From the editors of *Farm Equipment*...

Ag Equipment Intelligence

News, Information & Analysis for the Ag Equipment Marketer

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- German, UK Sales Fall
- Feb. NA Sales Up
- CNHI: No CE M&A

Which Has More Potential, Autonomous or Electric Tractors?

The rollout of their autonomous tractors at the 2016 Farm Progress Show in Boone, Iowa, garnered Case IH and New Holland a lot of attention for several weeks. *(See Ag Equipment Intelligence, September 2016.)* The Case IH version is a cabless vehicle utilizing the brand's Magnum tractor platform. New Holland's model called the T8 NHDrive, is outfitted with a cab, but is fully autonomous.

In quieter fashion, Deere began offering glimpses of its new all-electric tractor called SESAM, later in the year. Its major debut came at the SIMA show in Paris, France, in late February 2017. SESAM is short for Sustainable Energy Supply for Agricultural Machinery. Deere calls it the industry's first fully battery-powered tractor.

The prototype produces 130 kW (174 horsepower) of continuous power and is based on the 6R Series tractor chassis, using an adapted DirectDrive stepless transmission, with a speed range from 3-50 kph (2-30 mph) at full power. The tractor is emission-free and develops high torque at low speeds and a maximum output of around 400 horsepower.

The introduction of these technically advanced farm vehicles begs the question: In the long run, which of these tractors holds more possibilities for farmers, dealers and the manufacturers?

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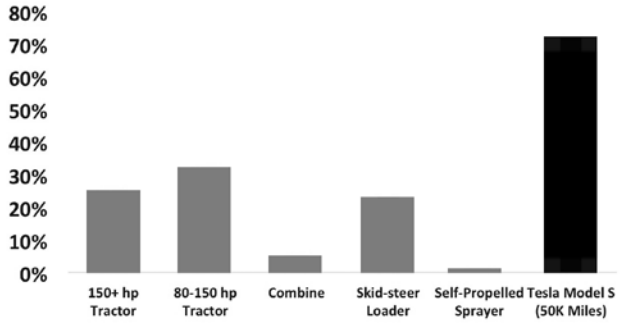
Residual Value — Farm Machinery vs. Tesla Auto After 10,000 Hours



Average expected lifespan of an electric motor is 29 years, which is two times the average lifespan of a traditional tractor.

Source: University of Minnesota, Machinery Cost Estimates, 2015 Electrek, 2016 – Tesla Model S residual value after 50,000 miles, U.S. DOE

AGCO Moves Back into Acquisition Mode

While other ag equipment manufacturers watch from the sidelines, AGCO continued to build a portfolio of crop and feed storage hardware for farms, co-ops and industrial businesses. In the past two months, the third largest farm equipment maker worldwide (behind John Deere and CNH Industrial), announced its intentions to acquire Kepler Weber, a maker of grain storage and handling products, as well as forage and dairy equipment specialist Lely.

Growing Grain Storage. Having acquired U.S. crop storage specialist GSI in December 2011, AGCO secured ownership of Cimbria in Denmark last September and has now turned its attention to South America and a large player in the agricultural storage market in Brazil.

Kepler Weber is active in a number of markets around the world supplying farm- and industrial-scale storage bins, elevators and conveyors, dryers and cleaners. It is listed on the Sao Paolo stock exchange, but AGCO has secured a binding agreement with two institutional investors to purchase shares that give it a 35% holding in the business.

The next step is a proposed public tender offer to obtain at least 65% but up to 100% of outstanding shares with the purpose of delisting the company. AGCO's proposed offer, equivalent to $7.03 per share, values Kepler Weber at $185 million.

Announcing AGCO's plans, Martin Richenhagen, chairman, president and chief executive officer, said, "The acquisition of Kepler Weber would significantly enhance our market position in the South American grain handling and storage industry with products that are complementary to our GSI offerings.

"This combination would provide significant marketing synergies and a leadership position in the South American market, and would further strengthen our capabilities to serve large global customers."

Richenhagen sees logic in a corporation making tractors, combines and other farm machinery also being

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involved in the farm crop storage sector and exploiting distribution and reputational strengths. Diversification into the storage arena is also lifting group sales, of course. The acquisition of GSI for $928 million is believed to add $700-$750 million to annual group revenues, while Cimbria — purchased for around $329 million — contributes $186 million or so at current exchange rates.

Cimbria has pursued an ambitious expansion strategy in recent years, targeting high growth markets of grain and seed importing countries such as Egypt and other Middle Eastern countries, having previously focused on exporting countries.

It has subsidiaries in 18 countries and sought cost efficiency gains by adding a factory in the Czech Republic to complement facilities in Denmark, Austria and Italy.

