

# Tractor tyre selection

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<https://www.aginnovators.org.au/initiatives/energy/information-papers/tractor-tyre-selection>

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Tyres are the key traction point on a vehicle. They are responsible for transmitting power from your tractor to the field. If your tractor's tyres are not optimised properly, you will use more fuel than you need. **Adjusting tyre pressures can deliver fuel savings in the range of 5 to 15 percent. Factors that need to be considered include tread, diameter, width, rim size, load indexes, single/double/triple arrangements and typical operating speeds.** Unsuitable tyres may make it difficult or impossible to implement other fuel-efficiency measures. Larger tyres spread the weight and enable operation at lower pressures.

## Quick tips

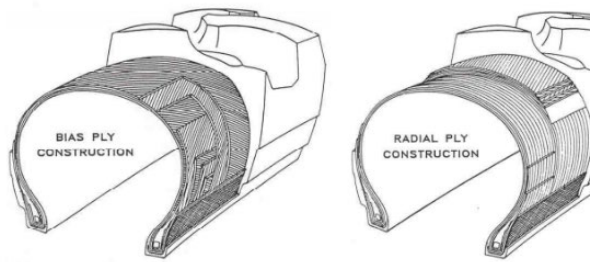
- **Consult with a professional.** Selecting a tyre involves several factors. A tractor tyre expert can save you considerable time and help you make the correct decision.
- **Bigger tyres for lower pressures.** If possible, get the largest tyres your tractor and operations permit. This will allow you to employ a wider range of pressures to maximise traction and efficiency.

- **Radial tyres have been the go.** Modern radial tyres allow for efficient operation, sometimes at lower pressures than you'd expect.
- **Check out new tyre developments.** Increased Flexion and Very High Flexion tyres operate at lower pressures and provide better traction, less wheel slip and lower compaction with increased field efficiency of about 5%.

## Radial versus bias ply construction

There are two distinct types of tyre construction: bias ply and radial ply. For most farming applications in NSW, radial tyres are preferred as their construction improves stiffness along the tread and results in greater traction.

Figure 1: Bias and radial ply tyre constructions<sup>1</sup>

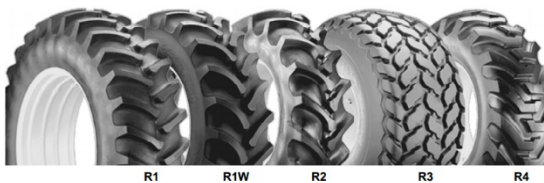


Due to their relatively weak sidewalls, radial ply tyres are not suited to holding liquid inside them and therefore this ballasting method should be avoided to prevent damaging the tyres.

## Tread types

In addition to ply construction, there are five main types of tyre tread designs: R1, R1W, R2, R3 and R4.

Figure 2: Different tread types<sup>2</sup>



R1, R1W and R2 tyres are known as 'agricultural' tyres and provide the best traction for farm field conditions. R1 tyres are typically the best option for the type of soils found in Australia. R1W tyres have deeper skids that provide increased traction in wet, sticky soil conditions. R2 tyres are used for field work in wet conditions and for high-value vegetable crops such as rice and sugarcane.

R3 and R4 are typically known as 'turf' and 'industrial' tyres, respectively.

## What is the right-sized tyre?

Refer to your vehicle's supplier or manufacturer for the appropriate size of tyre (width, height, etc.) for your tractor, based on the type of work you'll be performing. In general, you should attempt to obtain the largest tyres that your tractor allows, as this improves traction performance by permitting operation at lower tyre pressures for any given weight.

However, farmers should also weigh the benefits of having larger tyres against the disadvantages of carrying heavy, large tyres when additional traction is not required (e.g. on light loads). Also, it is important to ensure your tyre width and spacing set-up can match the crop row spacing you require.

## Wheel types

With regard to tractor wheels, three main styles exist. These include the following:

### Cast (non-adjustable) wheels

Often used for high-powered tractors and well suited to heavy drawbar field work in Australian conditions, these wheels can change the overall mass of the tractor significantly. They're better suited to heavy field cultivation than the wheel styles detailed below.

<sup>1</sup> Adapted from Brodbeck, K. N., 2004. *Choosing the Right Tire*, Des Moines, Iowa: American Society of Agricultural and Biological Engineers.

<sup>2</sup> Adapted from Brodbeck, K. N., 2004. *Choosing the Right Tire*, Des Moines, Iowa: American Society of Agricultural and Biological Engineers.

## Welded (non-adjustable) wheels

The lighter 'welded' wheel provides weight-saving features for tractors engaged in heavy linkage operations. The weight-saving feature provides an overall increase in rear axle carrying capacity through a reduction in wheel mass. Very often 'drilled' at the factory for the field fitment of cast weights, this wheel type can be ballasted, if required, for trailed draught equipment. In addition to its lighter weight, the welded wheel is often manufactured to extremely tight tolerances for alignment. This high level of tolerance can provide improved ride quality for high-speed transport applications.

