: The Union Stock Yard & Transit Company, 1918).

[8] Ibid.

existed real limits to acquiring purebred animals for the normal farmer. These limits meant that reform goals remained unfulfilled. The reason was self-evident: inflated prices.

At the time Poole wrote his critique, cattle prices on the market had plummeted. The agricultural community experienced hard economic conditions in the early 1920s. In that context, Poole's concerns were understandable. He argued that "better sire campaigns" and "purebred sermons" did not put money in the pocket of normal farmers, especially since they could not touch those price levels "with a ten-foot pole."[9]

Poole's article also provoked harsh responses. Breed associations and the agricultural press pushed back by first questioning his character. The Aberdeen-Angus breeders alleged that Poole wrote his criticism in *The Producer* only to reflect the resentment of western producers—a bitterness heightened by collapsing market prices. The International proffered arguments highly critical of the range, and Chicago meatpackers wielded a great deal of power over the livestock industry. Together, the International and Chicago meatpackers drove up prices on animals characterized as superior to levels unaffordable to commercial breeders, and Western producers resented Chicago for underpaying for commercial stock sent from the range. This dynamic of overpriced superior animals and underpriced range animals, from the perspective of range

[9] Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World*; "Has the International Made Good?," *The Agricultural Digest*; "Experts Tell Radio World Romantic Story of Live Stock," *Meat and Live Stock Digest*; "'Jim' Poole says the International has Missed its Calling: Has It?," *The Aberdeen-Angus Journal*.

interests, fueled producer resentment, and Poole's article certainly mirrored that frustration.[10]

Not only did his colleagues question Poole's character, but journals and breed associations also argued that he overlooked valuable improvements in commercial operations. Genetically, the use of purebred bulls was common in American agriculture by 1920. The range still included scrub genetics and many herds fell into the crossbred category. But producers commonly used purebred sires, possessed cows with some purebred genetics, and sold steers and heifers to Chicago with at least a mix of improved blood. By the end of the 1920s, 40 percent of all cattle in the West were either Hereford or some cross of Hereford. These cross matings followed the recommendations made by packer-representative R.J.H. De Loach and Charles S. Plumb, animal husbandry expert at Ohio State University, who argued that "breeding up" with purebred sires on inferior cows to produce crossbred offspring would improve the net value of livestock herds on the range, the yield of carcasses, and producer revenue.[11]

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[10] Ibid; "'Better Sires' Campaign Started by 'Uncle Sam,'" *The Aberdeen-Angus Journal* (1919): 14. The Aberdeen-Angus Breeders' Association journal featured a column accusing Poole of shifting his market analysis to suit the opinions of his readers. When writing for *The Breeder's Gazette*, for example, he applauded progressive goals and lauded the International, and if he published in *The Producer* he reflected what the ranchers in the West wanted to read. The Aberdeen-Angus breeders believed that his oscillating opinion and limited integrity undermined the force of his criticism, and they accused Poole of writing appeasing articles to increase the number of checks deposited in his bank account.

[11] Ibid; *Yearbook of the United States Department of Agriculture, 1921* (Washington D.C.: United States Government Printing Office), 731; John T. Schlebecker, *Cattle Raising, 1900-1961* (Lincoln: University of Nebraska Press, 1963), 84; "Remarkable Classes of Beef Breeding Cattle," *The Breeder's Gazette* LXXXII, no. 24 (1922): 838-840; Leo Minster, "Hereford Claims from England," *The Breeder's Gazette* LXXVI, no. 8 (1919): 309.

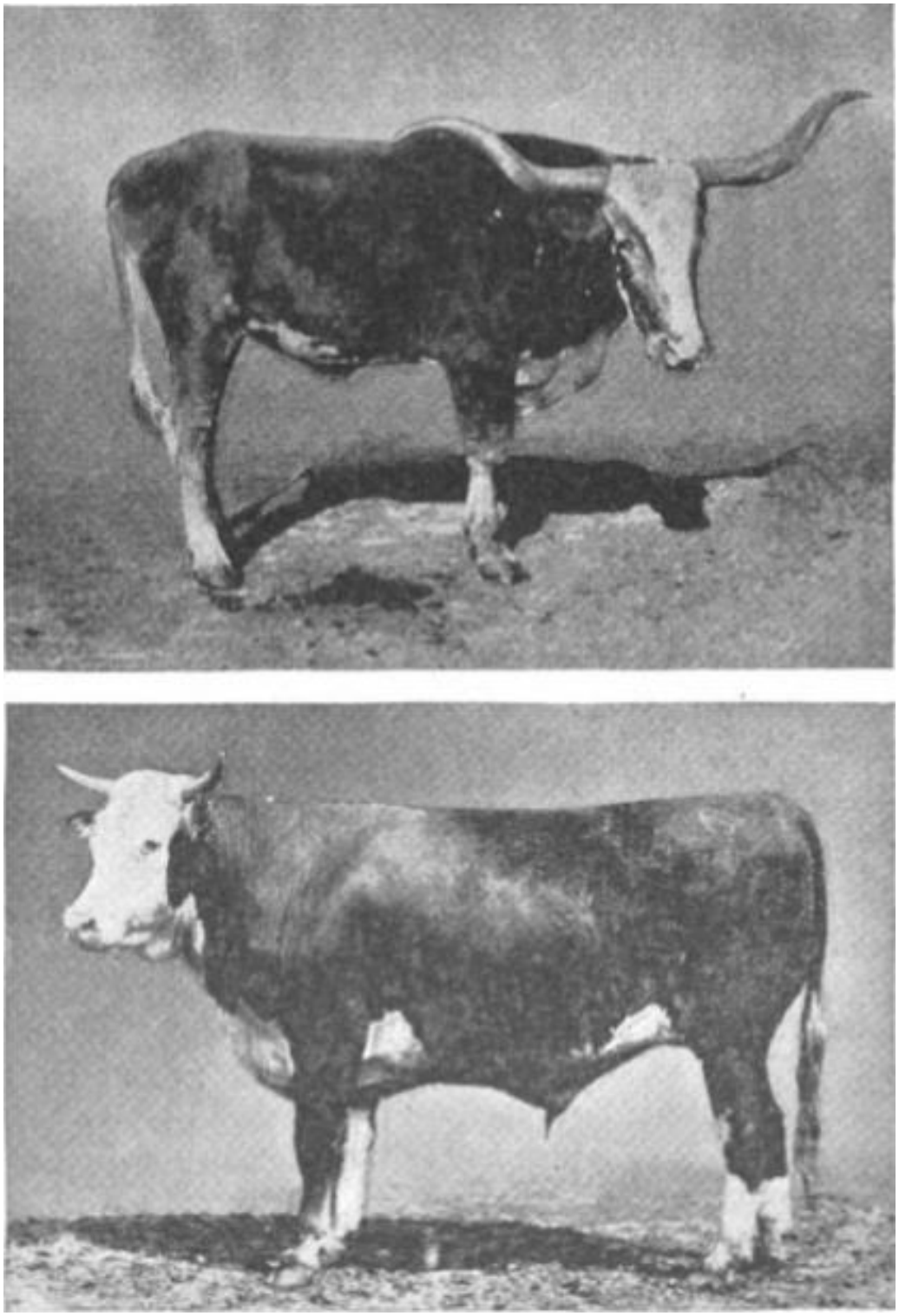

FIGURE 30. An image published by the USDA in 1919 to announce the near extinction of the Texas Longhorn in favor of superior livestock—Herefords. *Source:* E.W. Sheets, "Our Beef Supply," in *Yearbook of the United States Department of Agriculture*, 1921, 234.

Purebred Hereford cattle had distinct white faces, sometimes with white markings on feet and tails, with red bodies. When crossed with other breeds or "mongrels," Hereford bulls stamped their offspring with white faces. White-face calves with black, brown, and red bodies filled the range in the twentieth century.[12] Range producers adopted many of the tenets of progressive husbandry, and the use of purebred bulls shaped the genetic makeup and aesthetic look of their cattle, so much so that areas around Kansas City were unofficially known as "the Herefordshire of America." In 1919, 75 percent of cattle that passed through the Kansas City livestock facilities wore the Hereford's characteristic face.[13]

Representatives of the Aberdeen-Angus Breeders' Association also countered that the International deserved recognition for influencing farmers to raise younger animals with bodies better suited for feedlot production. This methodological influence or the ability of the International to change farmer behavior proved to be a strength of the show. For example, to improve efficiency in production, packers and professors encouraged farmers to feed grain in more dense animal populations, which led to a greater presence of feedlots and an increase in hornless cattle. Nineteenth-century range cattle with large horns performed poorly in tight quarters. The horns caused problems on the farm, during

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[12] T.F.B. Sotham, "The Potency of Hereford Blood," *Proceedings of the Third Annual Convention of the National Live Stock Association* (Denver: The Smith-Brooks Printing Company, 1900): 343-348.

