Urea: even spread is essential

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Accurate and even spreading is more important with urea products, as they typically have 80% of the density of other fertilisers.

While we often think of accuracy as achieving the correct application rate of fertiliser in kg/ha, of more importance is spreading that fertiliser evenly in the field.

All of today's spreaders are broadcast spreaders, which rely on having an overlapped spread pattern to ensure they spread evenly across the chosen bout widths (8m-30m)

This is more challenging with the lower density of urea requiring different settings – perhaps a more limited bout width and more care in windy conditions.

You must take into account:

- Type of spreader and its spreading ability.
- Physical quality of the fertiliser.
- Setting for the correct rate.
- Setting to spread evenly and bout width limitation.
- Use in the field.

Type of spreader

Twin disc type spreaders dominate the market, as spout types are limited to 8-12m bouts and single disc machines have a one-sided spread pattern that is difficult to match up.

However, machines within these categories have different spreading characteristics impacting on bout widths and evenness. Even different spreader models from the same manufacturer can have very different spread patterns.

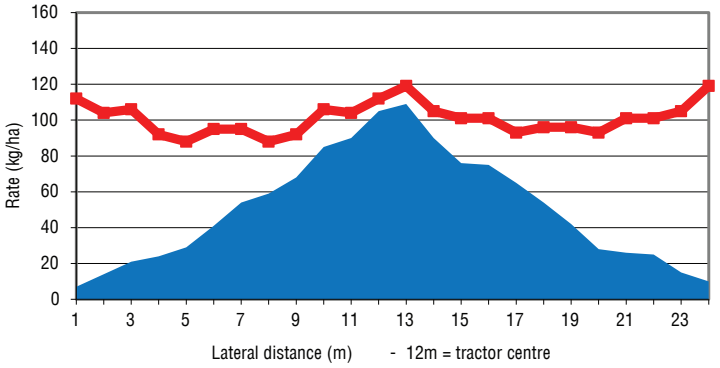
The design of the discs, vanes and hopper outlet will determine the spread pattern. Good spreaders will have a wide spread pattern, spreading the most behind the tractor and tapering smoothly towards the sides across the bout (Figure 1).

If the pattern is more shouldered, it will be less even and will be more affected by wind and fertiliser quality (Figure 2).

When selecting a spreader, always request test reports – preferably independent tests – and look for a low coefficient of variation (<10% but preferably <5%) for the products being used. It is particularly important to ask for these test results for urea products.

Critically, the spreader manufacturer should have a comprehensive database of spreading test results for a broad range of fertilisers, including urea, that will allow the spreader to be set correctly.

Figure 1: Good shaped fertiliser spread pattern resulting in a COV of 8%. (Blue indicates the basic pattern; the red line is the overlapped pattern)



Fertiliser quality

Fertiliser particle size, shape, density and strength will all influence the evenness of spread. Urea, at about 80% of the density of other fertilisers, is more difficult to throw and can be more impacted by wind.

Larger particles are generally easier to spread. So, look for 'granular' urea with a large particle size. At a minimum, 80% of the particles should be between 2mm and 4mm diameter, with most greater than 3.2mm.

Strong particles will not be easily broken when spreading, so good manufacturing and dry storage are important. Ask the supplier for strength and size details and test the product with hand-held sieve boxes and strength testers.

Protected urea is only as good as the base urea product it's based on. Ensure it has a larger particle size, good strength and is stored well. Excessive build-up of deposits on spreader vanes indicates poor physical quality and will result in uneven spreading.

Blends of urea with higher density P, K and S products can result in uneven spreading. Suppliers should provide proof of their spreadability with specific spreader models.

Setting the spreader to spread evenly

The spreading elements of fertiliser spreaders need to be set for the appropriate bout width and the fertiliser being used. Urea will usually require very different settings than CAN. It is

South Kilkenny dairy farmer John Robinson with his Teagasc advisor Nigel Kennington.

essential that spreader manufacturers have a large database of detailed spreading test results, using a huge range of fertilisers, to identify the adjustments needed to combinations of disc height over crop, spreader angle, disc type and speed, vane type and position and fertiliser drop point on the disc.

This information is available in manuals, but increasingly on websites or smartphone apps. Firstly, a fertiliser must be matched to a product in the database, typically by entering particle size distribution, particle strength, particle shape and density.

The database will indicate the bout width that can be achieved and the appropriate spreader settings.

With urea, the bout widths achievable may be less; different vanes or discs may be required and the pattern will be more impacted by wind. Many manufacturers suggest a simple field test with four to eight trays or mats to validate the setting.

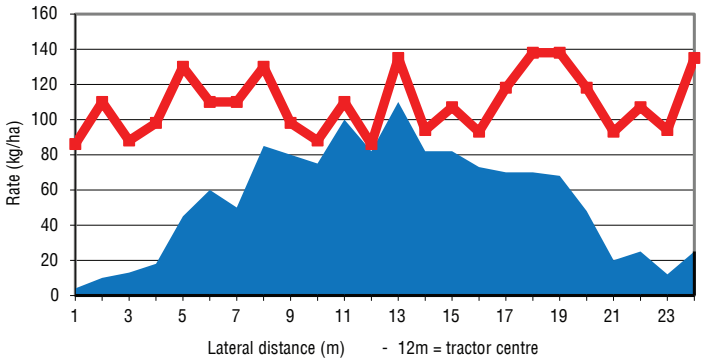
Rate setting/calibration

Getting the correct rate of fertiliser out (kg/ha) is also important and while manufacturers can give an initial setting from their database, some level of field calibration is usually needed.

Any high-spec spreaders can have on-board weighing systems that allow automatic calibration – just input the desired application rate and the controller will adjust the rate automatically.

A full calibration requires the fertiliser to be run-through the spreader and flow rate to be calculated, typically with a disc removed. Forward speed needs to be measured accurately too. Some manufacturers have very useful setting aids, such as calibrated flow bags, that guide settings without full calibration.

Figure 2: Poorly shaped fertiliser pattern with a COV of 17%.



Headland spreading and GPS control

Recent Teagasc Oak Park research suggests that fertiliser distribution in the headland areas of fields is quite uneven compared to the in-field area, contributing to yield loss.

There are two challenges; spreading to the boundary and merging the in-field runs with the headland runs.

To spread evenly to the field margin, manufacturers offer different adjustments such as deflectors, altered disc speed and fertiliser drop point, to alter the headland pattern, but these must be set very carefully.

Merging the in-field runs with the headland runs requires the spreader to be turned on and off at a precise distance from the headland. This can be very difficult with spreaders that throw fertiliser considerable distances.

Accurate GPS systems can automatically control the on/off point, making this more easily achieved and avoiding fertiliser waste. GPS control systems can also identify narrower bouts and adjust the application rate and spread pattern automatically.

Key points

- Even and accurate spreading of fertiliser is essential.
- Urea products are less dense and more difficult to spread wide.
- Urea may limit the bout width a spreader is capable of.
- Spreader manufacturers resources must have urea products in their database.
- Use the machine carefully in the field, particularly on the headlands and be conscious of the impact of wind on urea at wider bout widths.