Kepler Weber operates in a relatively volatile geographical market, as illustrated by net revenues that rocketed by more than 50% to the equivalent of $293 million in 2014, fell back to $227 million in 2015 and for the first 9 months of 2016 were reportedly down almost 33% to $105 million. But AGCO, CNH Industrial and Deere & Co. have all forecast improving market conditions for agricultural equipment sales in South America as other regions remain more or less static.

Expanding Forage Business. Forage and dairy equipment specialist Lely has reached agreement to sell the bulk of its hay tool business to AGCO to focus on the dairy industry with robotic milking and feeding systems, and a growing emphasis on data collection and analysis.

The privately owned group will wind down production of mowers, tedders and rakes — some of which are supplied to North American partner Vermeer — and close the factory in The Netherlands making them sometime next year.

AGCO already builds a comprehensive range of similar hay tools in Germany but will acquire the Lely Welger round and conventional hay baler lines and the Lely self-loading forage wagon range, along with the factories in Germany that build them.

The provisional agreement will likely see non-AGCO dealers handling the Lely products outside North America scrambling for alternative hay tool lines creating opportunities for Krone, Pöttinger and others.

"Lely is the most successful manufacturer of robotic milking systems and is seeing accelerating uptake, especially in North America, where it assembles the equipment in Pella, Iowa ..."

Lely Group CEO, Alexander van der Lely, says the deal results from a review of operations that concluded the company needed to focus on one or the other of its two quite different product groups. He is confident that the company's expertise with automated systems will further strengthen its position as an innovator in the dairy sector worldwide.

"Lely intends to focus entirely on its role as an innovator in the field of robotisation and sensor and data systems for use on dairy farms," he says. "Over the past 15 years, these product groups have grown into a successful activity for Lely, with a great deal of potential for the future."

Lely is the most successful manufacturer of robotic milking systems and is seeing accelerating uptake, especially in North America where Lely already focuses on this sector, assembling robotic equipment at its Pella, Iowa, headquarters *(see Ag Equipment Intelligence, June 2016)*. Dairy equipment made a significant contribution to group revenues that hit a peak of €619 million ($660 million) in 2015, but which dropped to €502 million ($535 million) last year.

The company has developed a range of complementary autonomous equipment for dairy farms, including forage blending and dispensing systems, feed push-up and stall cleaning robots, calf feeders and computer-based herd management programs.

AGCO's Upside. For AGCO, the deal provides two key product lines currently lacking in its hay tools portfolio. Development of the corporation's first forage wagon design has just been completed, but the Lely acquisition will provide a valuable shortcut into this market sector.

It will also bring a leading range of heavy duty round balers and baler-wrapper combinations into the fold; AGCO has in recent years relied on partnerships for its baler products. The Welger product line was acquired jointly by Lely and Vermeer in 2008, but Lely bought the U.S. company's minority holding in September last year — a move that can now be seen as preparation for selling the business.

About this acquisition, Richenhagen said, "The integration of Lely's industry leading competence in hay and forage technology will further strengthen AGCO's full line product offering." Subject to regulatory approval, he anticipates completion in the fourth quarter of this year. AEI

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Lemken Invests in R&D, Expands Production Capabilities

Opening a new R&D and on-farm training facilities, and modernizing the company's main factory pre-fabrication department last year, characterizes Lemken's outlook for the long term future of ag equipment markets. The German manufacturer of tillage, seeding and spraying equipment recently reported sales similar to levels seen in 2015.

The new R&D center, manned by 85 technicians, is said to be the industry's most sophisticated development facility for soil, cultivation, sowing and crop protection equipment.

Anthony van der Ley, managing director, said investments totalling €16 million ($17 million) in 2016 form part of long term plans to ensure ongoing modernization of the Lemken business. "We have to maintain a dynamic environment," he says. "As a family business, we act consistently and prudently, which will stand us in good stead once farmers' revenue situation finally improves and the market for agricultural technology picks up again as a consequence."

Van der Ley reported turnover for the year of €325 million ($345 million), a modest 0.5% decline on the year prior figure of €327 million ($347 million), as sales in Central and Eastern Europe recovered to offset weak demand in Germany and France.

Canada also figures in Lemken's top 10 markets, combining with sales in the U.S. to account for 6% of revenues, vs. 28% in Western Europe and 33% in Eastern Europe, where Russia and Ukraine in particular saw more positive sales activity.

Total exports accounted for 74% of sales, increasing by €5 million to €241 million ($5.3 million to $255.8 million) in the past year.

The business produced more than 12,800 implements in total, with moldboard plows being the biggest product group. Lemken saw its strongest growth in this area compared to 2015, despite the growing focus on minimum tillage and no-till crop establishment in many countries.

