

# Modern Machinery Matters



## Nebraska tractor tests are colour blind – but show buyers the way

By Roger Hoy, Director, Nebraska Tractor Test Laboratory

The Nebraska Tractor Test Laboratory (NTTL) has a long history dating back to 1920. This world-renowned US Midwest facility exists because of a Nebraska law originally passed in 1919, which in essence required a representative model of a tractor to be tested and the manufacturer's claims verified before the model could be sold in the state.



Roger Hoy.

While the law only applies to tractors sold and advertised in Nebraska, tractor users outside the state and internationally are effectively protected against false performance claims. There are few tractor models sold in other parts of the world that are not also sold and advertised in Nebraska – so most farmers benefit from the lab regardless of where their tractors are purchased.

The first tractor successfully tested in the lab was in 1920 – a Waterloo Boy. The original tractor test lab facility was intended to be only temporary and was erected very quickly, however, the building was used for decades.

Over the years, changes in tractor technology and increased specialisation of associated traction machinery have resulted in changes to the Tractor Test Act and corresponding alterations to the NTTL's role.

### Changing with the times

The Nebraska law originally applied to all tractors. But in the late 1950s and early 1960s, the law was changed to apply only to agricultural tractors and to exempt tractors less than 20 hp.

The law was again changed in 1986.

This change was made to recognise additional testing of tractor models by the manufacturers at OECD (Organization for Economic Cooperation and Development) tractor test stations worldwide.

The NTTL is designated as the official OECD tractor test station for the US.

Over the years, other procedural changes have occurred to account for improvements in tractor technology and to reduce the testing burden on manufacturers while maintaining protection for tractor buyers.

### Paying for power

Tractors are sold by power. The dollars spent per horsepower can only be compared among models of the different manufacturers when the buyer knows what usable power is being purchased for the dollar outlay.

Consumers are assured that NTTL performance data are obtained without bias to tractor colour or any favoured criteria and are obtained using a worldwide test standard so that tractor performance can legitimately be compared, no matter their country of origin or manufacturer.

### Back to the future

Some have suggested that conditions today are more similar to those that existed in 1919 than at any other time in the intervening years.

This is because the market is currently experiencing a proliferation of new tractor manufacturers, primarily from Asia, that have not yet demonstrated the high standards of performance farmers have come to expect from established manufacturers.

### Where to for the NTTL?

One vision that I have for the lab is to maintain and even enhance the existing reputation that the NTTL enjoys.

To do this, we will continue to offer accurate and unbiased data and lead in the development of new test techniques as new tractor technology comes along.

Examples may include:

- Developing a method to value continuously variable transmissions over traditional transmissions;
- Developing a method for evaluating the power bulge feature available with some PTOs; and,
- Researching the effect of alternative fuels such as bio-diesel, on tractor performance.

### Staying on the leading edge

To accomplish these goals, the NTTL needs to stay on the leading edge of test technology. In recent years, a new load car was commissioned that replaced a previous load car which had its origins in the 1930s.

The old drawbar track was 50 years old. It was replaced in 2007 with a new wider and longer drawbar test track to better accommodate today's larger tractors. ■

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## WHAT TESTS ARE PERFORMED AT THE NNTL?

All tractors tested undergo one or more tests at the Nebraska tractor test lab. Tractors have PTO horsepower verified. This test is more than just a verification of power; it also establishes a full load power and fuel curve and also includes partial power testing. Additionally, tractors with more than 100 PTO horsepower are tested for drawbar performance.

During drawbar testing, each tractor tows a load car. The new load car has been in use since 2003 and replaced the earlier load car that had its origins in 1937. During testing, a number of measurements are made in each gear at rated engine speed and maximum power engine speed. These measurements include fuel used (which is supplied and measured from the load car), drawbar pull, speed, travel reduction (reported as slip), distance traveled, engine and fan rpm, as well as various temperatures.

Fuel rate adjustment is allowed to ensure that:

- The minimum advertised power at either rated engine speed or standard PTO speed is met; or.
- The power does not exceed the maximum power desired by the manufacturer. The manufacturer is constrained to not exceed warranty fuel limits for the engine series in each model. Drawbar testing typically requires portions of three days

to complete. Because tractor performance varies depending upon atmospheric conditions, tests must be conducted when air temperatures are above 10°C and below 21°C and when barometric pressure is above 725 mm Hg.

In addition to PTO and drawbar tests, sound levels, hydraulic flow, and three-point lift capacity are also tested.



One of the larger tractors under test conditions at the NNTL.

## NEBRASKA TESTS CONFIRM NEW POWER AND FUEL EFFICIENCY BENCHMARKS

With broadacre and row crop farmers demanding higher powered and more versatile tractors that also reduce operating costs, Magnum's recent performance in the independent Nebraska test report confirm its ability to deliver an excellent return on investment on Australian farms.

"The Magnum 335 tested as the highest horsepower conventional tractor ever," said John Dreves, Case IH Tractor Brand Manager.

"In the Nebraska test, the 335 developed a record breaking maximum PTO power of 235 kW (315 hp) with a leading PTO power growth of 28 kW (37 hp), delivering on our engineering focus to continually grow the available power in a conventional tractor. For Australian growers this means they can use a rigid chassis tractor to complete the tasks often tackled by larger, articulated tractors, thereby reducing their operational costs."

John said the Magnum 335 meets the industry's demand for more pulling power. "With farm sizes increasing, growers are pulling larger, heavier implements to work more ground in one pass. The Magnum 335, rated at 205 PTO kW (275 hp) and delivering a 47 per cent torque rise, is designed to develop, maintain and consistently deliver the power required for larger implements."

The Magnum 335 has the necessary hydraulic power for larger, more demanding equipment, with hitch lift capacity testing at 8998 kg. This capacity is achieved via the hitch geometry, with improved hitch lift, high hydraulic operating pressure and built in tractor ballast for improved stability.

### Big fuel savings

"The Magnum's Automatic Productivity Management (APM) system delivers fuel efficient operation by automatically adjusting engine speed and transmission ratio. Tested at Nebraska, this feature delivered fuel savings of up to 21 per cent," John said.

The Magnum 335 has also recently gained approval to operate at three metre centres. With heavy duty axle load rated at 5400 kg, the same spacers for normal duals can be used making the 335 ideal for tram line farming.



Magnum 335.

"In short, the Magnum 335 has the lugging power, staying power and pulling power to hang in there, even in the toughest of conditions. It's a versatile tractor, with the ability to control compaction, increase traction efficiency, deliver comfort and reduce operating costs."

### New Steiger 485 miserly on fuel

Nebraska tests on the Steiger 485 fitted with APM as standard, showed a miserly fuel consumption across all loads and even outperformed its predecessor (the 480) by up to six per cent less fuel use.



Steiger 485.