[13] John E. Pickett, "White Faces: They are Thickest Round Kansas City, Which Has Become the Herefordshire of America," *The Country Gentleman* LXXXIV, no. 3 (1919): 5; Schlebecker, *Cattle Raising, 1900-1961*, 84; W.C. McGavock, "The Trend of the Times in the American Hereford Trade," *The Breeder's Gazette* LXX, no. 25 (1916): 1190-1191; Minster, "Hereford Claims from England," *The Breeder's Gazette*.

transport, and at the stockyards. With direct owner care, train travel, and the tight spaces of the slaughterhouse, horns proved only to be an impediment to the process. More hornless cattle could fit on a railcar and could eat grain from a feed bunk.

The prevention of product damage also encouraged the use of hornless cattle. Horns bruised other animals' carcasses and scratched, tore, and poked holes in the hides, which diminished the value of the edible cuts of meat and the byproducts. Feeders thus preferred hornless cattle, and they also garnered more value from processors and butchers. To ensure maximum productivity, reformers urged livestock producers to reduce the size or eliminate cattle horns all together.[14] This connection between improving efficiency and eliminating dangerously large horns circled back to the importance of British purebreds. British breeds either had smaller horns or no horns.

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[14] Herbert W. Mumford, *Beef Production* (Urbana, Illinois: Published by the Author, 1907), 95-99; Olmstead and Rhode, *Creating Abundance*, 327.

One solution to the horn problem was removal. Producers used two primary methods. They cut or sawed mature horns. Most commonly they put the animal in a stanchion with a halter around the head. Then, they tied the head with the nose pointing up. A hand saw often was used, but at the turn of the century breeders started using clippers. The clippers crushed the horn core and left a wound that often took a long time to heal. But as the clippers advanced in effectiveness, the process became easier. Despite the pain caused by the clippers, they were quicker and caused less bleeding than the saw. The abrasiveness of the saw left blood vessels more vulnerable to bleeding and the clipper cut them smoothly, which allowed them to clot. Using either tool, the handler cut or clipped slightly below where the horn met the skin. The procedure was painful and left the animal vulnerable to infection, infestation, and cold weather. The season mattered greatly. In the summer, infection, fly agitation, and maggots posed serious risks. In the winter, when the horn was cut off the frontal sinus opened, and the cold air could be drawn in causing death.

A second option was chemical application. Using chemicals cost less, required less labor, caused the least amount of pain for the animal, and could be done at a young age—the horn only needed to be an inch long. Despite reducing pain, this method was not pain free. Calves felt a burning sensation, but not for more than an hour. The animal rarely experienced appetite loss or death. Aesthetically, the chemical procedure left the head with little scaring and the shape looked more like a nature poll instead of the square look left by sawing. Producers could mix their own substance by combining potash and caustic soda. After application, a scab formed, but came off after about a month leaving a smooth, clean poll. Because of these advantages, commercial, or patented, dehorning chemicals became available in the twentieth century.

All in all, better breeding campaigns succeeded in growing the number of purebred cattle in the United States.[15] Between 1908 and 1957, the number of registered beef cattle grew by 800,000. Similar patterns occurred with hogs and sheep. The use of purebred sires increased and an emphasis on efficiency drove practical changes in commercial herds and flocks. In the sheep industry, producers used purebred genetics to increase wool and meat yields. Fleece weight, staple length, and clean wool output all improved from 1900 to 1950. This upward trend in fleece production mirrored the commercial emphasis on meat output. The overall numbers of lambs per 100 ewes dramatically increased as well, which allowed farmers to raise more meat with the same number of ewes.[16]

The swine industry also experienced gains in total output. Better breeding changed the finish age of market hogs. Over the first half of the twentieth century, pigs reached slaughter weight two months younger. They also converted feed at better rates. Feed required for a market hog to gain 100 pounds decreased from between 80 to 100 pounds.[17] Changing farmers' practices demonstrated the International's contribution to the national livestock improvement campaign. As the Aberdeen-Angus journal reminded readers, even though the range did not fill up with show animals from the International,

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[15] R.L. Willham, "Genetic Improvement of Beef Cattle in the United States: Cattle, People and Their Interaction," *Journal of Animal Science* 54, no. 3 (1982): 659-666; A.E. Darlow, "Fifty Years of Livestock Judging," *Journal of Animal Science* 17, no. 4 (1958): 1058-1063.

[16] E.J. Warwick, "Fifty Years of Progress in Breeding Beef Cattle," *Journal of Animal Science* 17, no. 4 (1958): 922-943; Clair E. Terrill, "Fifty Years of Progress in Sheep Breeding," *Journal of Animal Science* 17, no. 4 (1958): 944-959; W.A. Craft, "Fifty Years of Progress in Swine Breeding," *Journal of Animal Science* 17, no. 4 (1958): 960-980.

[17] Ibid.

producers changed their methods of selection, breeding, and culling based on the standards established in Chicago.[18]

Poole did not deny the International's educational influence. This show possessed an aspirational quality; by setting the standards for improvement, the International changed farmer preferences first and actual husbandry regimes and livestock bodies second. But it was cost that drove Poole's criticism, not the International's power to persuade. Judges' preferences for superlative animals undermined standard body type, which pushed costs higher. The continual selection of more extreme body types distorted the market. By definition, superlative animals were rare and, thus, too expensive for commercial producers. This perpetual rarity inevitably also meant divergence from practical animal forms.

Trends in Animal Form

Nothing quite captured the mixed consequences of the International like the baby-beef fad. Breeders and judges in Chicago used a specific set of parameters to identify and reproduce baby beeves, or the "pony types." Baby beeves typically ranged from 12 to 24

[18] "Baby Beef," *Chicago Livestock World* V, no. 298 (1904); Poole, "The Twentieth International: Retrospective View of the Needs and Conditions that Brought into Being the World's Most Conspicuous Live Stock Show," *The Shorthorn World*; "Has the International Made Good?," *The Agricultural Digest*; "Experts Tell Radio World Romantic Story of Live Stock," *Meat and Live Stock Digest*; DeWitt C. Wing, "The Present Situation in the Live Stock World," *The Berkshire World and Cornbelt Stockman* (1925): 20; "'Jim' Poole says the International has Missed its Calling: Has It?," *The Aberdeen-Angus Journal*; "Our Beef Supply," in *Yearbook of the United States Department of Agriculture, 1921*, 227-322; Darlow, "Fifty Years of Livestock Judging," *Journal of Animal Science*; Willham, "Genetic Improvement of Beef Cattle in the United States: Cattle, People and Their Interaction," *Journal of Animal Science*.

months old; however, some farmers more narrowly defined the upper age to 15 months.[19] Baby beeves weighed 800 to 1200 pounds and were either choice or prime in meat quality. Slaughtered baby beeves furnished thick, light, and flavorful steaks, which the twentieth-century consumer preferred.[20] Despite the higher overall weight of two- or three-year old carcass, the yearling animal killed a higher percentage of quality meat; yearling steers yielded 25 to 50 percent more meat than their older counterparts. Prioritizing yield over gross weight in order to address the need for more efficient animals and better-quality meat distinguished the baby-beef era.[21]

A baby-beef euphoria swept the livestock improvement movement. Boys' and girls' clubs organized around baby-beef goals, and the International hosted children with their baby-beef projects. Whether in the youth competitions or in the show ring, these types of animals were normalized by International judges. They overwhelming selected yearling cattle, which effectively ostracized older steers. This combination of age and specialization in meat production drove evaluation and eliminated two- and three-year-old cattle.[22] In the carload class, for example, every champion group after 1908 was

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[19] H.W. Vaughan, "Fashions in Market Cattle," *Types and Market Classes of Live Stock* (Columbus: R.G. Adams & Co., 1917), 69-78; "About Baby Beef," *Wallace's Farmer* XXX, no. 2 (1905): 34; "What is Baby Beef?," *The Breeder's Gazette* LXX, no. 1 (1916): 26-27; S.H. Ray, *The Production of Baby Beef* (Washington D.C.: United States Department of Agriculture, 1917).

[20] James E. Poole, "Why Beef Consumption is Lagging," *The Producer* III, no. 12 (1922): 13; "Baby Beef," *Chicago Livestock World* IX, no. 123 (1908): 2.