This year, Lemken will follow fellow European manufacturers Amazone, Horsch and Väderstad by introducing a single-seed planter for the first time, beginning with a 6 meter (20 foot) model before expanding the range with larger models.

Lemken also announced it is expanding its field sprayer segment following the opening of its Haren/Ems factory in early 2016 and the successful market launch of its Vega trailed field sprayer. The company created 8 new engineering positions in its development and testing departments. It also made crop protection a separate profit center.

The development of a self-propelled field sprayer will be given high priority this year, according to the company. It recently entered into a strategic partnership with the company Bräutigam for this purpose. Bräutigam, a specialist in the construction of self-propelled and carrier vehicles, will contribute the chassis and cab for Lemken's self-propelled sprayer. **AEI**

FARM MACHINERY TICKER (AS OF 3/13/17)

MANUFACTURERS	Symbol	3/13/17 Price	2/13/17 Price	1-Year High	1-Year Low	P/E Ratio	Avg. Volume	Market Cap.
Ag Growth Int'l.	AFN	$51.98	$55.00	$57.69	$31.04	285.60	44,141	828.78M
AGCO	AGCO	$59.26	$64.17	$64.90	$44.68	30.23	811,269	4.71B
AgJunction Inc.	AJX	$0.52	$0.53	$0.74	$0.42	N/A	43,892	64.76M
Alamo	ALG	$73.55	$77.15	$79.59	$52.82	21.26	50,557	846.6M
Art's Way Mfg.	ARTW	$3.75	$3.55	$4.70	$2.46	N/A	12,233	15.41M
Buhler Industries	BUI	$4.55	$4.60	$6.00	$4.40	31.60	526	113.75M
Caterpillar	CAT	$92.64	$98.50	$99.46	$69.04	N/A	4,945,220	54.33B
CNH Industrial	CNHI	$9.66	$9.56	$9.75	$6.03	N/A	1,414,980	13.154B
Deere & Co.	DE	$109.88	$110.75	$112.18	$74.91	23.80	2,406,000	34.97B
Kubota	KUBTY	$78.13	$82.60	$83.48	$60.85	16.77	13,243	19.39B
Lindsay	LNN	$80.49	$76.34	$89.98	$65.78	61.63	105,800	867.11M
Raven Industries	RAVN	$29.50	$24.90	$31.35	$13.12	61.46	159,802	1.07B
Titan Int'l.	TWI	$12.16	$13.30	$14.23	$4.80	N/A	455,634	657.33M
Trimble Navigation	TRMB	$31.58	$31.41	$32.19	$22.69	60.73	1,127,160	7.97B
Valmont Industries	VMI	$153.15	$144.65	$165.20	$117.10	20.07	154,893	3.45B
RETAILERS								
Cervus Equipment	CVL	$15.20	$15.20	$16.52	$10.41	N/A	12,879	239.57M
Rocky Mountain Equipment	RME	$10.68	$10.58	$11.25	$5.61	14.13	34,654	207.02M
Titan Machinery	TITN	$13.70	$13.75	$15.93	$8.68	N/A	87,785	290.26M
Tractor Supply	TSCO	$71.70	$73.16	$97.25	$61.50	21.93	1,653,060	9.37B

CNHI Sees Ag Pick Up in 2018; Not Pursuing M&A for CE

CNH Industrial expects replacement buying will give its ag business a boost next year. The company also reiterated that it's not looking to off load its construction equipment segment any time soon.

Following the AEM Investor Conference at the CONEXPO Show in Las Vegas last week, Michael Shlisky, market analyst for Seaport Global Securities, reported that CNHI's CEO Rich Tobin said, in agriculture, the company believes that regular replacement will begin to take place in 2018, even if there is no major improvement to farmer cash receipts.

"This is a positive, in our view, though our cash-receipts model currently suggests a decline next year with risk to the downside," Shlisky said in a March 13 note to investors.

In construction equipment, CNHI noted that orders are up year-over-year in the first quarter of 2017. Management emphasized the importance of the segment to the overall company, even though volumes and profitability are challenged. Reasons include the leveraging of the ag dealership platform as well as the powertrain designs across the portfolio, according to the SGS analyst.

"As such, in our view, the CNHI construction equipment business may not be for sale despite challenging returns in recent years. Importantly, CNHI noted that it does not take much growth from recent low levels to bring returns to levels the company would consider adequate; this would include high single-digit operating margins," Shlisky said. "Overall, CNHI did not seem to have much interest in pursuing an M&A deal in construction, believing that the current footprint can eventually deliver these adequate returns once volumes ramp back up." AEI

European TMR Makers Continue to Push Collaborative Efforts

Two European manufacturers of TMR (total mixed ration) cattle diet feeders are planning collaborations that would raise technical back-up levels to end users, broaden distribution opportunities and expand product lines.