The styles of wheel outlined above are considered to be non-adjustable. If you choose a non-adjustable wheel type and adjustment for various row-crop requirements is important, you'll require a bar-type rear axle for your tractor. This bar axle will allow the wheels to be slid to the required track settings on the tractor's axle bar.

## 'Lugged adjustable' wheels

The traditional style of wheel is often referred to as a 'lugged adjustable' wheel. It is appropriate for small/medium tractors engaged in various row-crop applications. This type of wheel has been superseded to a greater or lesser degree by waffle or ring rims; however, all of these wheel styles allow simple and relatively easy track setting changes to be made on-farm.

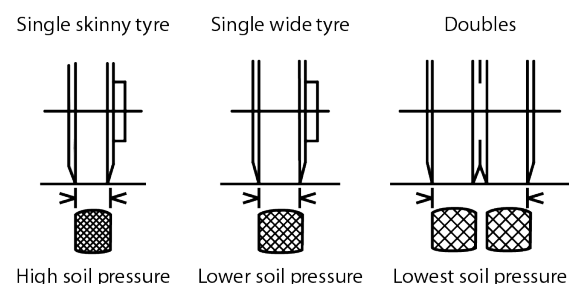
## Singles? Doubles? Triples?

Logistically, it is easier to check and maintain tyre pressures with fewer tyres. In addition, fewer wheels mean a lower gross tractor weight, which contributes to fuel efficiency.

However, heavier machines require increased pressure on tyres to meet the inflation rating for that load. It is important to check the inflation rating on your tyres and attempt to be close to the lower range of what is acceptable for them.

At some point, if your machine is particularly heavy, the required tyre inflation will be too high for your tyres or may result in high soil compaction or increased wheel slip. At this point you should consider adding additional wheels so that you can operate each tyre at lower pressure, thereby increasing traction and reducing soil compaction.

*Figure 3: Effect of tyre width and double tyre set-ups on traction and soil pressure<sup>3</sup>*



## Used tyres

Second-hand tyres are rarely a good idea as it may be difficult to observe wear or damage to tractor tyres, making tyre

<sup>3</sup> Adapted from Visagie, A. & Fuls, J., 2004. *Tractor Performance*.

failure and the tyres' remaining lifespan hard to predict.

In addition, a worn tyre is less capable of sustaining heavy loads than is an equivalent new tyre. Used tyres may therefore perform in sub-par ways.

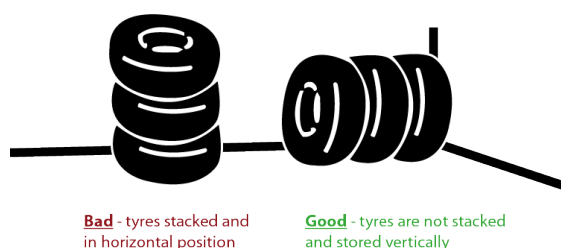
## Taking care of your tyres

Proper storage techniques and care are vital to maximising the lifespan of your tyres and to maintaining their performance.

The following factors will contribute to the deterioration of tyres and exposure to them should be minimised:

- heat
- air currents
- oils, fuels and solvents
- sunlight
- ozone (from electrical generators and arc welders)
- water
- dust and dirt.

*Figure 4: Tyres should be stored in cool and dry conditions, indoors. Tubeless tyres should be stored in an upright position and should not be stacked<sup>4</sup>*



<sup>4</sup> Adapted from Balkrishna Industries, 2010

## Case study

A University of Iowa trial found fuel consumption increased 4 percent during planting and 12 percent during field cultivation when dual tires were removed.<sup>5</sup>

## Recent Developments

New Increased Flexion (IF) and Very High Flexion (VF) tyre options supersede radial tyre technology. The IF and VF tyres (including Low Sidewall Technology) operate at lower pressures and provide better traction, less wheel slip and lower compaction with increased field efficiency of about 5%+. Compared to conventional tyres, IF technology is rated to carry 20% higher loads at the same inflation pressure or the same load at 20% less inflation pressure. VF tyres extend this to a 40% increase in load or 40% reduced pressure for the same load. To maximise the benefits of IF and VF technology it is important to maintain the recommended inflation pressures depending on load which will vary depending on the type of operation such as infield or transit modes.

## Further information

### Instructional video for tyre selection

An instructional video on how to properly select tyres and how to measure important parameters such as the axle ratio (in cases where this information is not available from your tractor's supplier or documentation) is available at:

<https://www.youtube.com/watch?v=cX08QJahdz8>

<sup>5</sup><https://store.extension.iastate.edu/product/14447>

## IF and VF farm tyre technology

Download a PDF with information on IF and VF tyre technology at:

<http://www.tyres4u.com.au/BrandImages/brandselector/alliance/pdfs/AllianceIFANDVF.pdf>

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<https://www.aginnovators.org.au/initiatives/energy/information-papers/tractor-tyre-selection>

Please see this factsheet for more information about this topic.

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