[21] O.M. Hayes, "Baby Beef Production," *The Breeder's Gazette* LXIII, no. 4 (1913): 194; John S. Goodwin, "The Performance Record of Angus Cattle: A Restatement of the Case for the Breed, With a Digest of Evidence," *The Breeder's Gazette* LXX, no. 25 (1916): 1206-1207; "The Carlots of Fat Cattle," *The Breeder's Gazette* LXXX, no. 23 (1921): 854-855; "Baby Beef," *Chicago Livestock World*; "About Baby Beef," *Wallace's Farmer*.

[22] James E. Poole, "Craze for Light Cattle," *The Producer* III, no. 7 (1921): 21; "The Show of Carlots of Fat and Feeder Cattle," *The Breeder's Gazette* LXXXII, no. 24 (1922): 841-

between 12 and 24 months in age. From 1900 through 1908, the average weight of the carload class winners was 1,457 pounds. Over the next nine shows, the average weight dropped to 1,138 pounds.[23]

These trendy, smaller-designed steers received a premium at the International's sale and on the commercial market.[24] As the age and weight decreased, the average sale price went up—prices more than doubled during this early period for animals that fit the baby-beef description.[25] The market monetarily encouraged a decrease in weight; animals weighing between 900 and 1,200 pounds received a premium over heavier livestock—an inversion of market preferences from decades before. Like weight, cattle age trended toward younger animals; Angus cattle one and two years old brought more at market than did Angus cattle aged three years and older.[26]

842; Alexander and Alexander, "Farming: 'How to Make it Pay,'" *Better Farming*; Toole, "Development of Our Modern Beef Type," *The Shorthorn World*.

[23] *The Union Stock Yard and Transit Company of Chicago: Eighty-Second Annual Live Stock Report, Year 1947 and Summary for Years 1865 to 1947 (*Chicago: The Union Stock Yard and Transit Co. of Chicago, 1948), Box 4-93, Chicago Stockyards Collection, Special Collections and University Archives, University of Illinois at Chicago, Chicago, IL (henceforth, CSC).

[24] "Demand for Baby Beef," *Chicago Livestock World* VIII, no. 276 (1907): 4; Poole, "Why Beef Consumption is Lagging," *The Producer*; H.W. Mumford, "Mumford on Beef Production," *Chicago Livestock World* VII, no. 270 (1906): 6; "The Show of Carlots of Fat and Feeder Cattle," *The Breeder's Gazette*; "Baby Beef," *Chicago Livestock World*.

[25] Ibid.

[26] "Average Weight of Livestock," in *"Our Year Book:" Telling Tables of the Livestock Trade for the Year 1901* (Chicago: Chicago Daily Drovers Journal, 1902), 19; "Average Weight of Stock," in *"Our Year Book:" Telling Tables of the Livestock Trade and General Business for the Year 1912* (Chicago: Chicago Daily Drovers Journal, 1913), 9; *"Our Year Book:" Telling Tables of the Livestock Trade and General Business for the Year 1912* (Chicago: Chicago Daily Drovers Journal, 1913); John M. Evvard, "Producing Baby Beeves on Corn Belt Farms," *Prairie Farmer* 90, no. 26 (1918): 9, 32; Beresford, "Baby Beef Making Safest System for Corn Belt," *Prairie Farmer*; McGavock, "The Trend of the Times in the American Hereford Trade," *The Breeder's Gazette*; Ray, *The Production of Baby Beef*.

As a result of these dramatic changes in farmer behavior and animal form, the International fell victim to fad. The show failed to distinguish between functional animals capable of mass reproduction and livestock manufactured to appease fanciful tastes. These unintended consequences were not driven by unethical motives or deceitful practices. Instead, the structure and process of show-ring selection pushed breeders to extremes. As outlined in the third chapter, judges utilized some combination of the analytical and comparative approaches. The analytical required evaluators to score livestock on their component parts based on the value of the part. This was also known as the scorecard approach. Then, the judge added up each category, such as breed type, head and neck, forequarters, hindquarters, and body, and the highest total represented the best animal overall. Scorecard judging depended on the separate evaluation of animal parts, and the relative value of those parts, and then the cumulative value of each individual animal.[27]

The analytical approach proved more effective in training judges or helping professional judges understand the priorities of a breed or type and the points attributed to different characteristics. Practically, judges relied on the comparative approach in the show ring. Judges lined animals side-by-side and head-to-tail and handled or touched each animal's parts to distinguish their value relative to their show-ring counterparts. If

[27] Robert S. Curtis, *The Fundamentals of Live Stock Judging and Selection*, 2nd ed. (Philadelphia and New York: Lea & Febiger, 1920), 40-42; Carl Warren Gay, *The Principles and Practice of Judging Live-Stock* (New York: The MacMillan Company, 1914), 64-65, 86-90; R.R. Benson, "The Mental Processes of a Stock Judge," *The Breeder's Gazette* vol. LXXIV, no. 3-1,912 (1918): 81.

comparing two animals, judges selected the animal with *more* of a certain trait that related to meat production, like back width or rump depth.[28]

In a larger class, the judge sorted through the different characteristics and prioritized animals with the *most* valuable qualities. Animals typically had some traits that were less desirable and some traits that were highly coveted. So, judges had to create, at least in their minds, a taxonomy of important qualities and select animals that possessed the *best* part or parts that were highest on the list of important qualities. To put it more simply, in meat-producing animals judges looked for the biggest backs, deepest rump, and often the shortest and most compact bodies. Perhaps competing animals possessed better color, breed character, heads, or constitution, but because the judges' main concerns related to market value, they started with body parts that correlated with carcass and worked down their lists of priorities.[29]

In wool or dairy classes, those preferences shifted, and the judges selected animals with the best qualities in different areas. Regardless of specialization or animal purpose, judges based comparisons on superlative qualities and superlative physiological type. This prioritization inherent to comparative evaluation drove type to more extreme forms. Emphasizing extremes in animal evaluation usurped standardization by continually moving or resetting the mean or average in body type, and then the judges would, compared to the new average, select animals that demonstrated extremes based on the new norm. Thus, superlative animals capable of success at the International were

[28] Ibid.
[29] Ibid.

always, by definition, in short supply. In this manner, the extremes of the show ring inflated the prices of breeding stock that critics lamented and the commercial-producer resented. This dynamic plagued the International, and pushed animals of superlative form to impracticality.

With every new fad came a new set of problems. By mid-century, International steers had become so small and compact that agriculturalists developed new words to describe the animals. "Compact" or "Comprest" steers emerged in the 1940s and 1950s; these words developed into actual categories of type or form that influenced judges' selections. But the extreme shortness that the show generated reduced the commercial productivity of the animals. When comparing conventional Shorthorns with Compact Shorthorns, for example, the former was able to convert digested dry matter into more commercial products. Even though judges and breeders associated smaller types with greater productivity, the Compacts and Comprests did not provide any carcass advantages over conventional purebreds in calorie efficiency, carcass yield, or product value. The selection of ultra-short cattle incidentally caused a reduction in overall body mass and, thus, a diminished ability to meet market demands.[30]

The initial thrust among packers and professors to entice breeders to produce smaller and younger animals resulted from the problems inherent to the extremes of nineteenth-century cattle. The large, thin "scrubs" with unknown genetics caused yield and productivity problems that limited packer ability to fulfill consumer demand and

[30] Warwick, "Fifty Years of Progress in Breeding Beef Cattle," *Journal of Animal Science*; Willham, "Genetic Improvement of Beef Cattle in the United States: Cattle, People and Their Interaction," *Journal of Animal Science*.

created productive inefficiencies that curtailed national food output—a concern of the professors. The original plan to moderate size and improve carcass yield initially solved these problems. In the first two decades of the twentieth century, agriculturalists reported commercial improvements in livestock. But the show ring did not reward moderation or balance; instead, the International heralded animals of extremes and superlative qualities. New extremes truncated any gains made in efficiency. Thus, the short-term utility of smaller animals ended when livestock pushed passed practicality to unreasonable shortness and fatness.

