CHAPTER 7

After the Tractor Wars: Farm Equipment Manufacturers in 1929[1]

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In his 1931 book *Century of the Reaper*, a history of the International Harvester Company and its predecessor, the company founded by his grandfather, Cyrus McCormick III,` briefly recognized a pivotal turning point in the early history of the farm tractor, a price war that attempted to accelerate tractor sales in the early 1920s. "When the tractor war was over," he wrote, "the farmers of the world appreciated beyond a shadow of a doubt that they would best serve themselves by providing their farms with a tractor rugged enough to resist the shocks of farm use and powerful enough to do all of their work. They knew that there can be no such thing as a good cheap tractor."

His statement recognized a profound, and much overlooked, shift in the evolution of farm equipment. *Tractor Wars: John Deere, Henry Ford, International Harvester, and the Birth of Modern Agriculture* features the twenty-year period between 1908 and 1928 during which the tractor was introduced to American farmers. In the face of great opposition and doubt, more than 160 companies were building more than 200,000 tractors annually by 1925. Automobile pioneer Henry Ford's Fordson tractor captured 75% market share, but in 1928 he exited the business to put his resources into the replacement for the Model T automobile. This created a void that would be filled by only a few mega-companies, all adopting the model of the "full line."

Closing his extended network of factories to reorganize and retool for production of the new Ford Model A automobile, Ford ordered the tools from the assembly line that produced the Fordson tractor to be quietly packed and shipped to Cork, Ireland. The last Fordson tractor, without fanfare, rolled off the assembly line at the River Rouge factory in Dearborn, Michigan on June 4, 1928. Ironically, Ford found change difficult. Still stubbornly convinced that the Model T was the perfect automobile and that the Fordson was the perfect tractor, Ford later bemused in a paper published in *Magazine for Business* that "In former days a new kind of article was opposed just because it was new, but now it is likely to be welcomed just because it is new."[2]

While Ford stuck to the design of his Fordson tractor with little modification in the 1920s, the industry evolved, led by the International Harvester Farmall tractor and the John Deere Model D tractor, which, with others, ushered in a new generation of row-crop and general-purpose tractors that were more durable, flexible, efficient, and powerful. The era of the horse-farmer seemed numbered.[3]

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[1] The phrase "tractor wars" comes from Cyrus McCormick III in his book *Century of the Reaper*, published in 1931. *Tractor Wars: John Deere, Henry Ford, International Harvester, and the Birth of Modern Agriculture* features the introduction of the farm tractor from 1908–1928 as told from the perspective of the three market share leaders during that period. Henry Ford's announcement of a farm tractor in 1908, and his departure from the business in 1928, serve as bookends to the story. This article picks up where *Tractor Wars* left off, outlining the next era of competition through the Great Depression and leading into World War II.

[2] This article is cited by Watts 2005: 355.

[3] Horses would still outnumber tractors on American farms into the 1950s.

Ohio State University professor G.W. McCuen plainly compared the benefits of tractors over horses. “Instead of going to a vicious cycle of growing more crops to feed more horses so that more crops may be grown to feed more horses,” he wrote, “the tractor has released man and horses from the farm.” The replacement of horses with tractors was no different than the replacement of the cradle by the reaper and binder, or the iron plow by the steel plow, he argued. Horses once replaced oxen as a more efficient way to do farm work, and mechanical power would continue to replace horses simply because it was a profitable change for farmers.[4]

The notable absence of the Fordson tractor was not the only change in front of manufacturers. The 1930s would prove another transformative period as industry consolidation, product innovation, food surpluses, and government intervention prioritized mechanization. For manufacturers, innovative engineering and machine evolution began to convince even the staunchest horse farmers of the undeniable economic opportunities of mechanical farm power.

As it would prove true for most Americans, the year 1929 would leave an indelible mark on the farm equipment industry. The impact was not marked by financial ruin, but instead by the reformation of an industry emerging from a disruptive decade, the 1920s, which kicked off with an agricultural recession, a training ground of sorts that ultimately benefited manufacturers, placing them in a recognizable position that help inform strategies to weather the economic tumult to come.

