

Hi-tech for high yields

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Machinery Forage harvesters

With grass and forage crops becoming a more regular part of arable rotations, ADAS has been looking into how to get the most from them. *CPM* finds out more, as well as taking a look at some of the latest forage harvesters on the market.

By Charlotte Cunningham

As farmers continue to look for ways to relieve weed burdens on farm, while also preserving soil health, there's been a move away from close cereal rotations — with many traditional arable set ups now making use of grass and forage crops.

But this break in usual cropping doesn't have to mean it can't be profitable.

With grass leys now becoming a more regular feature in many rotations, ADAS' Grass Yield Enhancement Network (Grass YEN) is aiming to increase yields of high quality forage through supporting farm innovators and developing platforms for industry/science interactions — which could provide some beneficial learning points for growers.

Grass YEN has been running for three seasons, from 2018 to 2020, involving over 25 UK farmers and in its time has

demonstrated that the UK has an ideal environment for achieving very high grass yields of more than 20-25t of DM/ha.

However, according to ADAS, UK growers generally achieve less than half of this potential and few accurately measure yields on a regular basis, particularly of conserved grass.

Production methods

This has resulted in a lack of information with which to quantify and benchmark the productivity of grass growing systems and, just as importantly, to determine which production methods are most effective.

To help farmers identify the most accurate and time efficient way of measuring grass, ADAS has been testing five methods including: counting and weighing silage trailers on a weighbridge; a John Deere HarvestLab equipped self-propelled forage harvester; weighing lengths of cut swath; weighing multiple 1m² quadrats; and a Haldrup small plot forage harvester.

In 2019, the tests were carried out on first and second cut silage in three fields totalling just over 13ha on the Rothamsted Research Farm at North Wyke, in Devon. This year, they were carried out on second and third cut silage in three fields totalling just over 39ha at Wigley near Ludlow, Shrops, farmed by R Gough and Son.

“Timewise the most efficient method was the John Deere forage harvester which, after initial calibration, provided instantaneous measurements of yield and dry matter content,” says Dr Pete Berry, ADAS head of

crop physiology. An 8100i model was used in 2019, and this year a 9600i demonstration machine was provided by Deere.

Weighing 3m lengths of cut swath in five parts of a field took two people about 1.25 hr/field, while cutting grass from 15 quadrats took 3.25 hr/field. The quadrat approach was also the least accurate, because such a small proportion of the field is actually measured, according to ADAS.

In 2019, the fresh yield measurements from the John Deere forage harvester and the weighbridge method were very similar, adds Pete. “Manually weighing lengths of swath and the small plot harvester gave higher fresh yields, possibly due to taking the measurements in higher yielding parts of the field as a result of chance selection.”

This year, the measurements have placed a greater focus on testing grass quality. Samples from the fields were sent to a commercial lab for fresh grass near-infrared spectroscopy analysis of dry matter content, crude protein and



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metabolisable energy. Dry matter content was also measured by ADAS directly by oven drying each sample.

The John Deere HarvestLab dry matter sensor fitted to the forage harvester's grass chute also uses NIRS to determine the same constituents, taking 4000 measurements per second at the point of harvest to accurately measure both grass yield and quality. In total over 200 grass samples were tested. Initial results so far indicate that HarvestLab gives very good accuracy of dry matter content for grass harvested at typical dry matters for clamping, he adds.

"The key value of the HarvestLab sensor to contractors is that they know the wet weight yield of the grass as it comes off the field," says John Deere harvesting division sales manager, Edward Stephenson. "Proving the correlation between wet yield and the system's ability to monitor that constantly and consistently means that contractors can charge customers for accurate tonnages going into the clamp.

"In my view the ADAS trials are making a very strong case for the use of HarvestLab yield monitoring to produce accurate wet and dry yield estimates for commercial use."

According to Pete, optimising technology has a huge role to play when it comes to getting the most from forage crops. "The Cereals YEN programme is making good progress in understanding what management and environmental factors are important for achieving high yields. To make similar progress with forage crops, we need accurate methods of measuring yield automatically that don't require too much extra legwork. Forage harvesters with yield mapping technology can provide this."

So turning the focus to the machinery side of things, what's new?

Fendt

Following its official UK launch at LAMMA earlier this year, the new Fendt Katana 650 self-propelled forage harvester is now available to order, ready for 2021 delivery.



The John Deere HarvestLab 3000 NIR sensor can be removed from the forager chute and used for stationary analysis.

The 650 replaces the outgoing 65, and according to Fendt, offers a balance of power and efficiency to give farmers and contractors operational savings and efficiencies.

"The combination of power improvements, cab refinements and enhanced cutting ability make this machine a real step forward for Fendt. I don't think an operator using a 700hp alternative would find the Katana any less powerful in the real world. We're really excited to bring this new model to the UK," says Dan Woodward, Fendt forage products specialist.