Irish manufacturer Keenan, which was acquired by U.S.-based animal nutrition giant Alltech last year *(see Ag Equipment Intelligence, May 2016)*, initiated talks with Italian counterpart Storti over opportunities for cooperation.

Robert Walker, Keenan CEO, said, "When we looked at our values, routes to market, target customer and the individual strengths of our two companies, it was quickly evident what great things we can achieve together for the benefit of each of our customers."

Walker, who spent 8 years in Italy as a regional director with Alltech, believes the proposed collaboration could result in Keenan's InTouch digital resource and dedicated nutritionists being made available to Storti customers to drive dairy and beef production efficiency.

Tapping Expertise. At the same time, Keenan could tap into the Italian company's design and manufacturing expertise to bring larger capacity models to market. The two parties are non-competing, he maintains, because of different philosophies and geographical reach.

Keenan sells direct, produces only horizontal mixers and has focused on digital innovation and nutrition quality. The company's patented MechFiber mix, which maintains a physical and chemical composition favorable to efficient digestion, is at the core of a nutrition advisory service that helps farmers get the most from the technology.

Storti produces both horizontal and vertical mixers and has concentrated on machine speed and capacity, being recognized as a global leader in self-propelled feeders. The company channels its sales and support through distributors.

NA Distribution. In Canada, Storti supplies its diet feeders through Nieboer Farm Supplies, Nobleford, Alta.; H&L Motors, Glenboro, Man., and lists a handful of other re-sellers both sides of the U.S./Canadian border. According to Reto Ammann, Storti sales and technical support manager, the business is looking to appoint further qualified dealers.

Storti has also announced that it will supply the chassis and silage shaving system of its Dobermann Evo self-propelled, self-loading feed mixer to the factory of Peeters Landbouwmachines, where the Dutch manufacturer's tub and spiral mixing system will be oufitted to create the Peecon Biga Rapide diet feeder.

While the Peecon range gains a new mixer-feeder without the expense of developing and building a self-propelled base, Storti should benefit from its partner's more extensive export activities.

New Market Penetration. Francesca Storti, president, said, "This agreement will open new opportunities to Storti in the very competitive and restricted market of self-propelled mixer wagons.

"In the last years, Peeters has shown to be very active in innovation and their presence has increased and consolidated in some market areas where Storti wants to enter and be present with its technology."

Peeters Landbouwmachines sells its Peecon tractor-powered diet feeders throughout the U.S., via distributors Con-Dor Enterprises, Topanga, Calif., covering the west coast to Mississippi, and Marloo Equipment, St. Louis, Mich., east of the Mississippi. Marloo is also national distributor for the company's Tulip brand tillage machinery, seeders and broadcast fertilizer applicators.

Expanded Product Range. D. Peeters, president of Peeters Landbouwmachines, said, "The cooperation with Storti creates a valuable addition to our existing product range after customers asked us for self-propelled feed mixers with a bigger volume. The simplicity but reliability of the solid Storti Dobermann gave us a perfect base." AEI

2016 German Tractor Sales Fall Again, But Improved Producer Prices Gives Rise to 'Cautious Optimism'

Tractor sales in Germany — the second largest EU market by unit volume after France — saw a decline for the third year running in 2016 as many farmers and custom operators deferred replacements in light of commodity price levels. But VDMA, the German association for agricultural machinery, says it is cautiously optimistic about 2017.

Tractor Sales Slip. The 2016 market was down 10.8% at 28,746 registered units of 51 horsepower or higher; 2015 sales were down 6.9% on the year prior, which had declined 4.5% vs. 2013. However, market watchers point out that 2016 sales were average for the past 10 years.

What did surprise them were untypical movements within power classes and also the lack of an end-of-year rally. December sales were 60% down vs. 2015, with large farms and custom operators seemingly more reluctant to invest as 200-300 horsepower tractor sales were down 32% as the year closed.

In contrast, sales of 60-110 horsepower tractors, commonly used by dairy and other livestock units, remained relatively stable despite pressures on incomes.

Brand analysis shows John Deere holding on to its number one position by a whisker — by just 49 units above 51 horsepower — for a 17.6% share, building to 19.7% when sub-51 horsepower compact tractors are included.

AGCO's Fendt scored a close second place (17.4%), followed by Deutz-Fahr (12.1%), Case IH (11.3%) and Claas (9.7%). These were the only brands selling more than 2,000 units to the mainstream farm sector and with no significant shifts in market share.

