Correct tyre pressure and ballasting

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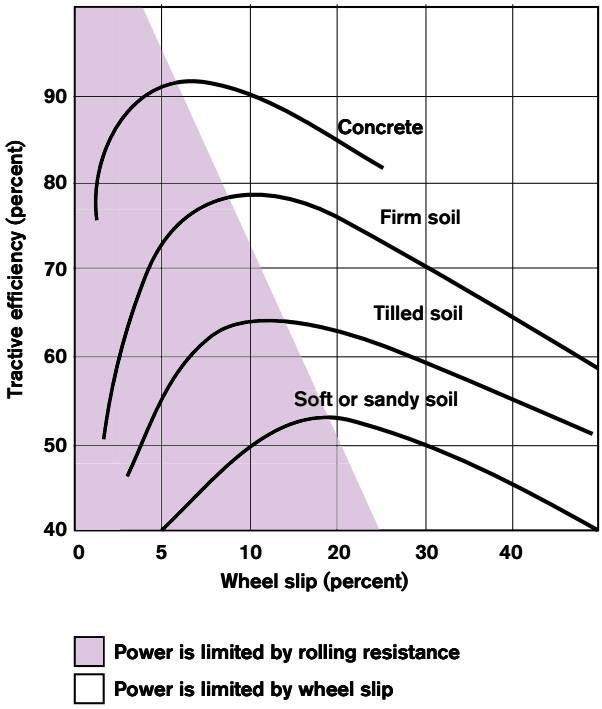
The basics

Tractor traction is a key element in tractor fuel use. The key is to get the right balance between wheel slip and rolling resistance. Increase tyre pressures and you reduce rolling resistance, but wheel slip increases. Lower tyre pressure and you get less wheel slip but rolling resistance increases. Getting the right balance will produce the lowest diesel costs. The amount and the distribution of ballast can affect this relationship, both in terms of traction efficiency and also fuel consumption



Maximum power is available at the peak of each curve - a compromise between rolling resistance and wheel slip.

In practice

The optimum tyre slip is determined by:

- Ballast
- Tyre pressure
- Task
- Ground conditions.

The adjacent graph shows how optimum slip changes with ground conditions. Tyre manufacturers produce tables and charts which give optimum pressures for a variety of jobs done in different conditions. It's worth taking a look at these and producing a simple summary covering the tasks that you undertake on your farm and the ground conditions you are likely to face. Carry this in the cab and you have a handy reference to use on an everyday basis.

Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig: Ewrop yn Buddsoddi mewn Ardaloedd Gwledig
The European Agricultural Fund for Rural Development: Europe Investing in Rural Areas

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Dairy Development Centre

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You can also produce wheel slip calculations yourself by measuring the distance covered by the tractor and the number of rotations of the wheel.

You can calculate wheel slip by using the below equation:

$$\text{slip (\%)} = \left(1 - \left(\frac{\text{distance driven}}{\text{circumference of tyre x number of rotations}}\right)\right) \times 100$$

Weight distribution

Similarly, it is worthwhile carrying a table of simple weight distribution in the cab. See the example below which indicates what ballasting should be used for each implement. Access to a weigh bridge can help in determining distribution for your particular tractor and implements.

Potential savings

Savings are proportional to how far the machine set-up is from the optimum. As a general example, a 20% over or under inflation of tyres can lead to an overall efficiency loss of around 25% - including tractive force and fuel consumption.

Efficient20, a European funded initiative to help farmers and foresters to reduce their fuel usage carried out some ploughing trials on a Shropshire farm which showed a 5% saving by dropping pressures from 23 psi all round to 14/17 psi (front/rear). Using larger tyres with a wider footprint gave a staggering 30% fuel decrease – saving 3.5 litres of diesel per hectare.

Optimum front and rear weight distribution

Tractor design / Implement type	Weight distribution	
	Front	Rear
Two-wheel drive / Trailing implement	25%	75%
Two-wheel drive / Semi-mounted implement	30%	70%
Two-wheel drive / Mounted implement	35%	65%
Front wheel assist / Trailing implement	40%	60%
Front wheel assist / Mounted implement	45%	55%
Four-wheel drive / Trailing implement	55%	45%
Four-wheel drive / Mounted implement	60%	40%

For more information on 'Correct tyre pressure and ballasting' please contact:

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