

Tractor test: Fendt 820 Vario TMS

Get frugal with a Fendt

A tractor's propensity for fuel has become a hot topic over the past 12 months. And with red diesel currently running up at the 50p/litre mark, when not so many years ago it was priced down at 20p, this keen interest in tractor guzzle rates is entirely understandable. On top of that, of course, there is the constant industry talk of relentlessly tightening emissions regulations doing their bit to increase an engine's craving for the pink stuff. We test the 140kW/190hp (ECE R24) Fendt 820 Vario TMS

It's a rather bleak picture. High diesel prices combine with cleaner but thirstier engines to give significantly increased tractor running costs. That's the current and somewhat depressing theory. Popular thinking is that implementation of the current Tier III emission standard requires the use of new technologies to reduce the production of nitrogen oxides and particles, and that this development inevitably leads to an increase rather than a decrease in fuel consumption.

But could it be that we're jumping to all the wrong conclusions and being unnecessarily pessimistic? Our experience, in many cases, is more upbeat than the one outlined above, to the extent that we've found a number of Tier III type engines to be, in fact, no thirstier than their 'dirtier' predecessors, and the tractor model featured here, the Fendt 820, is a case in point. Our test results prove this model to be just as economical as the tractors it replaced. But then we're getting ahead of ourselves. First, a little background. The Fendt 820 Vario TMS has been on the market since autumn 2006, when it was one of two new Fendt models to replace the previous three 110kW/150hp-132kW/180hp 815, 817 and 818 tractors in the German firm's line-up. The result is that in this 170-200hp sector of the market, Fendt now limits itself to listing a choice of two: The 125kW/170hp 818 Vario TMS and our 140kW/190hp 820 Vario TMS unit (rated output to ECE R24).

Both of the above tractors are powered by Deutz engines, the TCD 2012 L 06-4V. This water-cooled, turbocharged and after-cooled six-cylinder motor brings a

6,057cm³ capacity and a viscous fan, common-rail injection, four valves per cylinder and electronic control. Fairly standard stuff. What's new, though, is its external exhaust recirculation system, technology that is reckoned to reduce fuel consumption rates by up to 5% but then also allows the use of a 100% RME approved by Fendt.

So much for the manufacturer's brochure stats; more important to us is how the tractor performs at the DLG. Here we have no cause for complaint, with an impressive pto output return of 135.8kW at the rated speed of 2,100rpm and a similarly muscular 145.3kW maximum output at 1,800rpm. Fendt chooses not to go down the same route as John Deere and CNH with the latter firms' application-related engine power boosts, so there's no need to concern ourselves with the shape and performance impact of Fendt boost curves here – because there are none.

On the 820 there is just the one power curve – and it's a pretty impressive one, too. Torque rises by 40% as speed drops by 33%, while the start-off torque figure measures 124%. That may be all middle of the road for tractors in this category, but when talk turns to fuel consumption the Fendt starts to pull away from the rest of the pack: Specific fuel consumption of 233g/kWh at rated speed and 225g/kWh at maximum output, as well as similarly miserly returns at typical performance rates, make Fendt's 820 one of the more economical tractors in this sector.

In addition, the average Powermix measurement comes out at an excellent 278g/kWh and is one of the main reasons why





		-20%	-10%	0	+10%	+20%
Draft work: Average consumption 275g/kWh						
1 Heavy (100% load)	Cultivator					
	Plough					
2 Medium (70% load)	Cultivator					
	Plough					
Pto work: Average consumption 277g/kWh						
3 Heavy (100% load)	Power harrow					
	Mower					
4 Medium (70% load)	Power harrow					
	Mower					
5 Light (30% load)	Power harrow					
	Mower					
Mixed work: Average consumption 288g/kWh						
6	Manure spreader 6.7km/hr					
7	Baler 9.6km/hr					
8	Transport ¹⁾					
Powermix 278g/kWh²⁾						

The Powermix figure is shown down at the bottom to the right and is arrived at by averaging out the seven individual tests, recorded on 36 different test runs. Average data (in red) in the table indicate in which application the tractor's fuel consumption is more or less economical. Length and direction of the green bars show the degree to which the tractor deviates from its average performance as it works through the Powermix applications. ¹⁾ The transport cycle part of the test is not measured yet. ²⁾ The rate is expressed in g/kWh and indicates the average fuel consumption.



the tractor's engine notches a 'very good' score in our test sheet. Just to give an idea of the sort of differences we're talking about, the rates between the top and bottom tractors in this power category at full load can differ by as much as 10 litres/hour. Do the sums at 50p/litre, and these sorts of savings soon mount up. All of the above suggests good overall efficiency, and the 820's drawbar power

test results merely reinforce the point. Rated and max drawbar powers of 110kW and 120kW rank as above average, too.