These small animals created a range of new problems. For example, in spite of the "breeding up" campaigns that required farmers to use "improved" males, the bulls' short stature prevented them from successfully mating with average-sized, or bigger, cows. To assist reproduction, producers dug holes in the ground in which the larger female stood to lower her height and allow the "improved," extremely short bull to mate with her. Fat compounded reproductive problems by limiting vigor, reproductive health, and longevity. Of course, in the show ring, the additional fat carried by these Comprest cattle gave the appearance of a greater degree of finish, which was visually appealing. But the short strides and overweight bodies of these cattle inhibited their on-the-farm performance.[31]

The necessity of farmer intervention in animal reproduction was not confined to cattle. For swine, journals heavily advertised the benefits of using breeding crates in the

[31] Alvin H. Sanders, "When the Show-Ring Hurts the Breeds: Disaster Follow 'Plugging' and Overfitting Aged Animals," *Wallaces' Farmer* 55, no. 20 (1930): 1, 26; Cyrus H. Maxwell, "An Analysis of the Results of the Steer Carcass Contest at the International Livestock Exposition, 1908-1923," *The American Society of Animal Production: Record of Proceedings of Annual Meeting, December, 1922* (1923): 132-135.

improved hog industry. The crates did not force reproduction; instead, they protected the well-being of female and male pigs. They prevented the boars from chasing non-ovulating females that were not willing to mate, which preserved the health of expensive boars, sows, and gilts. When sows or gilts reached peak fertility, their bodies produced a chemical that induced muscular rigidity, or standing heat, which meant the females were willing to stand for the boars. The farmer identified an ovulating female by observing physiological indications of peak fertility, like erect ears, a willingness to stand or mate, and increased interest in the boars. Only then did they move her to a breeding crate.[32]

The crates varied in design but were generally box-shaped with an opening in the back connected to a small, narrow chute that dead-ended with two ledges on either side of the sow. Some crates had irons that prevented the sow from falling during mating while supporting the boar; some simply allowed the boar to guide himself with his front feet by using the ledges.[33]

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[32] "Points On Treatment of Herd Boars," *American Swineherd* XXXIX, no. 4 (1922): 11; John F. Myers, "Handling the Sows During the Breeding Season," *Berkshire World and Cornbelt Stockman* 6, no. 11 (1914): 6; Lee Boyce, "Breeding Crate Saves Time and Trouble," *Berkshire World and Cornbelt Stockman* 13, no. 7 (1921): 6; "Good Enough for the Breeder and Cheap Enough for the Farmer," *Berkshire World and Cornbelt Stockman* 4, no. 9 (1912): 28; "Smith's Standard Breeding Crate," *Berkshire World and Cornbelt Stockman* 2, no. 2 (1910): 20.

[33] Ibid.

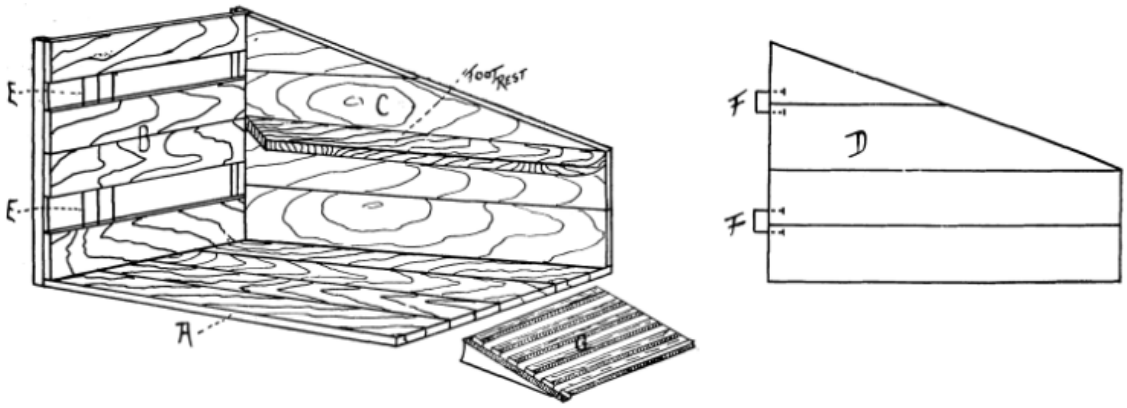

FIGURE 31. Basic Breeding Crate. *Source*: *The Breeder's Gazette* LIII, no. 4 (1908): 180.

Crates allowed farmers to manage and control breeding. Without the crates, hogs bred in the pasture or in large pens. In these conditions, the boars often chased the sows until they were at peak ovulation and the sow would stand for the boar. However, running and fighting before and after estrus could injure pigs. The crates were especially necessary in situations where the boar was much heavier than the sow. Dictating breeding not only allowed farmers to determine the date of birth, but it also helped producers ensure that their males and females were in top health while mating, which increased conception rates and litter size.[34]

[34] Ibid; "Another Breeding Crate," *The Breeder's Gazette* LIII, no. 4 (1908): 180.

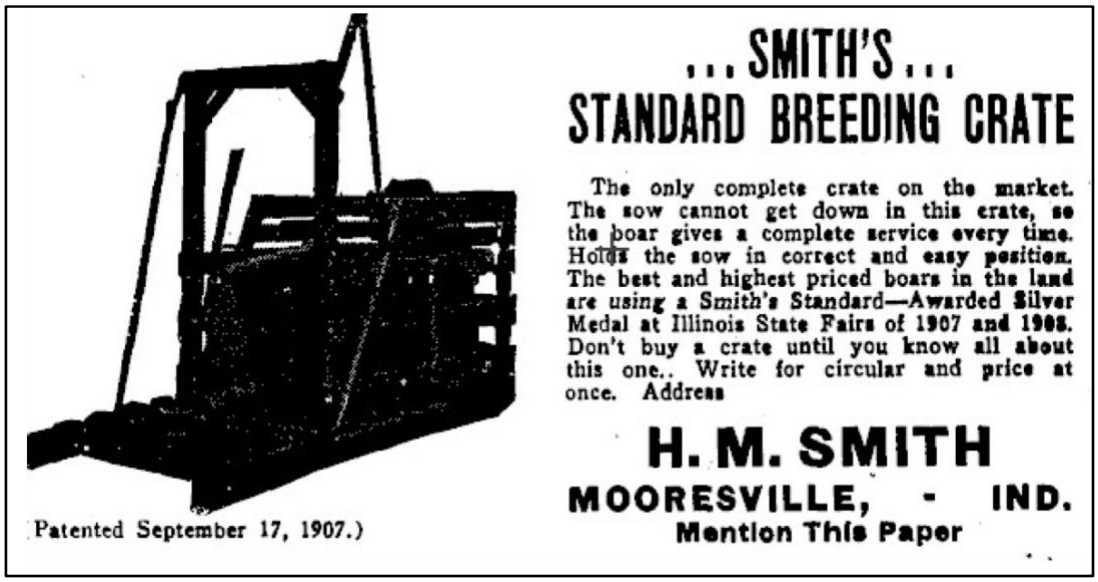

FIGURE 32. Smith's Patented Breeding Crate. *Source*: *Berkshire World and Cornbelt Stockman* 6, no. 3 (1914): 24.

The agricultural press advertised these benefits to established and aspiring improved breeders because the change in body type and husbandry regime pushed by the International necessitated controlled breeding. The externalities of the show ring that resulted in overly fat pigs or "improved boars" with vastly different body types than average sows made reformers reevaluate the feasibility or the efficacy of natural breeding. The breeding crates allowed for mating between sows with different skeletal structures and leaner body types than the fat, square-made boars from the show ring. The fat and limited mobility of these boars restricted their reproductive vigor and value without breeder assistance. The ledges and weight-holding devices in the crates assisted fat, compact boars during mating, which also prevented female injury. The crates served an important function in extending the breeding capacity of valuable boars.[35]

[35] Ibid.

The crates, in fostering a more productive environment for propagation, protected investments made by producers in improved animals by preventing injury or harm to sows and boars. And, in the end, the crates allowed boars to mate without exerting much energy, so these expensive animals could breed more sows without tiring, which allowed farmers to maximize profit on expensive-to-purchase males. The excesses of the show ring, both in cost and in physiological type, infringed on the practicality of natural breeding in an uncontrolled environment.[36]

The mixed consequences of the International became more acutely negative when the show ring spawned an outbreak of dwarfism or so-called "snorters" in the cattle industry. At first, judges admired snorters for embodying the most extreme examples of the idealized body. Snorter Shadow Isle Black Jestress 2, for example, won the Grand Champion Angus Female in 1953. Compared to her handlers, her stature demonstrated this degree of smallness (Figure 33).[37]

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[36] Ibid.

[37] Harlan Ritchie, "From Big to Small to Big to Small: Part 2 of a Pictorial History of Cattle Changes Over the Years," *On Pasture*, ed. Kathy Voth, https://onpasture.com/2016/07/11/from-big-to-small-to-big-to-small-part-2-of-a-pictorial-history-of-cattle-changes-over-the-years/; Harlan Ritchie, "From Big to Small to Big to Small- Our History of Cattle Breeding from 1742 to Today," *On Pasture*, ed. Kathy Voth, https://onpasture.com/2017/07/24/from-big-to-small-to-big-to-small-our-history-of-cattle-breeding-from-1742-to-today/; Harlan Ritchie, "From Big to Small to Big to Small: Part 3 of a Pictorial History of Cattle Over the Years," *On Pasture*, ed. Kathy Voth, https://onpasture.com/2016/07/18/from-big-to-small-to-big-to-small-part-3-of-a-pictorial-history-of-cattle-over-the-years/; Harlan Ritchie, "Harlan Ritchie' Beef Review," https://msu.edu/~ritchieh/currentevents.html.