The race to mechanize the farm accelerated during World War I as Europe, and then the United States, experienced shortages both in horses and people. With the “tremendous demand for food, more food, U.S. farmers were told to buy more machines—any machine that would increase their production and get it into the holds of ships more quickly.”[5]

Post-war, many young people did not return to the farm. With more mouths to feed and less labor available to raise the food necessary to do it, manufacturers sold a record 203,207 tractors in 1920. Then, a post-war recession rolled through the rural United States as commodity prices fell and farmers spent less on new equipment. For the burgeoning tractor industry, panic soon hit, led by Henry Ford who dropped the price of his Fordson tractor by more than half, to an unmatchable $395. International Harvester offered a $225 reduction of its Titan 10-20 tractor, but that only brought the price down to $1,000. Other manufacturers attempted more modest price reductions of their tractors over the next six months, but at best it slowed their march to bankruptcy.

The farm industry recovered by the mid-1920s and much had changed. The National Farming Demonstration programs that introduced the farm tractor were already a thing of the past, replaced by localized dealership demonstrations. According to A. C. Seyfarth, International Harvester’s advertising director, the Wichita Power Farming Equipment and Road Shows in February 1929 included “the introduction and more or less extensive use of general-purpose tractors other than the pioneer, the Farmall,”. John Deere brought its GP tractor, and with an Advance-Rumely “Do-All” were both “centers of interest.” The “Do-All” had a vertical, four-cylinder Waukesha engine. The Nebraska test lab, now the authority on tractor performance,

[4] *Farm Implement News*, Vol 54, No. 5, March 2, 1933, 28.
[5] *Fortune Magazine*, Vol. VIII, No. 2, August 1933, 21.

rated it a maximum load of 21.61 horsepower, having to "improvise" a method of locking the shifting lever to prevent gear slipping.[6]

Tractors, threshing machines, and a variety of implements were also on exhibit, alongside a variety of automotive exhibitions, and six booths by "Uncle Sam," providing a history of infrastructure growth in the United States since 1904.

After several years of steady growth from 1925–1928, tractor sales set a record with industry production of 223,081 machines. Heeding lessons from the recession of the 1920s, the farm equipment industry had undergone a profound transformation. Sales of both tractors and other farm machines were expected to once again continue an upward trajectory. The Deere & Company Board of Directors met in Moline, Illinois on the morning of October 29, 1929. History would remember it as Black Friday. For Deere, it was the close of the company's fiscal year. Executive Frank Silloway optimistically shared that ". . . we believe farmers, generally, are feeling better than they have for some time; and if general business continues its present pace into 1930 we should do as large a business in 1930 as we did in 1929 in the United States and Canada." A full year later Deere comptroller Theodore Wharton reported a company surplus of $22.9 million, no back dividends to pay, and reserve accounts of $33.4 million. Inventories were low, debt was low and receivables were high, all contributing to the "splendid financial condition of Deere & Company today" and showing "our ability to cope with any situation that may arise." Wharton attributed this position to lessons learned during the post-World War I depression in the United States. In 1921, in the first year of the tractor price wars, Deere & Company reported a loss of $2.7 million.

Deere had plenty of reasons for optimism during this period. Its tractor operation, which began in 1918, earned a profit for the first time in 1926. And with Ford's departure in 1928, Deere held a manageable second position behind perennial market leader International Harvester. Deere had also built a successful full line—a term used to describe a company that built and sold most of the equipment needed on the farm—through its entry into the harvesting business, the acquisition of ten affiliated companies from 1910-1912, and its capstone, the acquisition of the Waterloo Gasoline Engine Company in 1918.[7]

By the late 1920s, consolidation seemed the only path to survival for farm equipment companies. Even after the financial news from New York after Black Friday, *The Farm Implement News* predicted that "The year 1929 may go down in farm equipment trade history as one in which more progress in the development of power farming equipment was made than in any previous period. So far as tractors are concerned, the trend has been significant." The paper did not speculate on what was to come.[8]

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[6] In this case, Road Show did not mean the show travelled, but that it featured automobiles as well as tractors. Seyfarth; Nebraska Test No. 154 reported in *The 1928 Tractor Field Book*.

