



Using ground-friendly tyre pressures will have the effect that the spreader's height and tilt will change drastically during the application. A chain or hose which can be seen from the cab makes it easier to readjust this on the move.

PROPERLY SETTING UP FERTILISER SPREADERS

How to boost spreading accuracy

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Variable-rate application of nutrients is increasingly regarded as best practice, but the latest equipment and electronics are by no means the answer to every problem.

Modern farming requires fertiliser to be applied with consistent accuracy, whatever the spreading width and type of fertiliser. Unfortunately however, the operator cannot influence either the fertiliser characteristics or the weather. This makes fertiliser spreading a challenging task for both farmer and machine.

The factors responsible for spreading problems can be grouped in the following areas:

- > Fertiliser quality
- > Technical condition of implement
- > Environmental conditions
- > Operator competence

It is now more important than ever for practitioners to regularly update their fertiliser training so that they can assess all the factors and optimally configure each one. Farmers and contractors cannot afford to make mistakes when applying fertiliser!

Fertiliser quality determines nutrient distribution

When it comes to buying fertilisers, we find that the market is strongly dominated by price. Distributors and especially farmers hardly ever bother to check fertiliser quality. Sometimes important quality characteristics such as granule hardness and particle size distribution are not even indicated.



This is what can happen when the spreader is incorrectly calibrated.

Even fertilisers produced and packaged to the highest quality standards undergo changes caused by transportation, loading and unloading and storage. Experience suggests that quality losses are primarily due to increased moisture content in the products. For this reason, it is important to store fertiliser on a waterproof substrate and cover it securely to prevent it getting damp. Inadequate storage conditions or incorrect handling cause the different granular fractions to segregate during storage. Large round granules roll outwards while small angular granules and dust remain in the middle of the heap. This produces inhomogeneous fertiliser batches which make it very difficult to achieve uniform nutrient distribution. The only reliable way to ensure optimal lateral distribution is to do a tray test to check the calibration before you spread. Various tray test kits are available from spreader manufacturers for approximately €400. It takes half an hour to optimise the settings for distribution across rows and this procedure should be repeated with each new batch of fertiliser. Leading manufacturers are offering electronic systems to monitor distribution across rows for the 2018 fertiliser season. The additional cost of these sensors is around €7000. And even then, you still have to do a tray test to check the accuracy of distribution.

Influence of spreader design on spreading pattern

The safest way to ensure uniform distribution across and along rows in the field is to maximize the size and frequency of the spreading pattern overlap. A perfectly triangular pattern is ideal,



because the granules on the outer trajectory are thrown right up to the adjacent tramline. This is achieved by using spreading vanes of different lengths on the same disc and ensure generous overlaps by the left and right discs. This full triangular spreading pattern is not always achieved in practice, especially when tramlines are few and far between and when using cheap grades of urea. This combination tends to produce a trapezoidal spreading pattern which greatly increases the risk of poor distribution across rows. The larger the working width, the more important it is to ensure good fertiliser quality.

Manufacturers nowadays offer Internet databases to assist with basic calibration, and some even provide spreading charts for smart phones. Since these are always based on the latest test results, they should be preferred to printed charts. Farmers purchasing new machines should consider a GPS guidance system. Most manufacturers now offer automatic section control with at least eight sections and where the outer section can be activated independently of all others. This system works very well when correctly calibrated.

Environmental conditions affect the spread pattern

Wind is the main environmental factor. The spreading pattern is affected differently depending on the wind direction in relation to the direction of travel and the wind speed. Small, light granules are often thrown higher than heavy granules and are more at the mercy of the wind. Prills with a low specific weight are often carried very far by a tailwind. In a headwind however, once the energy which allows the prills to travel through the air is depleted, they are suspended in mid-air before dropping down. Urea spreading can be problematic at wind speeds above 4 m/s. By comparison, heavier granules (e.g. CAN) can make for a stable spreading pattern even in higher wind speed conditions (up to 6 m/s). The better the fertiliser quality, the larger the spreading window.