FIGURE 33. Shadow Isle Black Jestress 2. *Source*: American Angus Association.

With smaller carcasses, this fad for snorters created productive obstacles for the market, but dwarfism also led to health and farm management problems. Breeders who selected for ever-smaller cattle accidentally propagated a recessive "dwarf" gene, especially prominent in Herefords and Aberdeen-Angus cattle. In the 1950s, dwarfism plagued the purebred industry and created hysteria among farmers and breed associations. This problem began 20 years earlier when judges began selecting for "duck-legged" steers that carried ultra-thick bodies and excessively short legs, and as breeders oriented their matings based on this standard, the often lethal "dwarf" recessive gene emerged in purebred animals. These young calves had bowed front legs, short, flat faces with

protruding foreheads, undershot jaws, and pot bellies, and experienced incoordination, nervousness, and breathing difficulties; they rarely lived longer than a couple weeks.[38]

This gap between commercial needs and show ring priorities manifested in aesthetic preferences as well. In the USDA's 1936 *Yearbook*, W.H. Black of the Bureau of Animal Industry argued that aesthetic qualities, traits that help breeders identify breed, distracted the industry from moving toward more economically productive cattle. He did, however, commend the improved livestock movement for identifying breeds that specialized in a purpose. Maximizing farm yield required breeding animals proficient in the production of a single commodity, he asserted. But beyond using aesthetic traits to identify meat-producing breeds and selecting mating pairs that improved output, head, nose, hoof, hair, wool, hide, and color possessed no tangible market value.[39]

What mattered was purpose, Black argued, not breed aesthetics. The ability to distinguish between types and breeds of animals based on commodity production carried value. Among breeds already specialized in the production of meat, the color markings had no commercial value. For example, differentiating meat-producing Aberdeen-Angus from dairy cattle made sense. After identifying a meat animal, performance, not

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[38] Ibid; Warwick, "Fifty Years of Progress in Breeding Beef Cattle," *Journal of Animal Science*; Willham, "Genetic Improvement of Beef Cattle in the United States: Cattle, People and Their Interaction," *Journal of Animal Science*; Thomas J. Marlowe, "Evidence of Selection for the Snorter Dwarf Gene in Cattle," *Journal of Animal Science* 23, no. 2 (1964): 454-460; R.L. Preston, "Compact Cattle Genetics," in *Stetson, Pipe and Boots: Colorado's Cattleman Governor, A Biography about Dan Thornton* (Victoria, BC: Trafford Publishing, 2006); T.R. Preston and M.B. Willis, *Intensive Beef Production* (Oxford: Pergamon Press, 1970).

[39] W.H. Black, "Beef and Dual-Purpose Cattle Breeding," in *Yearbook of the United States Department of Agriculture, 1936* (Washington D.C.: United States Government Printing Office), 863-886; "Livestock Breeding at the Crossroads," in *Yearbook of the United States Department of Agriculture, 1936*, 831-862.

aesthetics, generated revenue and correlated to food output on the farm—a central concern for the USDA. And in this way, the value attributed to aesthetics and not performance distorted these animals' value to the average farmers.[40]

Whether it was impractical body types or aesthetic preferences, livestock evaluation at the International helped create this gulf between the standards meant to advance commercial agriculture and the individual animals selected as champions. International animal selection pushed livestock to extreme and even dangerous forms, which made them rare in quantity and stimulated the high prices. The physiological problems associated with very small animals thwarted efficiency goals and caused cost, reproductive, and well-being problems.

By definition, superlative animals capable of winning the International contradicted standardization. No different than the excesses of nineteenth-century British and America show cattle that greatly outsized commercial livestock and their human handlers, the International thrust animals toward a different extreme. The practical, market-oriented goals of early-maturing, smaller-sized livestock spawned the fad for baby beef and "pony carcasses." Promoters of reform heralded this baby-beef fad as proof of the International's influence on American agriculture, and they also celebrated the pony steers as ideal specimens suited for the modern age. The International changed livestock physique, and animals kept getting smaller and more compact with each passing year.[41] The alteration of animal bodies to such an extreme undermined standardization

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[40] Ibid.

[41] Vaughan, "Fashions in Market Cattle," in *Types and Market Classes of Live Stock*, 69-78; McGavock, "The Trend of the Times in the American Hereford Trade," *The Breeder's*

goals. Nevertheless, the animals, exhibits, and promoters of the International shaped the tastes and priorities of farmers while normalizing single-purpose livestock.[42]

Specialization

From the outset, the packers and professors who organized the International agreed in principle that scrub livestock and the range regime failed to meet the growing needs of American society; they worked together to organize the livestock improvement movement to address their respective anxieties about food quality and gross output, consumer demands, and soil fertility. However, in addressing concerns about the carrying capacity or fertility needs of farm land, the packers cared little about the professors' primary motive—permanent agriculture. The packers pushed specialization in American agriculture, which they hoped would provide a consistent supply of quality livestock to the Union Stockyards. However, specialization was not necessarily conducive to balanced or permanent farming. Agronomic experts worried about the consequences of segmentation and specialization, because permanent agriculture required the organic matter and nutrients in livestock manure to ensure continual production and profitability.[43]

Commercial fertilizers provided important elements, like nitrogen, phosphorus, and potassium. Premixed fertilizers allowed producers to maintain and increase farm

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Gazette; Poole, "Craze for Light Cattle," *The Producer*; Frank D. Tomson, "Shorthorn Excellence," *The Shorthorn World* IV, no. 1 (1919): 11.

[42] Ibid; Olmstead and Rhode, *Creating Abundance*, 309.

[43] Cyril G. Hopkins, *Soil Fertility and Permanent Agriculture* (Boston: Ginn and Company, 1910), xvii-xxiii, 198-235.

yields by invigorating crop growth. However, commercial fertilizers only stimulated crops; they did little to build the soil structure.[44] Short-term yield gains cloaked the inadequacies of commercial fertilizers in protecting, maintaining, and improving the soil. Despite these problems, yield gains that resulted from the application of commercial fertilizers drove farmer dependence on these inputs and ultimately undermined many of the professors' balanced-farming goals. And these yield gains allowed for the restructuring of farm purpose in favor of more specialized crop and animal husbandry regimes.[45]

The agricultural academics acknowledged a growing distinction between the ideal farmer and the modern stock feeder. In a "healthy" agricultural system, the farmer would raise crops and livestock and market surplus crops and meat to the consuming public while using waste to revive the soil. But the feeder deviated from the goals of permanent agriculture. Stock feeders bought animals and feed, and they generated revenue solely from off-farm exchanges or sales with little ability to return the manure and waste of animals to the soil where the grains grew. In addition, the revenue demands of single commodity production also skewed the principles of permanent agriculture. Even when animal production did not yield a profit, the fertility gains of balanced farming negated financial losses. Farmyard manure factored into overall revenue in crop and animal

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[44] Ibid; "Facts About Soil Fertility," *Prairie Farmer* 85, no. 5 (1912): 12; W.C. Bryant, "Raising Bumper Grain Crops," *Prairie Farmer* 85, no. 5 (1912): 10.

[45] Ibid; Vaclav Smil, *Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production* (Cambridge: The MIT Press, 2001).

production, and thus, it was essential to annual farm needs and the long-term pressure to increase farm productivity and national food output.[46]

The use of livestock on every farm to ensure the continued productivity and fertility of the soil was primarily a concern of the professors. The packers, on the other hand, owned commercial fertilizer companies and supported the segmentation of agricultural production. In fact, some packers envisioned the range as a nursery for feeder cattle and the Great Plains and Midwest as fattening districts for Chicago.[47] The packers' version of animal husbandry and specialization foreshadowed the development of twentieth-century American agriculture.

As a geographical middle ground, the Great Plains became a contested space for differing production regimes. Would it adopt range-like husbandry practices, or would it be subsumed by the growing influence of Corn Belt agriculture and the feedlot system of production? Terry G. Jordan has called this a "cultural contest" between Texas and the Midwest; the type of animal husbandry espoused by the International eventually won. As the twentieth century progressed, Plains farmers adopted Corn Belt agriculture by building extensive feedlots and shipping livestock to the market in Chicago. And

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[46] Ibid.