[7] Deere & Company reorganized its sales branches, acquired several regional manufacturers like the Syracuse Chilled Plow Company (soft-center plows), and added complementary products through acquisition of the Dain Manufacturing Company (haying tools), Van Brunt Manufacturing Company (seeding equipment), Marseilles Manufacturing Company (corn shellers, manure spreaders, grain elevators), Moline Wagon Company (wagons), the Kemp & Burpee Manufacturing Company (manure spreaders), and others. Deere designed and introduced its own grain binder in 1912, marking its entry into the harvesting business. Broehl 1984:328–344.

[88] *Farm Implement News*, January 9, 1930.

In the post-Ford tractor market, John Deere and International Harvester combined for more than 65% market share (tractor unit sales). Harvester had returned to its pre-Ford dominance, itself holding 49% of the market, but more than half of Deere's profits now came from two lines that did not exist in its portfolio in 1910—tractors and combine harvesters, an indicator of how rapidly the industry was changing. Furthermore, the transition from wood implements to steel was, for the most part, complete. And now, a wave of mergers and consolidations were being executed to compete with the two agricultural equipment giants.

More than 220,000 farm tractors were manufactured in 1929, most of them sold domestically by the 47 listed tractor manufacturers that survived the end of the decade. Only eight years before, 186 manufacturers built 73,200 tractors. There were still a handful of small, localized builders and machine shops, short-liners they were called, supplementing the trade, but buyers had mostly returned to a few industry leaders. It appeared to be business as usual.

Manufacturers saw only upside. Farm tractor sales trends indicated growing sales, and most farmers still did not own a tractor. Nearly 1.5 million tractors had been produced between 1918 and 1927, though in January 1928 there were only an estimated 177,248 tractors still in operation. Seventy-seven percent of those machines were in fifteen states, led by Illinois, Iowa, Ohio, Wisconsin, and California. Unsuccessful machines, made in low volumes by a variety of manufacturers, were now being replaced, but this time farmers knew what they wanted. Reliable, flexible, and purpose-built machines for specific crops, backed by parts and service and matched implements, had evolved the buying decision. And manufacturers prepared for the demand for replacement vehicles.[9]

It was estimated that American farmers added 20-million horsepower to farms in 1927, as "power relaced human labor to a greater extent than ever before." An estimated 170,000 machines were built, 120,000 of them sold in the United States, with the "general trend in tractor buying . . . towards larger machines," though now much different than the "huge lumbering monstrosities of fifteen years ago" which had "practically disappeared."[10]

Farm size was growing as well. There were 6,361,502 farms in the United States, comprising 878,798,000 acres in 1910 (138 acres per farm). This grew to 6,812,350 farms, comprising 1,054,515,000 acres (156 acres per farm) in 1935.[11]

According to the Federal Trade Commission, the increases reflected "the increased use of modern labor-saving farm implements which has served as the basis for growth of the farm implement and machinery industry."[12]

One concerning trend, which would continue during the Depression, was the increasing number of tenant farmers, as landowners added to their holdings and hired out much, if not all, of their labor needs. Southern tenant farming increased nearly 20% between 1880 and 1935, to 53.5%. Northern states were not much better, growing from 19.2% to 31.8% in 1935. There were consequences, according to the FTC. For one, owner equity was decreasing. Secondly, even

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[9] *Farm Implement News*, Vol. 49, No. 3, January 19, 1928, cover. By contrast, there were more than 17 million passenger cars and nearly 2.5 million trucks travelling on more than 521,000 miles of surfaced roads in the United States. Comparatively, in 1904, there were 55,000 total vehicles and 153,000 miles of road. Seyfarth, 69; *Farm Implement News*, Vol. 50, No. 8, February 21, 1929.

