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SYSTEM COMPARISON

Does a conditioner alone produce rapid wilts?

Rapid wilting is the be-all and end-all when it comes to getting forage into the clamp quickly. Yet, is it possible to get a fast wilt also from a mower conditioner alone without using a tedder? And is it possible to do without a conditioner at all? In a system comparison we compared two different types of mowers to find out their effects on wilting and their power input requirements. One mower system was equipped with conditioners, the other wasn't.

Twenty-four-hour silage is a buzzword in forage harvesting. Yet, for achieving an optimum dry matter content of 35% within such a short time it is necessary to give the crop the suitable treatment. And with efficiency being a top priority, many farmers usually operate big and heavy mower combinations that have integral conditioners. Yet, these machines require a rather high power input and hence a high-horsepower tractor. Therefore we wonder whether it isn't possible to get the same wilting effect in the same time period from a mower that has no conditioner but is followed by a tedder instead. We set up a comparison test and assessed the two systems in terms of wilting effect and power input. The 10m combinations that were used for the test consisted of an EasyCut F320 front mower and two B1000 rear mowers. One combination was kitted out with steel tine conditioners (CV models), the other worked without conditioners.

A tedder was used in another test version; this was a Krone Vendro 1020 with a working width of 10.20m.

PUSH-TYPE FRONT MOWERS

The front mowers that were supplied for the test were attached to the tractor in push-type configuration. The EasyCut F320 Push model has seven discs, with the outboard discs having top hats with welded lugs. Each mower has a 3.16m cutting width and yet achieves a transport width of 3m.

Each unit is suspended by two massive and adjustable coil springs and as an option by a telescoping top link for enhanced ground adaptation in undulating terrain. The discs on the F320 are powered by a right-angle gearbox on the right-hand side in direction of travel. Our F320 also had the extra top hats which group the material into a 1.40m swath for the tractor to straddle it.

The power flow from the pto to the F320CV front mower is split and sent to the right to drive the cutter bar and to the left to power the conditioner. Our steel tine conditioner measured 64cm in diameter and offered two speeds, 600rpm and 900rpm, which are selected by replacing the belt on the pulley with the help of the appropriate tool. The conditioning effect is controlled by altering the position of the baffle plate relative to the rotor, which is done on a lever – no tool required here. The swathing width can be varied between 1.30m and 2.70m by adjusting appropriate deflector plates.

△ The conditioned material looks very different from that cut without conditioner. The conditioner crimps the crops significantly (right) which leads to faster wilting. The mower without conditioner leaves a mat of nearly untreated crop.

Photos: Höner

△ The mower combination without conditioner is much more lightweight at identical work widths and has a slimmer design.

The most striking difference between the two front mower models is their weight: the F320 without conditioner weighs nearly 800kg, the F320CV 1,280kg, i.e. nearly 500kg more.

MUCH HEAVIER AT THE REAR

The rear-mounted B1000 mower without conditioner was launched last year and has a much more light-weight frame than its CV counterpart. With an operating weight of 1,750kg, the B1000 is nearly 50% lighter in weight than the 3,400kg CV version with conditioner.

The work width, however is not different and is 3.60m for each rear unit. Both rear mowers are suspended in their centre of gravity and are given extra stability by separate guide arms, a design Krone calls DuoGrip. The distance between the two rear units can be controlled hydraulically – an important detail for cutting in curved lines or on sloping fields. The maximum work width of the combination is 10m including a 17cm front/rear overlap.

As for hydraulic control, the B1000 requires only one da and one sa spool. Either unit can be raised individually from a switch box. The ground pressure of each mower is set hydraulically as a standard feature.

The tested mower conditioner boasted optional Isobus control which adapts the ground pressure continuously once the operator has selected the work width and ground pressure on the terminal. Like the conditioner on the front mower, the conditioners at the rear rotate at 600rpm or 900rpm. The speed is selected on a lever on the gearbox. Swathing plates group the material either into a wide or narrow swath. The baffle plate gap is adjusted to one of seven steps from a side-mounted lever.

CLEAN WORK

Day one of our comparison test near Spelle in northern Germany was the 9th of May 2021. For our comparison, we drew a line in the middle of the 6ha field and started cutting in the middle moving to the outside. One side of the test field was used to measure the wilting process, the other to measure the input power that the two combinations absorbed. This was done with the help of torque hubs.