[47] T.F.B. Sotham, "Building Meat on the Beef Model," *The National Provisioner* XXVI, no. 3 (1902): 23; "Cattle Feeding on Increase," *Wallaces' Farmer* (1936): 10; "The Ideal Corn Belt Farm," *Wallaces' Farmer* (1914): 4; "Beef Production in the Corn Belt: Feeding Cattle to Sell Corn," *Wallaces' Farmer* (1914): 5; "Beef Production in the Corn Belt: Feeding Cattle to Make Beef," *Wallaces' Farmer* (1914): 5; Alexander and Alexander, "Farming: 'How to Make it Pay,'" *Better Farming*; "The Production of Baby Beef, *Chicago Livestock World*; "Adjusting Production to Consumption," *Wallaces' Farmer* 40, no. 41 (1915): 6. For more about the packers involvement in the commercial fertilizer industry, see documents on Swift & Company at the Chicago History Museum Research Center, Swift and Company Records/Agricultural/Chemical Division-Historical Data, Box 2.

eventually, the agricultural systems allowed the Plains to be categorized in the common vernacular as part of the Midwest. The Corn Belt triumphed over the range. Producers provided feed to herds in the winter and marketed animals year-round. The docility of animals, the limited need for equestrians and equestrian skills, and the dependence on permanent livestock facilities, like barns, silos, and fences, differentiated this regionally-based agricultural system, which manifested in cattle fattening districts.[48]

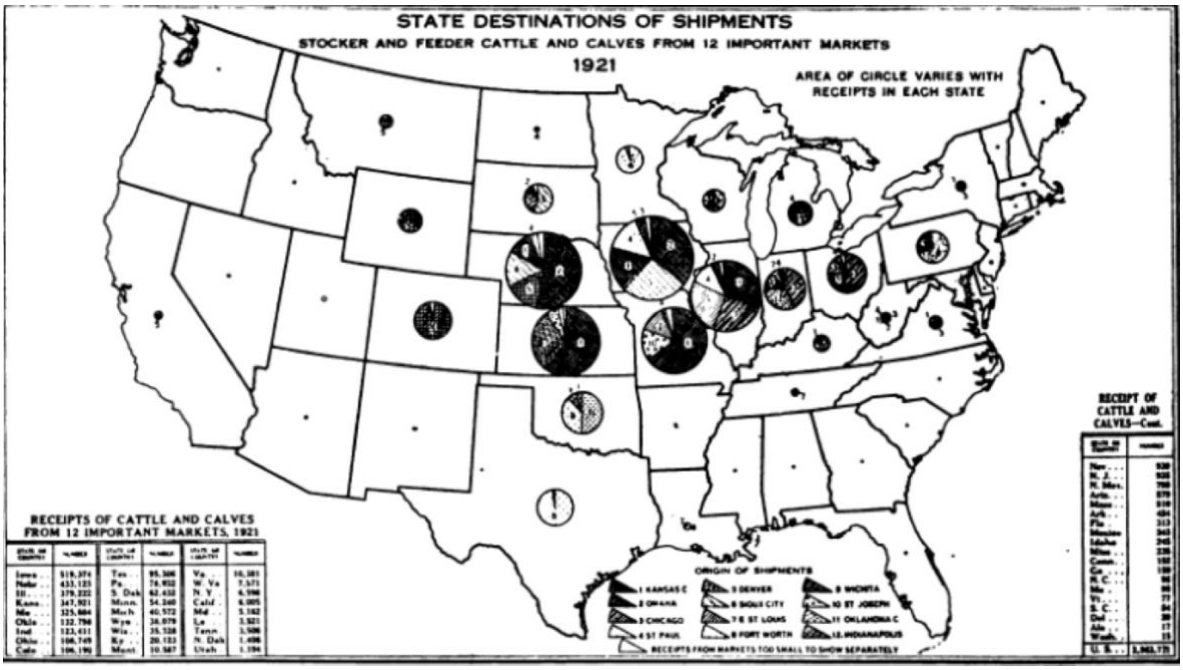

FIGURE 34. USDA map that depicts the percentage of stocker and feeder cattle bought by state. These cattle after purchased returned to the farm for fattening. Overwhelmingly, the Corn Belt served as the fattening district, especially Iowa, Nebraska, Illinois, Kansas, and Missouri. *Source:* E.W. Sheets, "Our Beef Supply," in *Yearbook of the United States Department of Agriculture*, 1921, 285.

Nothing was more indicative of this transformation than farmers' growing dependence on off-farm inputs, including feed. Over the first half of the twentieth

[48] Terry Jordan, *North American Cattle-Ranching Frontiers*: *Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993), x, 269-272; Olmstead and Rhode, *Creating Abundance*, 264.

century, farmers increasingly utilized and became reliant on commercial feeds. The feed manuals published at the end of the nineteenth century, like Elliot Stewart's *Feeding Animals*, little discussed manufactured or mixed feeds, but just three decades later the commercial feed industry grossed $400 million in revenue. Many agricultural historians focus on mechanization during this period, but in 1929 the feed industry outpaced agricultural machine and attachment sales by $122 million.[49]

Despite this disparity in sales, animals and machines were not mutually exclusive stories. The International and land-grant professors tried to make machines of animals that efficiently converted feed to meat and that yielded more food per acre to increase aggregate food output. These commercial feed sales highlighted the growth and prominence of this industry following the inauguration of the International. To be sure, the International was not the only force behind these changes; feed specialist F.B. Morrison, for example, attributed these changes to increased pressure to produce higher-quality animals and the land-grant professors and research-station researchers who applied science to advance feed conversion rates and improve animal health.[50]

These professors and researchers were the same university workers who created, officiated, and endorsed the International. In fact, they used the International to advertise the need for improved nutrition and to develop a better understanding among producers

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[49] Olmstead and Rhode, *Creating Abundance*, 314-329; F.B. Morrison, *Feeds and Feeding: A Handbook for the Student and Stockman* (Madison: The Henry-Morrison Company, 1920), 405-406; Elliot W. Stewart, *Feeding Animals: A Practical Work upon the Laws of Animal Growth*, 4th ed. (Buffalo: Baker, Jones & Co., Printers and Binders, 1888).

[50] Morrison, *Feeds and Feeding*.

of the biological needs of animals.[51] The push toward the formulation of specialized feed—feed produced off the farm with other people's grain—separated the manufacturing and application of farm inputs from the farmer and livestock. This condition further undermined the goals of balanced farming and mixed husbandry. The expert knowledge needed to produce scientifically-manufactured feed and fertilizers and to design and build the newest farm machines and attachments forced specialization on the farm, which increased the capital demands of farm production and farmer reliance on a network of nonfarm agricultural experts.

Farmers spent money on improved animals and commercial farm inputs, including feeds, machinery, and also permanent buildings. Livestock producers invested in concrete floors for animals and built permanent structures for a specified purpose, including a certain design for animal birth and other buildings and pens for feeding. One progressive farmer in Illinois, S.W. Larmore, reported to a *Prairie Farmer* journalist that he bought feed from local tenant farmers and that he had built a series of structures for his hogs. He also bragged that he had enough concrete on his farm to pave an entire Illinois town.[52] Larmore's investment in permanent structures exemplified the type of farm normalized by International promoters. He fed hogs in tight pens on concrete floors; as an alternative, many other farmers used slatted floors. In addition to feeding facilities,

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[51] *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1916), 240-243; *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1918), 252-255; *A Review of the International Live Stock Exposition: A Great Movement for Improvement of the Domestic Animals of the United States* (Chicago: The Union Stock Yard & Transit Company, 1922), 278-317.

[52] "A Productive Stock Farm," *Prairie Farmer* 90, no. 29 (1918): 9.

hog producers built special buildings called farrowing houses to birth piglets. For his farrowing house, Larmore had a series of eight-foot pens under one roof.[53]

These sorts of facilities with specific designs for birthing and feeding to manage and control pigs' feed intake and life cycle typified Corn Belt meat production.[54] Not unlike Larmore's ideal hog farm, feeding cattle and sheep also required constant access to feed and storage facilities for grain and roughages. Baby-beef production, in particular, hastened the development of feedlot use. The feeding regimen for baby beeves provided a stark contrast between modern husbandry and the range. From the time producers birthed baby beeves until they showed or butchered them, owners fed these animals continually, and thus the fattening process began with birth. The necessity to convert grain to meat 365 days a year prohibited scrubs or genetically unknown cattle from being baby beeves. Only the well-bred sorts normalized by the International were capable of this high-input, high-yield fattening process.

The sort of steers preferred by International showmen and judges suited the proclivities of the Corn Belt and feedlot finishing. Baby beeves had small, compact bodies with short legs. Not only were these bodies not capable of thriving in the grass-

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[53] Ibid.