As for other parts of the tractor, most of it will be familiar - which is why we don't go into too much detail, other than to highlight a few salient points. The proven Vario gearbox continues to excel in its overall level of specification,

The 820 Vario TMS Deutz engine complies with Tier IIIa emissions standards and delivers a strong power curve.

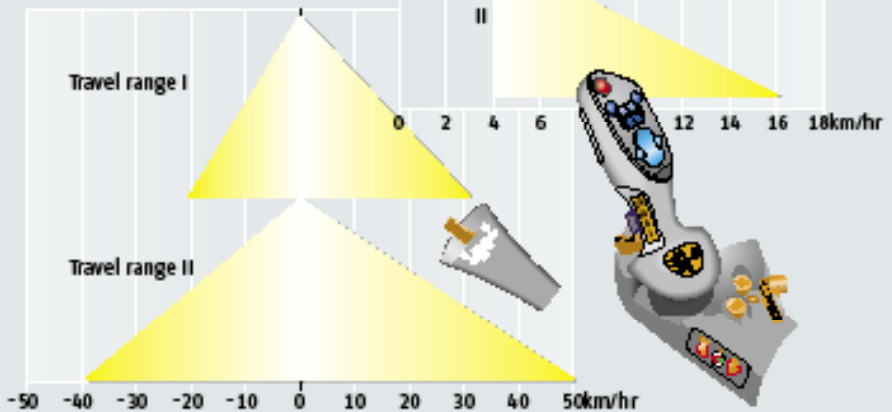
operation and handling. Four years ago, our conclusion was that this transmission, despite a lengthy list of tester comments and suggestions for possible tweaking, provided the CVT benchmark, and arguably the same holds true today: Infinitely variable, efficient and delivering 50km/hr travel at just 1,700rpm - all of which can be auto-controlled courtesy of TMS.

No grumbles in the back-end linkage and hydraulics departments, only new detail here being the option to take a 154-litre/min pump (£603 extra) rather than the 110-litre/min standard set-up. DLG results reinforce the Fendt claims and are very much in line with what was recorded on the 818 back in our 01/04 issue. Down below, the welcome news theme is maintained, with Fendt now approving the 820 for use with big 710/60R42 tyres (equivalent diameter to 710/70R38) and spec'ing the cab with a hydropneumatic suspension system as standard. Payload is generous at 5,335kg from a 12.5t GVWR and, in addition, the higher output and lower kerb weight of the more modern machine gives the 820 a power-to-weight advantage over the 818, too.

Fendt 820 Vario TMS: Internally, Fendt terms the stepless Vario transmission within the 820 as the ML160. There are two travel ranges of 0.02km/hr-28km/hr (reverse up to 17km/hr) and 0.02-50km/hr (reverse up to 40km/hr).

Infinitely variable in the main speed band

Stepless in forward and reverse



So where's the weak link in the Fendt argument? No big surprises, here: It's the dated and rather cramped cabin which, even now, still seems to divide operator opinion (see tinted box below). Interior noise levels within the cab are effectively muted at 72.3dB(A); nonetheless there will be other drivers who take a look at the larger Fendt accommodation offered by the higher hp 900-series tractors with envy and be longing for the day when this cab design, or something similar, finds its way down on to the 800s.

Service and maintenance arrangements remain as simple as before, so there are no additional test points to make here – other than the fact that Fendt now fits all Vario tractors with a standard fuel meter. AutoGuide automatic-steering appears on the options list, priced from £12,267. And while on the subject of price, the base spec Vario 820 TMS, including front-axle/cab suspension and front linkage, lists at £103,241, which is about £23,361 more expensive than the 818 Vario TMS of 2006. What does the 820 buyer get for the

extra cash? While the 820 has certainly benefited from a number of upgrades, the critical difference is that the newer tractor comes with a Tier III engine that generates 8kW more rated output and an extra 11kW of max pto output.