Prior to the test, we had the fields walked by hunters and their dogs and flown over by drones to detect game.

The weather on that day was perfect: 28° C and up to 25km/h wind speeds. Although it rained the day before, two thirds of the lush 60cm high ley stems had dried by 11 o'clock so the project could kick off. The light-weight mower combination without conditioners was operated by a 163hp Fendt 516 Vario and the mower conditioner combination to a 237hp Fendt 724 Vario. Both tractors used RTK positioning and guided the machines through the crops

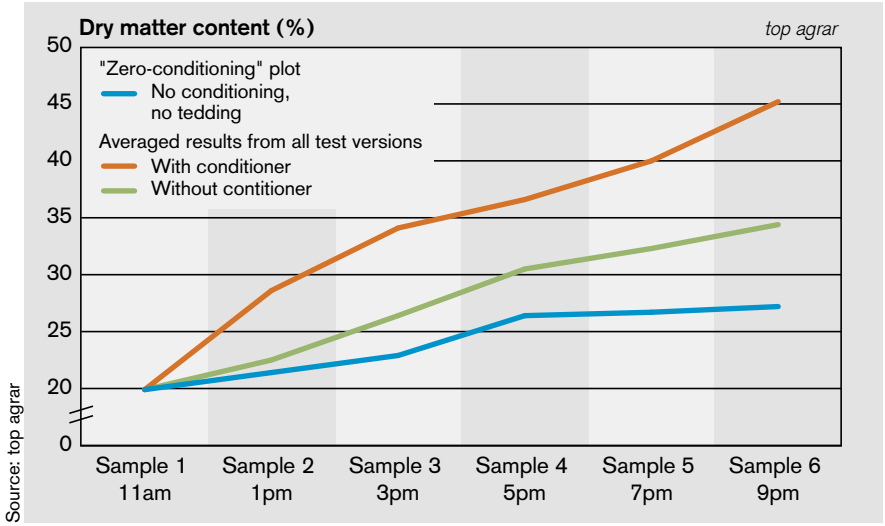
SUMMARY

A conditioner on a mower increases the wilting rate of the crop. Our test shows however that it doesn't necessarily take a conditioner for that.

A tedder, for example, can also produce 35% DM levels within 24 hours in grass that was cut without conditioner – provided the weather is right.

Indeed, in optimum weather, a tedder can produce even excessive DM levels – to the effect that crops must be harvested quickly if tedded in addition to conditioning.

TABLE 1: THE AVERAGE WILTING CURVES



△ The average wilting curves show clearly the difference between cutting with and without using a conditioner. Too much tedding may lead to excessive DM levels.

with centimetre accuracy. We selected a work width of 9.80m which ensured an ample overlap. The work rate was a consistent 10km/h.

In line with good agronomic practice, the mower combinations and the tedder were set to

- a cutting height of 8cm.
- The rear mowers spread the material across the full cutting width for fast wilting.
- The conditioner was set to maximum intensity, which means to 900rpm and the maximum gap.
- The front mowers swathed the material to about 1.40m
- so the tractors would always straddle the crop.
- The tedder was set up for its tines to rake approx. 1.5cm deeper than the stubble height.

The 6ha field was divided into six plots for carrying out the various tests, with three plots being assigned to each combination:

- One "zero conditioning" plot for each combination
- One "single-tedding-pass" plot (at 2pm) for each combination
- One "double-tedding-pass" plot (at 2 and 4pm) for each combination

We sampled the material in all plots every two hours and throughout the day from 11am to 9pm. The samples were stored in a cooled container and sent to the agricultural research centre Lufa NRW which also measured the crude ash levels. The initial moisture content measured was 19.9% DM.

FASTER WILTS THAN ANTICIPATED

Our test showed that the DM contents increased rapidly in the crop that was cut by the mower conditioner. Here, the DM levels reached 35% after only five hours. This target level was also reached on the same day in the other two test versions without conditioner. By comparison, in the "zero conditioning plot" where the material was neither tedded nor conditioned, DM levels increased by 9.2% to only 27.2% by the end of day. This is significantly lower and means that crimping or tedding made the difference and was absolutely necessary.

