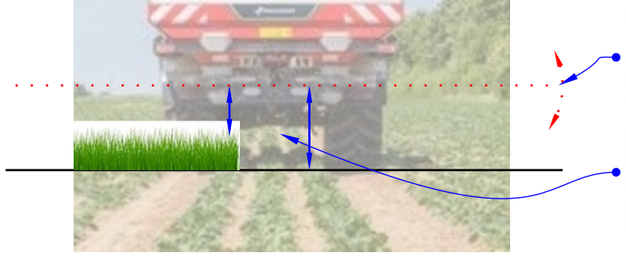
Fertiliser Spreader - Basic Setup and Calibration

1 Check the spreader before use

	No damage on hopper or frame
	Disc rotating freely, no play in bearing or gearbox
	Regulator mechanism functions, no wear in linkages
	Vanes not damaged or worn
	Agitator functions
	Headland control functions, fins not bent
	Lights are working
	PTO cover & chains in place

2 Fit the Machine correctly



Check operators manual, ensure tractor and spreader are compatible.
Fit front weights as necessary.
Check tractor controls

Ensure machine is level when viewed from rear. If not spread pattern will be wrong
Check the tyre pressure and adjust lower link arms.

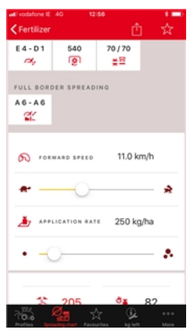
Machine height is measured over the crop.
Set the height of the spreader according to instruction manual for example 75cm+ over the crop.

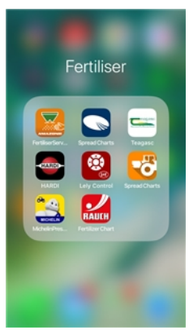
3 Machine Settings

Set the machine for bout width, fertiliser and rate you intend to use.
Use the Smart phone app, website or calibration/setting book to determine (depending on model)-

- Disc / vane choice and vane setting
- Fertiliser drop point setting
- Height of machine
- Front/back angle of machine
- Regulator setting

Some apps will also give you the flow rate, Kg/min of fertiliser





$$\text{Flow rate (kg/min)} = \frac{\text{Application rate (Kg/ha) x Forward speed (km/hr) x working width (m)}}{600}$$

4 Calibrate the Machine

Depending on machine type:
Example

- Remove a disc
- Turn on machine (agitator needs to be operating)
- Open shutter for 30 seconds
- Collect Fertiliser in a bucket
- Weight Fertiliser collected

amount collected (kg) x 4 = flow rate (kg/min)

If the actual flow rate from the machine does not match the desired flow rate adjust the regulator and recalibrate.

5 Calibration Video

We have created a series of short videos to accompany the information sheets. These go through the process of calibrating your fertiliser spreader, setting your fertiliser spreader and fertiliser quality. There is a QR code on each sheet to the relevant video.

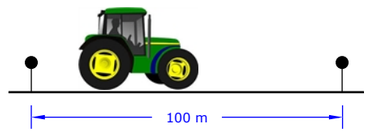
https://youtu.be/dFZQK3BjsQs

Use the link or the QR code to view.

6 Forward Speed & PTO Speed

Calibrate the tractors forward speed

- mark out 100m
- select desired forward gear
- set engine revs to give PTO speed of 540rpm
- Use a rolling start
- Record time taken to cover 100m



$$\text{Forward Speed (kph)} = \frac{360}{\text{time taken in seconds}}$$

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DESCRIPTION Basic setup

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Fertiliser Spreader - Tray Test and Field Procedure

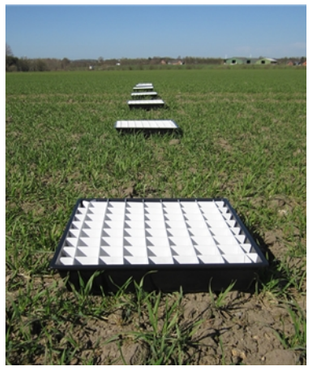
1 Check Settings in Field

- Machine set to manufactures guidelines for the fertiliser being used.
- Height of machine is correct
- PTO & Forward speed
- Working width is correct

2 Tray Test

Check for even distribution

- Set trays at equal distance across full bout width
- Run spreader over the trays in three passes, far left, centre, far right tramline, to ensure full spread pattern is recorded.
- Collect fertiliser in measuring cylinders and compare



3 Marking Out / GPS

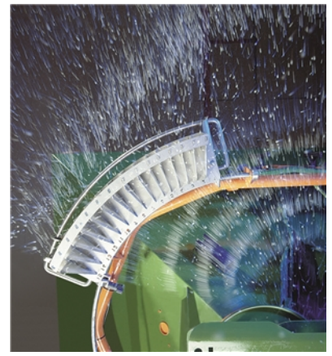
To achieve an accurate distribution it is critical that working width is correct.