Summary: The Fendt 820 has its faults. A more modern cabin would be warmly welcomed, and even the Vario transmission would benefit from a few tweaks such as, for example, an increase in the number of settings within the auto travel

Cab, gearbox and elements of tractor control: The good, the bad – and the not so pretty

Comments on the Fendt cab vary hugely, from 'all of the controls are in the right place and fall readily to hand' to 'it's too cramped, there's not enough stowage space, and it feels like living in a straightjacket'. Ok, so on this latest version, Fendt has added a new and grippier steering wheel, and the fan dial no longer has fixed steps, but this hardly rates as an interior transformation. That said, our tester view is that the controls do somehow feel as though they reside in the best place, while the firm's Vario terminal continues to set the standard in terms of its display and the level of tractor information provided. The cab may be bland and uninspiring, but what's there retains a quality feel.

The long-serving Vario transmission, together with TMS (Tractor Management System) and its wide range of setting options, receives both criticism and praise: There are more than ten levers, buttons, slides and dials that control the four driving strategies and load limit sensing, engine speed, acceleration rates, memorised speeds and cruise control. Add to these the option that the operator can program in specific engine speeds in which engine control takes over in a number of applications if TMS is activated... And so the list goes on, which is why Vario has a reputation for being so tricky to fathom for the uninitiated. The reality, of course, is that even the more experienced Fendt operators may struggle to extract the absolute

maximum from Vario, so many and diverse are its setting options. The solution, from our standpoint, would be for Fendt to automate more of the settings – for example, provide an auto shift for the travel range I to II change, and have auto load limit sensing on pto engagement. In addition, we think it should be possible to override the cruise control setting from the joystick when in pedal mode. Other thoughts: How about an automatic park lock, and perhaps a soft but audible alarm on the shuttle reverser when the operator flicks the joystick across to the left?



+ Mudguard-mounted controls operate linkage, hydraulics and pto. Buttons are of a decent size.



+ Already first-rate stabilisers have been further improved with the incorporation of a break-back system.



- Starting to look dated, there are separate dials for heating and ventilation – but no fancy climate control. This is an area that Fendt needs to address.



+ Pneumatic cab suspension system provides the operator with a comfortable tractor ride.



- Passenger seat is not the best. Legroom is in short supply, and the chair itself is tricky to fold away.



- New quick-lift button has to be pressed twice on a stationary tractor. Depth control lacks an adjustable stop.



Air conditioning, yes; climate control, no. And space within the Fendt 820 cab is at a premium, too. Countering this, the accommodation is pleasantly quiet at 72.3dB(A). Photos: ST.



New steering wheel has a chunky, almost sporty look. It feels good in the hand and was liked by our testers.

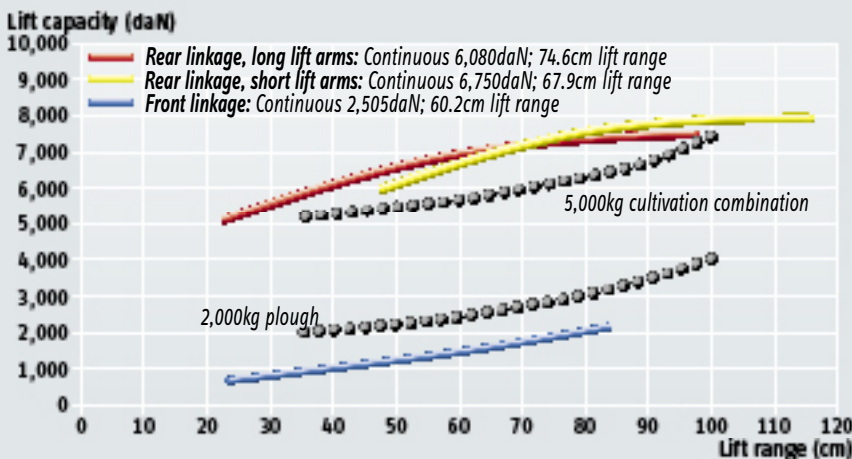


There is no shortage of control set-up options when it comes to ways to tailor how a particular tractor operates. Flipside is that this can be both confusing and intimidating.



Rear linkage and hydraulics put in characteristically strong test performances. Main new detail here is the option to take a 154l/min pump rather than the 110-litre norm.