[10] *Farm Implement News*, Vol. 49, No. 2, January 12, 1928, 16–17.

[11] *Report on the Agricultural Implement and Machinery Industry*, 1938, 62-63.

[12] *Report on the Agricultural Implement and Machinery Industry*, 1938, 3.

though their holdings were larger and landowners were hiring more tenant farmers, they were doing so for shorter periods, focusing on the growing of seasonal cash crops. In the process, the land was suffering and steady employment was difficult. "This system, unfortunately, often results in depleting the fertility of the soil with consequently steadily decreasing returns for both tenant and landlord," offered an industry analyst.[13]

Collectively, these trends signaled ongoing demand, and manufacturers were planning accordingly. But now, the cost pressures of designing, building, selling, and serving a successful tractor priced out new and long-standing manufacturers alike, and many scrambled to find suitable partners. By the end of the decade, seven full-line manufacturers emerged:

1. **International Harvester**
   International Harvester was formed through the merger of McCormick Harvesting Machine Company and the Deering Harvesting Company, as well as several smaller harvesting equipment companies, in 1902. In all, the merger combined the five large manufacturers of harvesting (90% of industry sales) and haying equipment (80% of industry sales) in the country. Its full line quickly followed, as well as leading the industry in development of the farm tractor, as well as automobiles and trucks. After a Sherman Anti-Trust Act investigation, Harvester was forced to sell some of its subsidiaries and restricted to having only one dealership in any time they were represented. Still, the company led in most equipment categories.
2. **Deere & Company**
   Founded with the development of a steel plow in 1837, John Deere was primarily a manufacturer of tillage equipment, and after 1877 seeding equipment. From 1910-1918, Deere developed its full line by consolidating subsidiaries and sales branches, and making a series of acquisitions that added haying equipment, harvesters, corn shellers, manure spreaders, wagons, and in 1918, engines and tractors through the acquisition of the Waterloo Gasoline Engine Company.
3. **J.I. Case Co.**
   Formed in 1842 to manufacture threshing machines, J.I. Case developed experimental gasoline tractors as early as 1892, though none made it to production until 1911 when the line featured plows, engines, corn shellers, and with the acquisition of the Pierce Motor Co. in 1912, even automobiles. In 1919, J.I. Case acquired the Grand Detour Plow Company, a descendent of the original John Deere plow factory (his partner, Leonard Andrus, continued after Deere relocated to Moline, Illinois). The full line was completed through acquisition of the Emerson-Brantingham Co. in Rockford, Illinois, and the J.I. Case Threshing Machine Co.—an entirely independent company with a similar name and history. After decades of competition, in 1929 the two J.I. Case companies began operating under the new name J.I. Case. Co.
4. **Allis Chalmers Manufacturing Company**
   Founded in 1847 and reorganized in 1904, Allis manufactured primarily gasoline engines, hydraulic turbines, sawmills, steam engines, and mining machinery. In March 1928, the

[13] Southern tenant farming increased from 36.2% in 1880 to 53.5% in 1935. *Report on the Agricultural Implement and Machinery Industry*, 1938.

company expanded through the acquisition of the Monarch Tractor Co. (Springfield, Illinois) and La Cross Plow Co. (La Crosse, Wisconsin). In 1931, the acquisition of the Advance-Rumley Co. (La Porte, Indiana) added combines and threshing machines.