Air humidity is another important environmental factor. When using strongly hygroscopic types of



Fertiliser quality has a major influence on spread characteristics, so it is important to check the dust content, granule hardness and especially particle size distribution.

fertiliser, you may notice a change in flow characteristics and distribution across rows during the course of the day. Under these circumstances a second tray test should be conducted in the afternoon to check the spread pattern.

Work rate should not be the operator's main priority!

In the farming industry we tend to measure success by the daily work rate – but when it comes to fertilising, the spreading accuracy is far more critical. On a 100-hectare farm, an error of just 20% in spreading accuracy across rows – which is barely perceptible to the naked eye – can lead to financial losses of approximately €5000. Every working hour used to optimise the spreader performance is time well spent. Voluntary fertiliser spreader tests carried out at the German agricultural training institute DEULA in Nienburg, Lower Saxony, invariably show that maintenance and repairs can improve the performance of many machines (Fig. 1). Another issue is adjusting the spreader's height and tilt to its fill level and the soil conditions. From an agronomic perspective, a suitably low tyre inflation pressure helps avoid compaction and ruts. The issue on trailed spreaders with hopper capacities of over 3000 kg is that the dropping fill level may have a great effect on the spreading width. The spreader height can change by up to 20 cm and the tilt by up to 15°. This calls for a particularly vigilant and intuitive operator to ensure that the original height and tilt settings are always appropriately adjusted and not just calibrated to an average. Especially border spreading facilities can put operator motivation to a severe test. Not only must these ma-

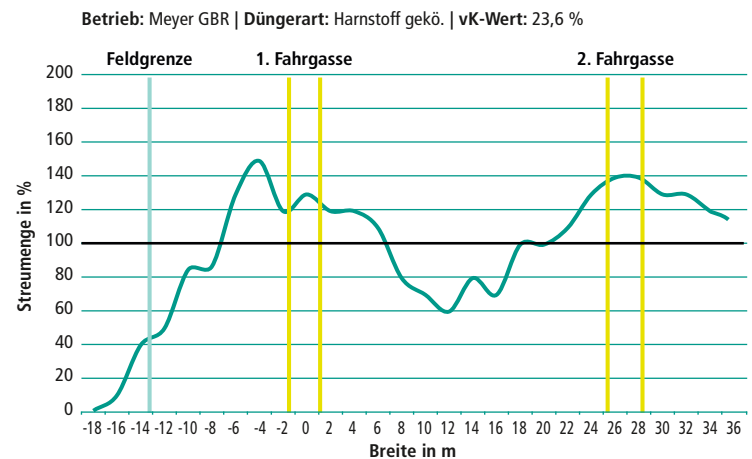
chines be correctly calibrated to suit the current conditions and the type of fertiliser, but some of them require operators to leave the cab at the corners of the field to switch between field edge, boundary and water-course spreading. When purchasing a new spreader, it is worth considering systems which allow you to select these modes from the cab. All farmers want to exploit the productivity of their field right up to the margins. At the same time however, we cannot allow any fertiliser to fall on non-agricultural land, or to contaminate surface water. It is worth considering that approx. 10–20% of a 5-ha field lies in the outer 5 m of the field.

Conclusion

Although rapid and smart advances in fertiliser application technology, the technology still does not provide solutions for the major problems of environmental protection and fertiliser quality. Especially in view of the current uneasy situation on many farms and the increasing trend towards environmentally friendly spreading practices, this means that good operator training and a conscious decision to purchase quality fertiliser is essential for profitable crop production. Before spreading fertiliser, all farmers should carry out a tray test in the field and at the edge to optimise the distribution across rows.



Fig. 1: Fertiliser spreader testing
The 20% CoV suggests an over- or under-application of up to 40% in many areas.



Quelle: DEULA-Nienburg



To achieve high yields along field boundaries without harming the environment, farmers should calibrate distribution across rows in this area too.



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