Fendt 820 Vario TMS: Lift power and lift requirement



Fendt 820 Vario TMS: The red curve shows the recorded lift capacity (90% of maximum lift) as continuous lift power on the link ends, whereas the yellow curve refers to lift capacity with the lift arms shortened - nearly 700kg extra lift capacity, 7cm smaller lift range. The 5t cultivation combination may cause the rear linkage to struggle at the top of the geometry arc, as demonstrated by the way in which the red curve starts to tail off.

modes. Oh, yes, and the passenger seat is spartan and rather unforgiving for the more sensitive of co-pilot behinds.

But that's about it. Across the major test parameters the Fendt 820 continues to excel, just as the 818 Vario model did four years ago. Perhaps of greatest interest to today's potential purchasers is that even though the 820 Vario now meets Tier III emissions and is more powerful than the 818, its fuel consumption figures remain pretty much on a par.

As usual with Fendt ownership, it's the hefty initial capital cost that tends to be the major stumbling block. If, however, a buyer can stretch his budget and he is clocking sufficient tractor hours for the economy and transmission sophistication factors to kick in with some significance, then he may well be able to make those sums stack up.

MN, HW

Fendt 820 Vario TMS

Technical data

Engine: 140kW/190hp (ECE R24) at 2,100rpm, water-cooled six-cylinder Deutz TCD 2012 L 06-4V engine with common-rail, turbocharger and intercooler (6,057cm³), 340-litre fuel tank

Transmission: Stepless Vario ML160 gearbox with 'Variotronic TI' technology; two travel ranges up to 28km/hr and up to 50km/hr (reverse speeds up to 16 and 37km/hr), powershuttle, load limit sensing, cruise control

Brakes: Wet multi-disc brakes on rear wheels, wet cardan brake on front wheels; hand brake operated via an accumulator system, standard specification includes full air braking set-up

Electrics: 12V, one battery (170Ah), 143-amp alternator. 3kW/4hp starter motor

Linkage: Cat II/III; ELC with draft linkage control and automatic shock absorption; front linkage is supplied as standard equipment on the 820

Hydraulics: Swash plate pump of 110 litres/min output (154-litre/min option), 200 bar, three (max four) double-acting spool valves with electronic timing and setting of the tractor's hydraulic flow; available oil for external use by towed/mounted implements is 45 litres

Pto: 540/540E/1,000rpm; 1 3/8", six splines, flanged, electrohydraulic engagement with fully automatic functions and external control. Front pto 1,000rpm option

Axles and running gear: Axle with planetary drives, front-axle and cab suspension system. Multi-plate differential locks and 4WD with electrohydraulic engagement; 600/65 R28 front tyres and 650/65 R42 rear tyres in test

Service and maintenance: 16.5 litres of engine oil (500-hour intervals); 50 litres of gearbox oil (2,000 hours) and 50 litres of hydraulic oil (1,000 hours); 21-litre cooling system

Price: In base specification £103,241 without VAT; £2,093 front pto. AutoGuide automatic-steering system preparation adds from £12,267



Results from the test station

Pto output:	
Maximum (at 1,800rpm)	145.3kW
At rated engine speed (2,100rpm)	135.8kW
Fuel consumption: (pto at work)	
Specific at max output	225g/kWh
Specific at rated speed	233g/kWh
Absolute max/rated speed	38.9 and 37.7l/hr
Torque:	
Max	871Nm (1,400rpm)
Torque rise	40.9%
Engine speed drop	33.3%
Start-off torque	124%
Transmission:	
No. of gears in 4-12km/hr range	Stepless
Linkage lift: (90% max oil pressure, corrected)	
Bottom/middle/top	6,080/7,555/8,000daN
Lift range under load	74.6cm (23-97.6cm)
Front linkage lift: (90% max oil press., corrected)	
Bottom/middle/top	2,515/3,020/3,700daN
Lift range under load	60cm (24-84cm)
Hydraulic output:	
Operating pressure	212 bar
Max flow	106.5 litres/min
Max output	32.1kW (99.6 litres/min, 194 bar)
Drawbar power:	
Max (1,800rpm)	119.9kW (275g/kWh)
At rated speed	109.8kW (289g/kWh)
Noise level: (Under load at driver's ear)	
Cab closed/open	72.3/80.3dB(A)
Braking:	
Maximum mean deceleration	5.6m/s ²
Pedal force	36daN
Turning circle:	
4WD disengaged	11.40m
4WD engaged	12.35m
Dimensions and weights:	
Front axle	2,840kg
Rear axle	4,325kg
Unladen weight	7,165kg
GVWR	12,500kg
Payload	5,335kg
Power-weight ratio	51kg/kW
Wheelbase	274cm
Track width front/rear	194/191cm
Ground clearance	49.0cm