[54] J.D. Coburn, "Hog Houses and Pens," in *Swine Husbandry* (New York: Orange Judd Company, 1919); Edward Norris Wentworth, *Progressive Hog Raising…* (Chicago: Armour's Bureau of Agricultural Research and Economics, 1922); "Concrete for the Farm," *The Agricultural Digest* II, no. 6 (1917): 713, 725. On these concrete slabs, many hog producers, for example, included self-feeders so that the pigs could eat as much grain as possible. At the base, the feeders had doors or flaps that covered holes. Gravity kept the holes filled with grain and the hogs lifted the doors with their snouts to access the feed. Simpler in design, these feeders allowed producers to give hogs a maximum quantity of grain-based calories. Other hog producers invested in large barns with narrow, but long pens with troughs and waterers. This controlled environment allowed producers to measure and dictate feed intake and weight gain.

fed, range regime, but the amount of travel required on the range would prevent baby beeves from optimizing the calories they consumed. Even though the International sought to assist American agriculture writ large, the sort of demands placed on care, breeding, and feeding proffered by the show manifested in a region-based feedlot system. The unique traits of Longhorns that made them particularly adept at range survival and production went ignored for the sake of agricultural specialization.[55]

The horn size, long legs, wily demeanor, and hardiness, which the packers and professors characterized as inferior and inefficient, suited the subtropical regions of the United States allowing Longhorn-based cattle to thrive with little intervention. However, the International ignored the strengths and inclinations of these "scrub" animals. Longhorns' lean bodies, long legs, and resistance to Texas fever helped ranchers take advantage of the vast grazing grounds and the unique ecological qualities of the warmer climates of the South and Southwest.[56]

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[55] Alexander and Alexander, "Farming: 'How to Make it Pay,'" *Better Farming*; "About Baby Beef," *Wallace's Farmer*; "The Carlots of Fat Cattle," *The Breeder's Gazette*; Toole, "Development of Our Modern Beef Type," *The Shorthorn World*; "The Production of Baby Beef," *Chicago Livestock World*; Evvard, "Producing Baby Beeves on Corn Belt Farms," *Prairie Farmer*; Beresford, "Baby Beef Making Safest System for Corn Belt," *Prairie Farmer*; Jay Whitson, "Cattle Feeding Methods Changing?," *The Breeder's Gazette* LXXX, no. 13 (1921): 437-438; Whitson, "Baby Beefmaking in the Cornbelt," *The Breeder's Gazette*; Mumford, "Mumford on Beef Production," *Chicago Livestock World*; Wing, "The Present Situation in the Live Stock World," *The Berkshire World and Cornbelt Stockman*; Poole, "Young Cattle the Most Profitable," *The Breeder's Gazette*; C.S. Plumb, "Feeding Baby Beef," *American Agriculturalist* (1915), Vol. III, CSPP.

[56] Claire Strom, *Making Catfish Bait Out of Government Boys: The Fight Against Cattle Ticks and the Transformation of the Yeoman South* (Athens: The University of Georgia Press, 2009), xiii-xvi, 1-33; Mumford, *Beef Production*, 138-142; Olmstead and Rhode, *Creating Abundance*, 322-323, 399-400.

Immunity to Texas fever, also called Southern cattle fever and tick fever, exemplified their usefulness to these regions, which became a major problem for northern producers and meatpackers when these animals were driven to railheads and shipped to feedlots and slaughterhouses. Left in their southern environment, Longhorn cattle, with their immunity or partial immunity, experienced little damage or illness when in contact with the carrier of the fever. The cattle tick transmitted this fever and only existed in areas of the country without a good winter freeze, which killed the tick.[57] Northern livestock were vulnerable to the ravages of the fever. The disease attacked the animals' red blood cells and farmers often noticed blood in their cattle's urine. After exposure to southern cattle, infected northern stock usually died in under 10 days, and the disease killed as much as 90% of an infected herd.[58]

Containment was the first response. In 1890, the secretary of agriculture quarantined southern cattle. The initial quarantine line covered Arkansas, Texas, and the Indian Territory and then was extended along the Mason-Dixon line in the East. Then, in 1906, the federal government enlarged the efforts and focused on eradication. Like the characterization of the "scrub" at the International, the response to the tick mirrored a similar classification of southern agriculture as underdeveloped and applied the same sort of modern, scientific approach.[59]

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[57] Ibid.
[58] Ibid.
[59] Ibid.

FIGURE 35. Federal Quarantine Line, 1906. *Source:* W.M. MacKellar, "Cattle Tick Fever," in *Yearbook of the United States Department of Agriculture*, 1942, 575.

Consequently, the United States became divided agriculturally based on immunological responses to Texas fever, and when the federal government moved to regulate and stamp out the problem, this line demarcated regions. The government initiated a labor-intensive effort to eradicate the southern tick to prevent the transmission. The USDA focused on killing off the carrier instead of breeding animals with immunity. Tick eradiation required the dipping of southern cattle in vats every two weeks from the spring to the fall.[60]

The quarantine line served to protect the vulnerability of the "superior" stock of the North. Even though categorized as inferior, the genetic and physiological traits of Texas cattle served a purpose despite the objections of reformers who demeaned them;

[60] Ibid.

their physiological and immunological traits allowed them to thrive in the southern regions of the United States. Nevertheless, Texas cattle carried a negative connotation, and their disease spreading capabilities worsened their favorability among agriculturalists in the Corn Belt. Instead of seeing their resistance as a strength, reformers characterized them as a threat. Stamping out or removing the scrubs from the range represented a loss in biodiversity—traits valuable to the different climates, terrains, and demands of the American landscape.

Some livestock experts at the time, however, did cultivate an appreciation for what we might now term biodiversity. In the early twentieth century, livestock-legend Richard Walsh worked for commercial interests in multiple regions and countries that primarily used Southern cattle. He began his career by managing the world-famous Adair ranch in Texas. Then he moved to Brazil for two years to help Murdo Mackenzie establish his ranches near Sao Paulo. Finally, in 1913, Walsh moved to Southern Rhodesia to run the livestock division of the British South Africa Company, which hired him to introduce modern cattle-raising to the region. Just prior to his death, Walsh traveled to El Paso, Texas, to speak at the American Livestock National Association. He outlined Rhodesia's agricultural infrastructure, grazing conditions, and native cattle situation. Of course, he associated British livestock like the Holstein-Friesian to modern animals. But in an interesting moment in his speech, he congratulated Texas cattle.

Perhaps because of his audience; Walsh expressed his admiration for their peculiar traits that made them amenable to the climate.[61]

In 1902, following the Boer War, British administrators imported 7,000 yearling and two-year-old heifers from Texas to restock South Africa. These Texas cattle, Walsh bragged, thrived in these tropical and subtropical climates. Ironically, these were the same animals that American reformers saw as backward and inefficient. Their biological inclinations that helped them prosper in the southern United States proved to be a strength when seen through a different lens. The fever-resistant quality of the Texas cattle shipped to Rhodesia melded well with the terrain and climate. In particular, Walsh admired their ability to endure the disease, climate, and foraging demands of the region. Walsh's reflections on specific livestock needs in southern Africa modified or even challenged the International's notion of what types of animals were "superior."[62]

Despite the advantages of livestock suited to different ecological regions, the improved livestock movement succeeded in prioritizing British livestock throughout the United States, and this trend over the course of the century effectively narrowed the genetic diversity of farm animals. With each passing decade, livestock represented a more select set of genetics. By the beginning of the twenty-first century, 87 percent of purebred pigs came from only four different breeds—Hampshire, Landrace, Durocs, and Yorkshires. Several breeds vanished from farms all together, including the Suffolk, Cheshire, and Essex. A century after the International began, American hog farms

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[61] Richard Walsh, "Cattle Conditions in Southern Rhodesia," *The Producer* III, no. 7 (1921): 5-9.