5. **Oliver Farm Equipment Company**
   The formation of the $50 million Oliver Farm Equipment Company was announced on April 1, 1929—a consolidation of the Oliver Chilled Plow Works, Nichols & Shepard, and Hart-Parr Company (the company that coined the word "tractor"). "Thus," noted International Harvester's advertising director, "another pioneer in the tractor industry lost its identity, and the long famous Hart-Parr tractors became known as Oliver Hart-Parr." Oliver now included plows, threshing machines, planters, corn pickers, and combines. By the end of 1936, Oliver operated four factories in Iowa, Indiana, Michigan, and Ohio.
6. **Minneapolis-Moline Power Implement Company**
   Founded in the 1860s as Candee, Swan, & Company, the company was renamed as the Moline Plow Company during a trademark dispute with its neighboring rival, John Deere. In 1911, the Moline Plow Company added grain drills, harvesting equipment and an additional plow line through acquisitions, and from a brief period operated the largest tractor factory in the world. In 1919 the company was purchased by the Willys Overland Co., which attempted to integrate automobile and tractor manufacturing. After several bankruptcies, the company was reorganized in 1922, and then again in 1929 with the formation of the Minneapolis-Moline Company, a consolidation of the Moline Implement Company, Minneapolis Steel Machinery Company (builders of the Twin City tractor), and the Minneapolis Threshing Machine Company (builders of the Minneapolis tractor).
7. **Massey-Harris Co.**
   Massey-Harris was originally formed in the 1840s in Ontario, Canada, manufacturing of plows, hoes, and rakes. In 1876 the company was granted the first Canadian patent for a grain binder. From 1891-1904, acquisitions of farm wagon, manure spreader, and gasoline manufacturers expanded its reach. Tractor production began in 1918. Massey-Harris incorporated in the state of New York in 1917, and in 1928 acquired the J.I. Case Plow Works in Racine, Wisconsin (not to be confused with the J.I. Case Co.).

Even among these consolidated companies, there remained great disparity in resources. For example, each company operated a system of branch houses, organizations that carried farm equipment and repair parts, and employed salespeople who kept relationships with dealers and negotiated sales on behalf of the parent company. International Harvester operated 84 branches in the United States and 17 in Canada. Allis-Chalmers operated 19 branches in the United States and seven in Canada, as well as offices in Argentina, Bolivia, Chile, France, and England. John Deere operated 14 domestic and one Canadian sales branch.[14]

The Great Depression, as it was for many industries, caused a re-examination of long-held industry practices, and a continued assessment of the relationship between manufacturers, dealers, and their customers. In 1930, 1,352 banks failed, followed by 2,294 in 1931. In 1930, 26,335 businesses failed in the United States. The value of farm property declined from $57.7 billion in 1929 to $51.8 billion in 1930 (and down from $78.3 billion in 1920). Severe drought,

[14] *Report on the Agricultural Implement and Machinery Industry,* 202.

grasshopper attacks, and the Dust Bowl contributed to the severe impact the Great Depression had on farmers.[15]

More than 600,000 tractors were sold in total in the United States from 1927–1932, compared to more than 18 million automobiles. The decline in horses on the farm continued from its height in 1918 (21,550,000 horses). By the end of 1932 it was nearly half (12,679,000).[16]

Farm machinery prices increased by nearly 60% between 1913 and 1928, while the prices of farm commodities during the same period rose only 44.5%. Equipment manufacturers during this period maintained that the cost of equipment was minimal in comparison to the cost of land, buildings, livestock, seed, and other farm inputs. In 1931, farmers spent only 3 ½ cents of every dollar of gross farm income on equipment. And that equipment, they argued, was generating more income than ever before. [17]

Not surprisingly, tractor production fell by nearly two-thirds, to total industry production of 71,703 units.[18]

Despite the positive report at the end of 1930, the Great Depression, combined with drought in parts of the United States, and the dust bowl that hit hardest in Oklahoma, Texas, and Kansas, had, of course, a profound impact also on equipment producers. After a 17% drop in sales in 1930 (tractors sales fell from $25.9 million to $2.1 million); implement sales from $26.9 million to $4.5 million), Deere & Company sales fell another 67% the following year. Sales for 1933 were 86% less than 1930.

The market leader, International Harvester, reported a 40% fall in sales for 1931.

Even so, the farm population increased for the first time since 1925.[19]

Farm equipment manufacturers were regulated, but industry consolidation and the evolution of their machines and practices created an environment that drove demands for greater oversight and government scrutiny.