The Katana 650 offers more power than its predecessor, with 25hp added to the existing MTU six-cylinder in-line engine, to bring it up to 650hp overall. It also boasts a new intake and processing system which is claimed to improve crop flow and increase



Counting and weighing silage trailers on a weighbridge was one of the five testing methods used in the ADAS Grass YEN field trials.

cutting capacity.

New roller conditioner crackers have also been introduced to improve the quality of the harvested crop and reduce the power and fuel requirement, adds Dan.

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Claas' Jaguar Terra Trac is the first self-propelled forage harvester available with a factory-integrated crawler track system with hydraulic suspension.

▶ a quieter driving experience facilitated by coated glass which has reduced noise levels by three decibels, and also benefits from improved ventilation.

The Katana also features Fendt's 'BalancedGrip' all-wheel drive system — making the new model more versatile and providing greater stability in undulating fields, notes Dan. "BalancedGrip takes data from a gyroscope and detects the weight transfer on all corners of the harvester to manage which wheels power should be sent to. This makes it ideal for almost any field type and gives the machine greater stability.

The cutting speed, efficiency and longevity of the knives has also been enhanced in the new model. Two new roller conditioners, new crackers that expand the cut length to 30mm, and an enlarged 300mm roll diameter have

increased the flow capacity by 21%. However, the new machine also boasts a drop in fuel consumption of 12%.

Claas

Due to have made its UK debut at this year's Grassland & Muck event, Claas' Jaguar Terra Trac is the first self-propelled forage harvester available to feature a factory-integrated crawler track system with hydraulic suspension.

The new concept offers optimal soil protection under all conditions and an intelligent headland protection system prevents damage to the grass cover and enables year-round operation, says Claas.

Two Jaguar models are available with the Terra Trac system — the new top-of-the-range 925hp Jaguar 990TT and the 653hp Jaguar 960TT.

As well as the new model, Claas has

Attachment options

For those with maize, Claas has also recently launched the new Orbis 900 — a row-independent maize front attachment with 9m working width, for use on the Jaguar.

The main point of difference within the new launch is a transport width of just 3m and the new automatic folding transport protection with integrated lighting, says Dean. "As with the Orbis 750, the frame of the Orbis 900 consists of five parts. This makes it unrivalled for fast folding and enables an extremely compact, road-travel-friendly design without compromising visibility to the front or sides to any significant degree.

"As a result of the new transport width of just 3m, and a design that optimises visibility, a transport speed of 40km/h can be maintained safely."

During folding/unfolding, the optional fully integrated transport protection —



with warning stickers and lighting — automatically pivots into the appropriate position for road travel or field work, he adds. "The entire folding process takes only 30 seconds and doesn't even require the operator to get down from the cab.

"This cuts transit and setup times considerably and reduces the operator's workload during transfers. At speeds between 2-7km/h, the touch of a button is all that is required to start the automatic folding process. With the front attachment in working position, the transport protection remains safely out of the way in its parking position."

added a number of updates and new features across the whole Jaguar 900 series this year.

These include the adoption of the latest CEBIS touchscreen-based control concept, plus a change to more powerful Stage V engines for the Jaguar 900, as well as a new optional additive system and a 42-knife chopping cylinder, explains the firm's Dean Cottey. "The new top-of-the-range Jaguar 990 is powered by a 925hp MAN engine. The MAN V12 has a displacement of 24litres and an 850hp version will also be used in the Jaguar 980.

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"The Jaguar 970 moves to a new MAN D4276 straight six, which develops 790hp from its displacement of some 16 litres. With a displacement of almost three litres per cylinder, this promises a stable power curve with sustained torque, giving the Jaguar 970 the best figures in its class with regard to fuel consumption/t of harvested material." ■



What is John Deere's HarvestLab?

John Deere's HarvestLab technology uses near-infrared (NIR) spectroscopy to analyse various constituents within harvested crops, silage or slurry.

According to Deere, the latest 3000 sensor can consider a 12% wider wavelength spectrum for additional accuracy and provides more than 4000 measurement points per second — typically equating to around one million measurements per load, explains Edward. "Compared with traditional analysis methods that involve sending samples to

a lab, using the technology is a much quicker process and also eliminates factors such as oxygen or heat exposure that can often distort results when manually sampling."

When it comes to harvested crops, crop moisture can vary by up to 20% in a single field requiring different lengths of cut to ensure ideal silage compaction without air pockets, he adds. However, the HarvestLab technology enables automatic length of cut adjustment based on dry matter content. "In addition, automatic silage

noculant rate adjustments help to optimise fermentation and have the potential to save growers up to 10% of their silage additives."

As well as dry matter, operators can glean accurate, real-time readings on crude protein, starch, crude fibre, NDF, ADF, sugar and crude ash.

HarvestLab can also be used as a laboratory unit at a storage facility or office. Connecting to a vehicle power outlet keeps growers completely mobile and provides them with instant information wherever they are, concludes Edward.



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