Rising Optimism. Frankfurt-based VDMA Agricultural Machinery reports that, while the downward trend of the past year has significantly slowed, with a production turnover of €7.2 billion ($7.7 billion), the industry still falls short on growth. "A 2% decline is certainly no reason for euphoria, but certainly for cautious optimism, more so since producer prices, especially for milk, are clearly picking up," says Dr. Bernd Scherer, managing director of VDMA Agricultural Machinery.

Strength of incoming orders has provided a boost to the industry since the fourth quarter of the past year, he says. "In Germany, we recorded an increase of 7%. In other markets, especially outside the EU, there are also remarkable growth rates. Only France, the most important destination for German exports of agricultural machinery, needs to improve," explains Scherer. With a share of 26%, the demand in the domestic market still plays a major role. However, sales in the German market in 2016 fell 9% short of the previous year's level.

The association notes that the sales declines for harvesting machines and milking and transport equipment were steeper than that of tractors. On the other hand, the year ended with a double-digit growth for manufacturers of drilling, sowing and crop protection equipment.

Eastern Europe. VDMA adds that agricultural machinery business went especially well in the Eastern European territorial states of Russia and Ukraine, which the industry considers the most important future markets with a high sales potential, according to VDMA. "After years of insecurity, both markets are making an impressive comeback. In Russia, growth was 50%, in the Ukraine [it was] 70%," Scherer says. AEI

Amazone Reports Slight Sales Increase in 2016

A growing product range, especially within the tillage sector, helped Amazone offset the impact of slow demand in key markets to record a slight increase in sales last year.

The German manufacturer of tillage equipment, grain seeders, fertilizer spreaders and crop sprayers — distributed in the U.S. by AMS Inc., Ogden, Ill. — saw sales of €406 million ($431 million) in 2016, up 1% compared to 2015.

That put the group ahead of counterparts in the German ag equipment industry who recorded a 2% drop in sales on average.

But the result is still a long way behind Amazone's record €515 million ($547 million) in sales rung up in 2013 and the second best figure of €468 million ($497 million) in 2014.

Nonetheless, joint managing directors Christian Dreyer and Dr. Justus Dreyer are pleased with the 2016 result. "The willingness of farmers and contractors to invest was internationally very restrained due to poor producer prices and under average harvests," they point out. "With our new product developments, we were able to compensate and gain new customers for Amazone machines."

Key investments during the year included the acquisition of the Vogel & Noot moldboard plow and the Hungarian factory that builds it. In one stroke, that deal added 5 new ranges to the single plow family created by Amazone internally after its decision to enter this sector of the tillage equipment market.

A new paint facility started operations at Amazone's fertilizer spreader plant after a €20 million ($21.2 million) investment — the largest in the company's history. Another €2 million ($2.1 million) were spent on a new 32,300 square foot center for prototype construction, testing and electronic laboratories, doubling the capacity of the research and test operations.

Also, Amazone purchased a 60 acre plot of land 15 miles from its headquarters to get ready to expand its production facility when the time is right.

"With our new plows and innovations in cultivation, sowing, spreading and spraying technologies, we are better positioned than ever before," say the directors. AEI

South American Ag Equipment News

Exhibitors Report Increased Equipment Sales at Brazilian Farm Show

Nearly $640,000 (R$2 billion) in sales of ag machinery was recorded during a Feb. 6-10 farm show in southern Brazil. The Show Rural Coopavel, held in the city of Cascaval in the state of Paraná is one of the largest agricultural fairs in Brazil where producers seek innovations and new products.

The 2016 show garnered sales of R$1.2 billion. "In line with Anfavea (National Assn. of Motor Vehicle Manufacturers; Brazil), we can estimate a sales growth of tractors and harvesters in a volume of 15% in 2017," Alexandre Blasi, commercial director at New Holland in Brazil, told S. Farming Brasil after the farm show results were released.

According to *Ag Equipment Intelligence's* correspondent in South America, farmers in Brazil go to agricultural fairs to personally check the equipment. "They like to talk to the salesman, to other farmers, sit in the cabs and make a decision. Most manufacturers launch new products at these events. Generally, banks offer more friendly credit lines during these events. In Argentina, it is not very different."

Banks Report Loans in Dollars Would Boost Argentina's Ag Economy

Financial institutions in Argentina have revealed new offers of credit availability in dollars with lower interest rates for grain farmers and cattle ranchers. American currency is often used in Argentina for loans or as a form of savings as a protection against the frequent devaluations of the local currency, the Argentine peso.

Improving machinery sales in 2016 and a growth of ag investment in January and February of 3.9% and 5.7%, respectively, has bolstered banks' confidence. Interest rates in dollars range from 5-6% per year, while in pesos the average is over 20%.