- Physically mark out bouts widths in field
- Foam marking possible for narrow working widths
- Alternatively use of GPS guidance will ensure bout width is maintained

4 Headland Control

Headland control options
Many different types available: reverse disc direction; different disc/vane; deflector etc.
Many offer the user select the extent of control

- Yield orienting - full rate to boundary, with small amount beyond boundary
- Environmental - Reduced rate to boundary with zero beyond.
- Watercourse - Reduced rate to boundary side, +1m buffer zone unspread



We have created a short video which goes through the process of setting your fertiliser spreader.

https://youtu.be/rfMXCTF10Sc

5 Maintenance / Care

Fertiliser is corrosive

- Clean spreader after use
- Lubricate all moving parts
- Apply anti corrosive protection
- Store spreader saftely
- Replace damaged parts

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Fertiliser Quality Characteristics & Impact on Spreading

1 Fertiliser Granule Size

Particle size and size distribution will have a large impact on the fertiliser spread width and uniformity.

- In general large granules will be thrown further than small granules
- The more variation within granule size the greater risk to uneven spreading / segregation
- Aim for 80% of granules in the 2 to 4 mm range
- Larger granules better on wider spread widths
- Use a fertiliser sieve box to determine fertiliser size range

Fertiliser Size (mm)		
<2mm	2.00 to 3.3mm	3.3 to 4.75
		

We have created a short video which explains fertiliser characteristics and how to assess them.

https://youtu.be/qsK9warJftw

2 Shape of Granules

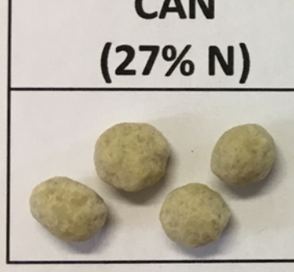
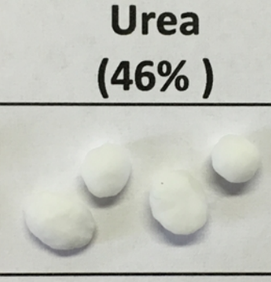
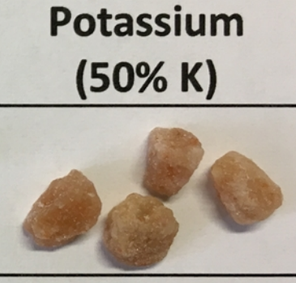
Fertiliser granule shape will vary among fertilisers. For example nitrogen (CAN, Urea & Phosphorus) tend to be round in shape where as potassium tends to be angular. Round granules tends to roll along the vanes while angular granules tend to slide along the vales.

Rounded granules

- Move off the spreader disc more easily
- Travel through the air better

Angular granules

- Due to angular nature and move on spinning discs can result in some breakage on the disc
- Don't travel as well in the air due to granule shape and exit velocity from the vanes.

CAN (27% N)	Urea (46%)	Potassium (50% K)
		

3 Fertiliser Density

Granule Density represents the mass to volume ratio of granules. This is a measure of the physical weight of 1 liter of fertiliser measured by a weighting scale.

- Important factor when setting up the fertiliser spreader
- Large impact on the spread width of the fertiliser
- More dense particles will spread wider at high spinning disc speeds
- Blending fertilisers of similar density will be important to prevent segregation
- Urea is a low density fertiliser
  - Granule density of 0.75 kg/L
  - More difficult to spread on large bout widths
- CAN (27% N) high density fertiliser
  - Granule density of 1.0kg/L
  - Easier to spread

4 Granule Hardness

Granule hardness refers to the force that can be applied before the granule breaks.

- Granule hardness will influence both the spread width and the disc speed
- Soft fertilisers may shatter on the disc resulting in granule breakage
- Check fertiliser granule hardness with a hardness indicator
- Aim for a granule hardness of greater than 6

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Fertiliser Spreader - Technology and Development

1 Auto Calibration

Higher Spec machines will self-calibrate. They use a combination of weight cells and speed sensors to constantly check and adjust the spreader output.
They will automatically adjust the regulator to ensure the correct rate is being delivered onto the disc, even if the tractor speed changes.

2 GPS Section Control

- Gauging the correct 'turn on' and 'turn off' points when leaving or approaching the headland is challenging with modern spreaders. This can now be automated with GPS giving the exact position and controlling the on/off setting.
- GPS technology can also be used to alter the fertiliser flow rate and the shape of the spread pattern to allow more accurate spreading on short runs. This is achieved by altering the fertiliser drop point on the disc or the disc speed while adjusting the application rate. Manufacturers refer to this as 'section control'.
- These technologies can prevent lodging / yield loss on headlands and can also save fertiliser.

3 N Sensor

Tractor mounted reflectance sensors can capture information about variation in the volume of the crop and its N content.
This can be used to modify the amount of N applied, as the spreader moves through the field, although information about future crop demand and soil supply are also needed. The crop information can also be acquired by a drone or satellite in advance of fertilising the crop.

4 Spread Pattern Sensor

Spreader manufactures are looking at ways to improve the accuracy of the spread pattern for different fertilisers. One system uses sensors mounted on the rear of the spreader to check the spread fan as it leaves the spreader and makes adjustments as required. This can also be linked to a wind speed sensor mounted on the machine, the spreader will compensate for adverse wind.

5 Simplified tray test

Tray testing is being made simpler so that it can be done more regularly. The use of rubber mats which can be easily stored in the tractor cab and a smart phone means it is easy to setup.
Once the fertiliser has been applied to the mats a simple photo will calculate the amount of fertiliser on each mat and will compare the results using the spreaders app.

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