[62] Ibid.

systematized meat production with genetically-homogenous groupings of high-yielding pigs, which required permanent buildings and controlled environments.[63]

The packers and professors who organized the International initiated this trend toward high-density production systems that, over time, grew in scale and dependence on commercial feeds. But high-density feeding, whether on the feedlot or in enclosed structures, caused unintended problems. Dependence on grain calories to fatten livestock led to overeating and acidosis in ruminant animals. Cattle and sheep fell into the ruminant category—species that had a stomach with multiple compartments. They differed from horses and pigs with single compartment stomachs, or monogastrics, as the multi-chambered stomachs of cattle and sheep required the utilization of roughages for digestion, which allowed them to prosper on the roughage-only diet of the range. Although each chamber of the stomach had a different name and function—rumen, reticulum, omasum, and abomasum—this complex system still required the "scratch" and work of roughages to digest food, and any imbalances with grain resulted in ill health.[64]

The feedlot system depended on the heavy use of grain, which posed real problems for profitability and efficiency with cattle and sheep. Even on heavily monitored and micromanaged feedlots, larger and stronger animals pushed weaker ones aside while eating, which prevented the feeder from dictating the amount of grain each animal consumed. In these situations, the better-performing animals, because of their

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[63] Olmstead and Rhode, *Creating Abundance*, 313-314

[64] "Watch Your Feeder Lambs, They May Eat Themselves to Death," *Farmers' Weekly Review* 27, no. 35 (1948): 4; "Entrerotoxemia Can Hit Healthy Lambs," *Farmers' Weekly Review* 36, no. 41 (1957): 2; "Overeating Disease Is Serious Threat to Feeder Lambs," *Farmers' Weekly Review* 26, no. 45 (1947): 1.

strength and higher rate of grain consumption, became more susceptible to disease. Pathologists and veterinarians advised feeders to separate cattle and sheep based on age and size so that the animals competed fairly and had similar caloric needs, which made it easier to regulate feedings.[65]

The biological responses of cattle and sheep to the feedlot system pushed producers to provide additional support to guarantee the survival of the animals. Otherwise, the animals' biological reactions to this grain-based system could have eliminated the economic benefit of feedlot production. To protect their investments, feeders responded by inoculating or vaccinating livestock as they arrived at the feedlot with an enterotoxemia bacteria to prevent the prevalence of the disease. During a suspected outbreak, the feeders would force their animals to eat sulfur, which dramatically reduced the death of lambs after experiencing symptoms of the disease. And finally, pathologists and veterinarians urged farmers to keep enough roughage, like hay, available for cattle and sheep.[66]

The organization of animals into the feedlot system also led to parasite problems. Being in confined spaces where livestock lived on top of their own fecal matter facilitated the transmission of internal parasites. In the open spaces of the range, livestock ate roughages and moved to new areas, but animals confined to a single space created problems that limited the thrift of livestock. Producers noticed a reduction in feed conversion rates because the parasites caused harm to animal health and prevented

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[65] Ibid.
[66] Ibid; "Vaccine Protects Feeder Lambs," *Wallaces' Farmer* (1950): 61.

livestock from utilizing the nutrients available in the grain. Even more, parasites often caused anemia. Cattle and sheep fell victim to a particularly brutal type of parasite called coccidiosis. This intestinal pest irritated animals and sucked nutrients from the host. Their appetites decreased, and with their backs arched, they displayed weak and thin bodies. Coccidiosis often led to pneumonia and even death.[67]

FIGURE 36. Sheep affected with coccidiosis. *Source:* G. Cikmans and D.A. Shorb, "Internal Parasites of Sheep and Goats," in *Yearbook of the United States Department of Agriculture*, 1942, 864.

[67] "Vet Advises Treating Lambs for Worms," *Farmers' Weekly Review* 31, no. 37 (1952): 2; "Good Management Protects Calves from Coccidiosis," *Farmers' Weekly Review* 20, no. 29 (1942); 4; "Paved Feedlots Found Profitable," *Farmers' Weekly Review* 35, no. 17 (1956): 4; "Livestock Farming Conserves Soil," *Prairie Farmer* 91, no. 29 (1919): 11, 33.

Pathologists worried that the prevalence of parasitism truncated national food output; they urged farmers to invest more money in feedlot infrastructure, alter management practices, and adopt a parasite-treatment program.[68] The concrete floors allowed farmers to easily clean and distribute manure, which reduced the impact of parasites. But the division of labor inherent to modern farming, including growing grain, feeding livestock, and the removal and distribution of manure, forced farmers into different specialties. Specialization in one area of agriculture—animals' bodies—influenced all aspects of farm structure. The International pushed for a high-yielding, single-purpose husbandry, which affected every level of production and the tasks and commodity focus of the farmer. Not only did farmers become reliant on off-farm inputs and nonfarm agricultural experts, but producers and their animals also became specialists within this broader agricultural sequence.[69]

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[68] Ibid; "Permanent Buildings," *Prairie Farmer* 88, no. 23 (1916): 25; "A Productive Stock Farm," *Prairie Farmer*.

[69] Algie Martin Simons, editor of the *International Socialist Review*, objected to the modern condition, especially to, what he considered, the robbing of the countryside of money and resources by urban consumers and capitalists. As it relates to the former, he lamented, the owners of agricultural mortgages and landlords far too often resided in the city and rented property to tenant farmers—a condition that removed the owners of the farm from the work and the workers of the farm.

Tenant farmers shipped the products of the soil's "choicest elements," fertility, to the city and that essential organic matter, instead of returning to the field, fed urban residents and the waste filled the rivers and lakes with toxic material. Simons also objected to the impact of modern life and the suggestions of modern farming on the producers. He urged readers to reject the imposition of crop and animal husbandry systems geared toward surplus production that removed the capital and resources from the farm and away from the producer. And, in particular, he shunned the idea of the specialist. Modern farming urged, he argued, farmers to become specialists in crop or animal husbandry. Even more specifically, they were specialists of one crop or animal, which rendered them completely dependent on a network of other specialists, salesman, outside inputs, and capital. A.M. Simons, *The American Farmer* (Chicago: Charles H. Kerr, 1903).

Conclusion

In 1971, the Union Stockyards closed after years of decline resulting from the emergence of interstate trucking and the decentralization of meatpacking. The International Livestock Exposition survived a bit longer until 1975, with the International Amphitheatre hosting livestock each year during this period with exceptions of a hoof and mouth outbreak in 1914 and 1915 and during World War II.[70] A new Amphitheatre was built in 1934, and in this new facility radio networks aired live national broadcasts of the livestock competition, which were heard by farmers and urban consumers. This Chicago venue also hosted many events central to American cultural and political life. The International Amphitheatre housed five presidential nominating conventions, including the infamous Democratic National Convention in 1968. It also hosted NBA basketball games, wrestling and boxing matches, and concerts for the Beatles, Elvis, and Michael Jackson.[71] Nevertheless, what initiated the organization of the International and the erection of the many Exposition venues was a group of meatpackers and land-grant university researchers who wanted to transform American livestock and ensure American food security.

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[70] Overlapping for two years, 1974 and 1975, the North American International Livestock Exposition in Louisville, Kentucky, became the new home for the International's Saddle and Sirloin Club and replaced the Exposition as the new center of livestock evaluation; it remains as such still today.

[71] "International Amphitheater," *Encyclopedia of Chicago*, http://www.encyclopedia.chicagohistory.org/pages/647.html; Anthony Burke Boylan, "Amphitheatre Gets Its Final Curtain Call," *Chicago Tribune*, May 30, 1999.

The International took aim at the roughness, ponderousness, and old age of nineteenth-century livestock and redirected breeder attention toward quality. This approach that focused on value differentiated nineteenth-century husbandry from the practices that reformers considered "modern." Defining value, however, proved more difficult than simply recognizing the weaknesses of animal agriculture. The International intervened to frame the conversation and construct the standards for the improved livestock movement. The show provided examples of modern animals, and through a large group of supporters and surrogates, including the agricultural press and land-grant universities, it advertised the scientific breeding and feeding methods used to propagate and raise "superior" animals.[72]

These well-bred animals, reformers argued, efficiently transformed grain calories to meat. As such, the modern animal was a production-specific machine in a larger industrial system, and the improved producer and feeder needed to be experts and specialists too. Being able to reshape animal form, select for positive and eliminate negative genetic traits, and dictate breeding, feeding, and marketing amounted to control over the nation's food source. Despite this animal mechanization and desired control, the modern condition rendered farmers dependent on non-agricultural consumers, a web of chemical, seed, and machine companies, and urban capital. This model of agricultural production connected a large network of mutually dependent farm and nonfarm agricultural specialists who met in Chicago each year.

[72] Toole, "Development of Our Modern Beef Type," *The Shorthorn World*.

But the International also provoked an unending cycle in show-animal selection and breeding that encouraged extreme body types. International livestock initially became more moderate in type. But by the 1920s, the problems of extremes started to manifest in excessively small animals. These cattle, sheep, and pigs of superlative qualities were rare, and thus the cost of attaining what the International deemed the best was too high for the average farmer. Even though the show effectively altered animals' bodies, excessively small animals also created new problems that led to serious reproductive and health consequences.

The Exposition much more effectively addressed specialization; in fact, the International helped initiate broad trends toward specialization in the meat industry. Compact or Comprest livestock suited feedlot husbandry, and their bodies were geared toward the production of meat—a single purpose. Concrete feedlots, dense-population feeding, permanent buildings, and corn were required to optimize meat production. This capital- and labor-intensive process, dependent on nonfarm agricultural specialists and orchestrated by the International, became the predominant husbandry regime in American agriculture over the course of the twentieth century.

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