"In 2016, our bank had an increase of 43% in our agricultural loans and the expectation for this year is for this to increase if the weather helps to put a record volume of harvest [yields] and the resulting increase of credit demand," said Pablo Bullrich, manager of farm business at Santander, during an interview with financial newspaper *Cronista Comercial*.

Argentina Agency Reports Ag Machinery Sales Grew 131% in the 4Q16

Sales of agricultural machinery in Argentina soared 131.2% in the fourth quarter compared to the same period in 2015 to AR$6.9 billion (approx. US$450 million), according to official data released by the National Institute of Statistics and Census. The total revenue of the sector had an increase of 105.8% in the year.

During the fourth quarter, the agency indicated, tractors and harvesters accounted for over half of the total revenue. Sales of harvesters showed the most growth, up by 157% compared to 2015, followed by seeders with a 70.7% increase. In the fourth quarter alone sales of seeders jumped 150.4%. AEI

After Up and Down Year, UK Tractor Sales Finish Down in 2016 — Again

A hoped-for bottoming out of the UK farm tractor market last Fall, when apparently buoyant demand lifted sales 33% ahead of prior-year figures to offset earlier losses, turned out to be a false hope.

Sales in November, down almost 5%, and an unprecedented 13.4% drop in December, resulted in a year-end sales of just 10,602 units of 51 horsepower or higher — the lowest annual total for a decade.

That 2.2% reduction on the previous year continued a trend; 2015 sales had plummeted 12.8% from a 2014 total of 12,433 units, which was down 0.5% on 2013.

Market watchers following monthly registration figures produced by the UK's road vehicle licensing authority saw a roller-coaster sales profile. January down 11% was countered by February sales up 11%; March and April sales plunged 16% and 21%, respectively, but were up 14% in May.

June and July dropped 16% and almost 19%, only for things to pick up again in August (+15%), September (+33%) and October (+33%). That brought year-to-date sales within 1.4% of the 2014 figure.

But hopes for this heralded market recovery were quickly dashed as November figures dropped nearly 5% and December's fell more than 13%. Tractors that had to be registered to beat an emissions deadline, it turned out, bolstered much of the fall demand.

A number of factors are to blame for UK farmers' reluctance to buy tractors in usual numbers. Although a recent recovery in global milk prices has started feeding through to British dairy farmers, they have yet to make up for a long period in which all but the most efficient have been producing milk at a loss.

In the cropping sector, growers are more inclined to invest in new cultivation and seeding technology than tractors as they adopt cost-cutting methods in a battle to maintain margins on grain and oilseed crops.

Then there is the European dimension — uncertainty among British farmers as to how their financial planning will be affected by Britain's exit (Brexit) from the European Union. The industry also face a tightening of used tractor exports to Britain's neighbors in Europe because of their own agricultural ills.

In Europe's two biggest machinery markets, France and Germany, commodity prices have been depressed by an influx of produce from countries that used to have strong exports to Russia until sanctions hit.

To add to the woes of British manufacturers and dealers in established imported brands, more east European manufacturers are looking to the UK market for sales in what is already a hugely competitive market. According to AEA, the British machinery trade body, equipment sales to farmers and contractors are typically worth around £2 billion ($2.1 billion) a year, with tractors accounting for just under 40% of the total and combines for 9%.

A period of economic improvement and political stability would help maintain that market, but there is little prospect of either in the short-term. AEI

Equipment Sales Turn Positive

North American large ag equipment sales turned positive with 10% year-over-year growth in February (U.S. +13%) after 36 months of consecutive declines, according to Mircea (Mig) Dobre, an analyst with RW Baird. 4WD tractor sales were down, but combines and row-crop tractors were up double digits. "February was a below-average month for sales but growth is encouraging, as we highlighted in last month's retail sales that we needed to see growth turn soon for Deere to meet the down 5-10% guidance for FY17 North American ag," Dobre said in a note to investors.