On January 22, 1932, Congress approved "An act to provide emergency financing facilities for financial institutions, to aid in financing agriculture, commerce, and industry, and for other purposes." Fifty million dollars was allocated towards emergency loans for farmers that had suffered crop loss the previous year.[20]

Finley P. Mount, president of the Advance-Rumely Corporation said "There are no bread lines or soup kitchens on the farm." And that "we sometimes overlook the tremendous home market which belongs to the American farmer. There are 124 million people who consume food three times a day, 365 days in the year. . . . But even with unemployment, people are being fed, food is being consumed, the surplus [of food] is being wiped out."[21]

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[15] Watkins 1993: 55, 115.

[16] There were 21,550,000 horses on American farms in 1918. By the end of 1932 it was 12,679,000.

[17] *Report on the Agricultural Implement and Machinery Industry* cites the Bureau of Agricultural Economics, 410.

[18] Gray 1958: 25.

[19] Farm population increased to 31,241,000 on Jan 1932 from 30,169,000 on Jan 1, 1930. It was the first increase since 1925, with a net loss from 1910-1932 of 835,000. Report of the United States Bureau of Agricultural Statistics in *Farm Implement News*, Vol. 53, No 34, November 23, 1932, 23.

[20] *Farm Implement News*, March 10, 1932, 14-15.

[21] Speech by Finley P. Mount, representing the National Association of Farm Equipment Manufacturers, entitled "Facts about Farm Prices" reported in the *Farm Implement News*, Vol. 53, No. 4, January 28, 1932.

On the heels of the National Industrial Recovery Act, the Agricultural Adjustment Act was passed in early 1933, just three months after Franklin Roosevelt took office, and was implemented in its early months by former John Deere and Moline Plow Company executive George Peek (His brother, Burton, was Deere & Company's general counsel.). Its goal was to increase the purchasing power of farmers by closing the gap between production and consumption. To accomplish the goal, farmers were paid not to produce. This equated to millions of acres of crops being plowed over, and within a few years had created greater inequities in land ownership. The Supreme Court, in 1936, ruled the Agricultural Adjustment Act unconstitutional, though in the short-term it kept many farmers solvent. It also helped farm equipment manufacturers return to profitability.[22]

Sales of the now eight full-line companies experienced combined sales during this period of $437 million in 1929, down to just $85 million in 1929, back to $373 million in 1936.[23]

Recovery was not only the result of government intervention. The introduction of the small tractor had irreversibly changed farming, but the revelation of the general-purpose tractor, capable of operating a wider range of farm jobs and adaptable to a diverse array of implements, hastened the adoption of tractors. The transition gained momentum with each passing day, as innovative new implements—plows, cultivators, grain and corn binders, and other compatible machines, continued to be designed specifically for tractor use.

Perhaps the first major innovation of the era was already widely adopted, the powerlift first featured on John Deere's model GP tractor in 1928. The GP was a row-crop tractor, Deere's less successful response to the International Harvester Farmall. But the tractor did include the first successful powerlift, a well-known concept that no company had yet to fully implement. For a century, farmers had to manually lift their implements out of the ground at the end of every row, turn around, and then drop it again into the ground. It was backbreaking work and cost valuable time in the field. The powerlift allowed the operator to simply hit a button or pull a lever to accomplish the same task. The Works Progress Administration estimated that this one innovation saved a farmer thirty-minutes a day, or a staggering 1-million-man hours in a year industry-wide.[24]

Other industry innovations in this era included pneumatic tires, the adoption of regular gasoline, continued standardization of implements, and by the end of the 1930s, further adoption of automotive design. Ironically, this was a trend many tractor manufacturers had started several decades prior, then abandoned. But this transition was different, focused on increased power, efficiency, versatility, and even style. By the late 1930s tractors were being designed by well-known industrial designers like Henry Dreyfuss (John Deere) and Raymond Loewy (International Harvester).

Increased tractor horsepower and stronger transmissions allowed farmers to transition from two-bottom to three-bottom and four-bottom plows with little additional investment. In the Great Plains states, farmers acquired more land, as larger implements produced more work. And now their more powerful tractors could pull their combines up sloped fields. The problem was

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[22] Discussion of the Agricultural Adjustment Act in Fite 1954: 251–252.