Looking at the wilting curves obtained in the individual test versions, we found that the mower conditioners stood out clearly: in all test versions the conditioned material reached the targeted 35% DM level easily. Additional tedding led to another significant rise of DM percentages in conditioned material. This means, when giving an additional tedding pass care should be taken that the eventual DM level is not too high. For example, in our conditions, we could have started swathing as early as 4pm. After a second tedding pass, the DM level increased rapidly to more than 38%.

Comparing the results of the test versions without conditioner, the tedder increased the DM levels by nearly an extra 8% within 10 hours. In our conditions, the second tedding pass didn't further increase the DM contents that were achieved by the first tedding pass. But in this plot, those same 35% were reached two hours earlier at 7pm. This means you can start swathing in the evening or the next morning and gather the crop at the same time. In all samples, the crude ash contents were scattered around a low ±7% and didn't change much after tedding.

CLEARLY HIGHER TRACTOR INPUTS

We measured the input power of both mower combinations on the Fendt 724. This was done by fitting a torque hub to the front and rear stub shafts. The comparison showed that the combination without conditioner required an input of 61kW/83hp and the mower conditioner with the baffle plate set to its minimum gap absorbed 122kW/166hp, which of course translates into a significantly higher fuel consumption.

Photos: Höner

△ Left: Some plots were tedded. The work width of the tedder matched that of the mower combinations. Right: The tractor power input was measured by torque hubs.

TABLE 2: THE MOWER COMBINATIONS COMPARED

Technical data	F320 + B1000	F320CV + B1000CV
Front mower weight (kg)*	800	1,280
Rear mower weight (kg) *	1,750	3,400
Total combination weight (kg)	2,550	4,680
Weight of the combination incl. tractor (kg)	9,620 (516 Vario)	12,980 (724 Vario)
Input power of the tested front mower (kW/hp)	21/29	40/55
Input power of the tested rear mower (kW/hp)	40/54	82/111
Input power of the tested combination (kW/hp)	61/83	122/166
Front mower list price (test specification) (€) *	15,160	22,675
Rear mower list price (test specification) (€) *	40,800	66,875
Combination list price (test specification) (€) *	55,960	89,550

** Manufacturer information, all pricing excl. VAT.* *Source: top agrar, top agrar measurements*

△ The weight difference between the two combinations is substantial and so is the price difference of €33,590 .

WHICH SYSTEM IS FOR WHOM?

As anticipated, the conditioner increased the rate of wilting in all test versions. In our clearly optimal harvest conditions, the target moisture level of 35% DM was reached within a few hours. If a tedding pass is added to get a more uniform wilt, the dried crop must be harvested sooner if conditions permit, because the DM levels may increase excessively if the crop continues drying for too long after tedding. This said, this can exactly be an advantage in very narrow harvest time windows – provided the harvest chain can keep up. The conditioner is an intriguing option also for contractors and coops, because it frees them of the necessity of tedding.

At the same time, the comparison shows also that it is indeed possible to gather the crop within 24 hours even though it was not conditioned by a conditioner. A tedder tractor combination offers the advantage of being 3t lighter in weight than the mower conditioner combination; the mower tractor combination is 2.13t lighter than the latter. All this translates into gentler treading in challenging conditions and on slopes. A wider combination may not necessarily require a higher-powered tractor. And then, many livestock farmers run a tedder anyway for harvesting silage or straw in autumn.

And if 24-hour silage is not a priority, the tedder also helps taking out the time pressure when fast-paced processes are not possible. The system is also a good option for farmers who bale the silage or harvest it with a forage wagon. As this is more time consuming than harvesting with the forager, the risk of excessive DM levels is not so high.

If we extrapolate these results to the second or third grass cut, we should see the wilting curves rise even more rapidly due to shorter growth and better weather. Although it is possible to reduce the intensity of the conditioner significantly, the machine is heavier than a mower without conditioner. Apart from that, it is a €33,590 higher investment (all pricing excl. VAT) – the mower conditioner costs €89,550 and the mower without conditioner €55,960. The tedder used in our comparison is priced at about €25,000.

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Translated into English by trans-agrar

VIDEO

Watch our video documenting the tests at www.topagrar.com/maehen2021