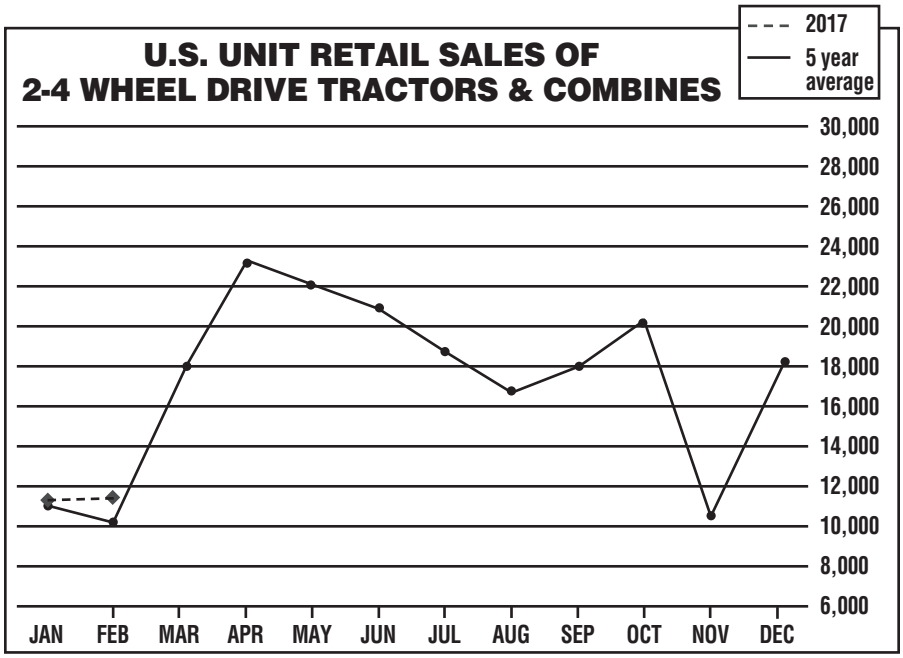
- U.S. and Canada large tractor and combine retail sales increased 10% year-over-year in February, after decreasing 32% in January, 22% in December and various amounts from 7-40% in the preceding 34 months. U.S. sales increased 13% year-over-year, while Canadian sales were down 3%. February 2017 marked the first growth after 36 consecutive months of year-over-year declines (February 2016 down 39% and February 2015 down 23%).
- 4WD tractor sales decreased 10.4% year-over-year in February vs. a 39.5% decrease the month before. U.S. dealer inventories of 4WD tractors decreased 15.1% year-over-year in January. February is typically a modestly below-average month for 4WD tractor sales, accounting for 7.7% of annual sales over the last 5 years.
- Row-crop tractor sales posted a 12.7% year-over-year increase, compared with the 29.5% decrease in January; L3M sales decreased 16.2%. U.S. row-crop tractor inventories decreased 10.8% year-over-year in January vs. a 12.2% decrease in December.
- Combine sales increased 14.5% in February following January's –36.5%. U.S. combine inventories were 6.8% lower year-over-year in January. February is typically a below-average month for combine sales, accounting for 4.4% of annual sales the last 5 years.
- Mid-range tractor sales decreased in February, down 1.6% year-over-year after a 9.3% decrease last month. Compact tractor sales increased 22.4% year-over-year after a 14.7% increase last month. AEI

FEBRUARY U.S. UNIT RETAIL SALES

Equipment	February 2017	February 2016	Percent Change	YTD 20 17	YTD 2016	Percent Change	January 2017 Field Inventory
Farm Wheel Tractors-2WD							
Under 40 HP	7,288	6,006	21.3	13,377	11,360	17.8	75,584
40-100 HP	3,025	3,122	–3.1	6,468	6,953	–7.0	35,380
100 HP Plus	1,125	961	17.1	2,325	2,675	–12.5	9,347
Total-2WD	11,438	10,089	13.4	22,170	20,970	5.7	120,311
Total-4WD	119	158	–24.7	228	334	–31.7	713
Total Tractors	11,557	10,247	12.8	22,398	21,304	5.1	121,024
SP Combines	210	163	28.8	415	581	–28.6	741

FEBRUARY CANADIAN UNIT RETAIL SALES

Equipment	February 2017	February 2016	Percent Change	YTD 2017	YTD 2016	Percent Change	January 2017 Field Inventory
Farm Wheel Tractors-2WD							
Under 40 HP	580	423	37.1	1,308	1,016	28.7	7,569
40-100 HP	294	250	17.6	696	669	4.0	3,868
100 HP Plus	210	224	–6.3	406	509	–20.2	2,491
Total-2WD	1,084	897	20.8	2,410	2,194	9.8	13,928
Total-4WD	80	64	25.0	118	131	–9.9	311
Total Tractors	1,164	961	21.1	2,528	2,325	8.7	14,239
SP Combines	66	78	–15.4	150	115	30.4	258



— Assn. of Equipment Manufacturers

No estimates for potential growth and revenue have been offered for electric tractors, but according to Tractica, a market intelligence firm that focuses on human interaction with technology, revenue from driverless tractors would reach $30.7 billion by 2024.

Autonomous vs. Electric? When it comes to self-driving vehicles, Kraig Schulz, co-founder, president and CEO of Autonomous Tractor Corp., says the real question is what level of autonomy do farmers really need? He believes a "Tesla for tractors," is the best bet for the ag industry; most likely a semi-autonomous, electrically powered vehicle.