The test results

Engine: ++	
Performance characteristics	1.5
Fuel economy	1.0
Pto output/drawbar power	1.1
Good power curve, low fuel use for Tier IIIa unit. Deutz engine is one of the 820's star test turns.	
Transmission: ++	
Gearbox ratios/functions	1.0
Shifting	1.5
Clutch, throttle	1.1
Pto	1.5

Vario infinitely variable gearbox offers excellent functionality and is linked to an engine/gearbox control system. All of the many different settings can initially confuse the novice operator. Three pto speeds, good automatic gearbox functions.

Axles and running gear: ++	
Steering	1.2
Four-wheel drive and diff lock	1.0
Hand/foot brake	2.0
Front-axle/cab suspension	1.2/1.5
Weight and payload	1.0

Compact and manoeuvrable. Combination of modest kerb weight and 12.5t gross vehicle weight results in a high and usable payload.

Linkage/hydraulics: ++	
Lift power and lift height	1.2
Operation	1.5
Hydraulic output	2.1
Spool valves	1.2
Hydraulic couplers	1.3

Above average lifting power and lift range; strong hydraulic output, excellent time- and flow-controlled spools. Couplers are quality items. Option to specify a bigger pump.

Cab: +	
Space and comfort	2.1
Visibility	1.9
Heating/ventilation	2.5
Noise level	1.7
Electrical system	1.8
Build quality	2.0
Maintenance	1.5

Cab is generally average, although its test score is pulled up by the pleasingly low noise levels. Visibility is ok, too. Fuel tank provides plenty of capacity, and main service intervals are long.

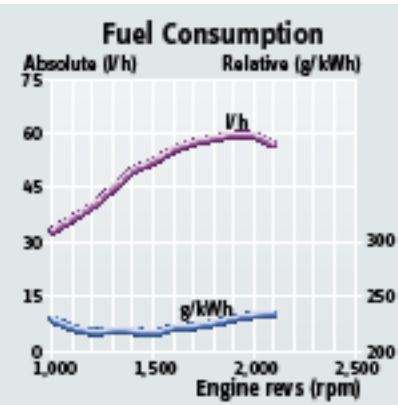
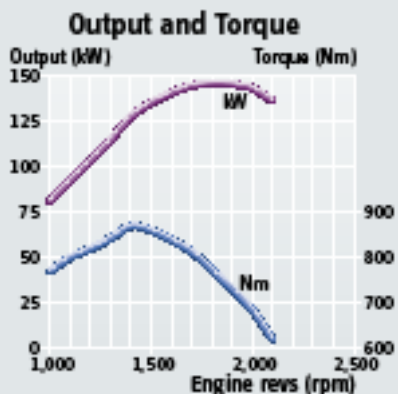
Ability:	--	-	0	+	++
Basic standards					
Average standards					●
High standards					●
Field work					●
Grassland work					●
Transport work					●
Loader work					●

Price: Low High
£80,000 to £85,000

Typical farmer buying price after discount excl VAT for base specification Fendt 820 Vario TMS

Grading system:	0 average
++ very good	-- poor
+ good	- below average

The individual marks are extracts from our assessments and do not necessarily result in a mathematically conclusive overall mark



Fuel economy at typical performance

Working areas	Output	Speed	g/kWh	l/hr
Standard speed pto 540rpm	100%	1,933	231	39.7
Economy speed pto 540rpm	100%	1,490	216	34.4
Standard speed pto 1,000rpm	100%	1,900	230	39.7
Economy pto 1,000rpm	100%	-	-	-
Engine in top speed range	80%	Max	243	31.4
High output	80%	90%	236	30.5
Transport work	40%	90%	232	15.0
Low output, 1/2 speed	40%	60%	234	15.1
High output, 1/2 speed	60%	60%	220	21.4