[23] According to the Federal Trade Commission, the B.F. Avery Company was the eighth full-line manufacturer, even though it did not carry a line of tractors. Federal Trade Commission, *Agricultural Implement and Machinery Industry*, 626; Broehl 1984: 527–528.

[24] Works Progress Administration study of the powerlift cited in Williams 1987: 91.

real—farmers were slipping their tractors into low gear and hitching it to a team of horses for additional pulling power!

The use of pneumatic rubber tires found few early converts and was initially envisioned only as an alternative to steel wheels for industrial purposes, especially roadwork. These were hard rubber, not the pneumatic tires that would be adopted later. International Harvester experimented with rubber tires in 1918, but they failed to perform and efforts were abandoned.

In 1931, tire-maker B.F. Goodrich introduced a "zero pressure" farm tractor tire, a rubber tire that "was neither pneumatic nor solid, but had a web of solid piers inside that supported the outer arch which was said to give the tire enough flexibility to provide full soil contact and superior traction, besides being puncture proof." But it, too, did not find an audience.[25]

In 1932, a collaboration between Allis-Chalmers and Firestone got it right. That year, an Allis-Chalmers Model U tractor on rubber airplane tires hauled a trailer loaded with implements the 88.1 miles from Milwaukee to Chicago in five hours and one minute, including a route along Michigan Avenue. The destination was the International Live Stock Exposition in Chicago. The "new record for road speed of an air-tire stock model farm tractor will undoubtedly set at rest any doubts that may have existed as to the practicability of the modern tractor for road work," offered an industry publication. Still, the assertion was that the "successful performance of the air-tired tractor in all kinds of farm work is of even greater importance."[26]

The first official test of pneumatic tires at the Nebraska Tractor Tests (No. 223), was held in May 1934. These tests provided the official ratings for all manufacturers for advertising purposes. What stood out was the increased efficiency of rubber over steel. A rating of 5.62 horsepower hours per gallon of fuel was recorded using steel wheels, compared to 8.18 horsepower hours per gallon of fuel on rubber tires. By 1939, 83% of all tractors sold in the United States had rubber tires.[27]

Tractor adoption continued to spread as a replacement for scarce and costly labor in the east, for adaptability in the west, and the expansion of general-purpose tractors for planting and cultivation of row crops, but innovative new machines would continue to facilitate the march towards mechanization that would feed a growing world. A new machine form that was "spreading like wildfire" had been around for decades in previous forms but had started to overcome many of the obstacles once faced by the farm tractor. It was called a *combine* because it combined the functions of grain cutting, threshing, and cleaning into one machine.[28]

Farm income in 1932, approximately $5.4 billion, was 42% of what it was in 1929 before it began to rise again in 1933. Farmer purchase rates increased slightly faster. Except for rapid growth by Allis-Chalmers during this period—they now composed 11.3% of total farm equipment sales in 1936 (increased from 2.9% in 1929), the industry saw market share signs of a new competitive era. International Harvester's share fell from 51.1% to 44.7%. Deere & Company's share increased nearly three percentage points, to 23.3%. Besides the advances made by Allis-

[25] Moore, https://www.farmcollector.com/tractors/allis-chalmers-rubber-firestone-tires/.
[26] *Farm Implement News*, Vol. 53, No 34, November 23, 1932, 18–23.
[27] The adoption of rubber tires was swift. The first were sold in 1932. By 1935, 14% of tractors had rubber tires. By 1939 the total was eighty-nine percent; Williams 1987: 93.
[28] *Farm Implement News*, Vol. 49, No. 2, January 12, 1928, 16–17.