Speaking earlier this year at the 2017 Precision Farming Dealer Summit, a conference organized by *Precision Farming Dealer*, a sister publication of *Ag Equipment Intelligence*, Schulz says, autonomy is a spectrum.

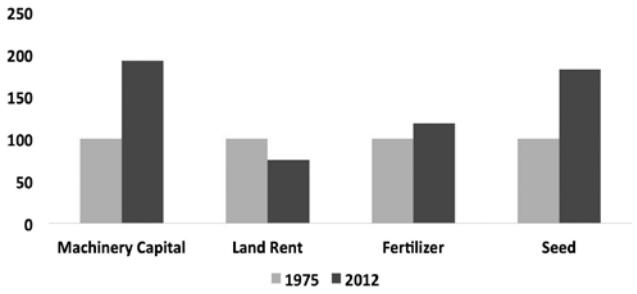
"Rudimentary autonomy that must be observed or managed by someone in the vehicle is on one end, and more complex, self-sufficient autonomy is on the other. Maybe down the road we will see tractors that have already gone out and plowed the field and come back while you're still getting your second cup of coffee, but for now the autonomy we see in farming still requires a certain level of supervision. Autonomy in the truest sense is something that functions completely on its own — something I don't think we will see broadly adopted among row-crop producers any time soon."

Driving Costs Down. According to Schulz, between 1975 and 2012, the purchase cost of machinery and its repair have both about doubled. "These rising costs in equipment and maintenance, and limited improvement in fuel efficiency have led to almost continuously rising production costs for farmers over the last 25 years," he says.

Schulz believes electrification might be an answer to rising equipment costs. "Electric tractors would get better fuel economy, have an increased longevity and reduced repair costs — all facts that have been proven by the automotive world. Electric drive technology has been adopted by the marine, locomotive and mining industries, but not in ag. Isn't it about time our industry started moving to a more cost-effective solution like electric drivetrains?"

He says Tesla automobiles are a good example that demonstrates how electric tractors would be an improvement for farmers. "An electric vehicle has only a small fraction of the moving parts of a mechanical or hydraulic vehicle," Schulz explains. "Since the whole system becomes digitized, the communications systems can be dramatically simplified, eliminating hundreds of wire connections. Using fiber optic cables alone can reduce most of the wires in a tractor to just one cable."

He adds that advances like these can translate into real dollars for producers. According to Schulz, a Tesla retains better than 70% of its value after 50,000 miles while traditional cars lose 70% of their value. Part of the reason, but not the only reason, for this disparity is the average expected lifespan of an electric motor is 29 years, which is two times the average lifespan of a traditional tractor.



Between 1975-2012, the cost of machinery and repair have about doubled. Use of electric farm vehicles could help reduce these costs.

Source: Kansas State University

"Farmers would benefit greatly from equipment with longer lifespans and less frequent need for repair."

He points to the improved fuel efficiency with electric vehicles as another benefit. A gasoline-powered vehicle gets roughly 35 miles per gallon, Schulz says. A hybrid gasoline and electric platform would increase efficiency by about 30%, and moving it to a completely electric platform would increase it significantly more. "Simply put, transmissions aren't that efficient and electricity is a much more efficient way to transfer power."

Challenge of Batteries. Like the Tesla, the biggest drawback to electric drive platforms is the vast majority of electric systems use batteries. "This works well for the Tesla design since most of the time a driver will only use the Tesla at a fraction of its full horsepower and is used only a few hours each day," Schulz says.

"The biggest drawback to electric drive platforms is the vast majority of electric systems use batteries ..."

"Teslas today carry about 100 kilowatt hours of batteries, but even just a 200 horsepower electric tractor would need about 1,500 to work for a full day. Batteries alone would cost farmers about $350,000 for this hypothetical electric tractor, not to mention the battery pack would also weigh more than the tractor.

"The world is moving to electric vehicles. It might be more gradual, but it will make its way to farms and change the industry," Schulz predicts.

Semi-Autonomous & Electric. "Semi-autonomous equipment seems to be the answer," he adds. "Equipment that operates independently enough that the farmer can be within reasonable distance to intervene when a problem occurs is more realistic than fully autonomous equipment."

Further, Schulz explains, if the equipment is semi-autonomous, a tractor may not be needed to pull it. And it probably would not need a cab. "Why wouldn't the power and mobility be integrated into the implement itself in a modular fashion that can be moved from implement to implement?

"With an electric drivetrain this is possible — providing even better control of the implement and driving down even further the cost of equipment. Fully autonomous equipment might not be as necessary as we think it is," Schulz says. AEI