Chalmers, which introduced a small, one-man harvester to great acclaim in 1934 (called the All-Crop), all other full-liners lost ground.[29]

The boom-and-bust cycle of the farm equipment industry forced manufacturers to emerge from the Great Depression leaner, more innovative, and more efficient, just in time for everything to evolve again when United States manufacturing responded to the Japanese attack on Pearl Harbor in 1941. These full-line manufacturers continued to dominate tractor and overall farm equipment sales through the 1950s, the peak of tractor sales (by units) in the United States. But there was one new, familiar entrant. Henry Ford returned in 1939 with a partner well-known in the industry, an Irish inventor named Henry Ferguson. But even Ford could not pick up where he left off nearly 20 years earlier, though his very presence put the other full-line manufacturers on notice for yet another cycle of intense competition in the tractor wars.[30]

Bibliography

Broehl, Jr., Wayne (1984) *John Deere's Company: A History of Deere & Company and Its Times*. New York: Doubleday

Crissey, Forrest (1936) *Alexander Legge 1866-1933*. Chicago, IL: Privately printed by the Alexader Legge Memorial Committee.

Dahlstrom, Neil (2022) *Tractor Wars: John Deere, Henry Ford, International Harvester and the Birth of Modern Agriculture*. Dallas, Texas: Matt Holt Books.

Federal Trade Commission (1938) *Report on the Agricultural Implement and Machinery Industry, 75th Cong. 3rd Session, House Document 702*. Washington, D.C.: United States Government Printing Office.

Fite, Gilbert C. (1954) *George N. Peek and the Fight for Farm Parity: A Vivid story of the farmers' campaign for agricultural equality and of the man who led it*. Norman, OH: University of Oklahoma Press.

Federal Trade Commission (1948) *Report of the Federal Trade Commission on Manufacture and Distribution of Farm Implements*. Washington, D.C.: United States Government Printing Office.

Fortune Magazine, Vol. VIII, No. 2, August 1933.

Gray, R.B. (1958) *Development of the Agricultural Tractor in the United States, Part II*. St. Joseph, MI; American Society of Agricultural Engineers.

Klancher, Lee (2012) *The Farmall Dynasty: The Story of the Engineering and Design That Created International Harvester Tractors*. Octane Press.

McCormick, III, Cyrus (1931) *Century of the Reaper*. Boston, MS: Houghton Mifflin Company.

[29] *Report of the Federal Trade Commission on Manufacture and Distribution of Farm Implements*, 110.

[30] Harry Ferguson developed a 3-point linkage system which would be fully adopted across the industry. He showed it to Henry Ford as early as 1920, but the two did not partner until 1936. The result was the Ford-Ferguson 9N tractor, which debuted in June 1939. The 3-point hitch system featured two arms on pivots under the rear tractor axle, which formed a triangle with a single mounted strut. Using a hydraulic valve, the implement automatically raised and lowered based on resistance during field operation, creating a consistent and greatly reduced draft on the implement; Williams, 102–103.

Moore, Sam. “Harvey Firestone and the Rubber Tractor Tire,” Accessed 25 August 2024 https://www.farmcollector.com/tractors/allis-chalmers-rubber-firestone-tires/.

Seyfarth, A.C. *Tractor History*. McCormick-International Harvester Collection, Wisconsin Historical Society, McCormick Mss 6z Folder 13864.

The 1928 Tractor Field Book (1928): Chicago, IL: Farm Implement News Co.

United States Department of Agriculture (1922). *Fourteenth Census of the United States Taken in the Year 1920, Volume 5, Agriculture*. Washington, D.C.: Washington Government Printing Office.

Watkins, T.H. (1993) *The Great Depression: American in the 1930s*. New York: Back Bay Books.

Watts, Steven (2005) *The People’s Tycoon: Henry Ford and the American Century*. New York: Alfred Knopf.

White, William. “Economic History of Tractors in the United States.” EH.Net Encyclopedia, edited by Robert Whaples. Accessed 25 August 2024 https://eh.net/encyclopedia/economic-history-of-tractors-in-the-united-states/

Wiliams, Robert (1987) *Fordson, Farmall, and Poppin’ Johnny: A History of the Farm Tractor and Its Impact on America*. Urbana, IL: University of Illinois Press.