Australian Tractor tests— Report on test No. 29 (Farmers' edition)
Zetor 25A diesel

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1. THE TESTS

(1) After 12 hours of running-in, two types of tests were carried out, in order to measure the performance of the engine, as measured by the power in the belt driven by the belt pulley, and the performance of the tractor as a whole, as measured by drawbar pull, tractor speed, wheel slip, and drawbar horse-power (d.b.h.p.), with the tractor running on a bitumen test track.

The main results of these tests are given in Sections 2, 3, and 4. Other measurements and observations were made of various features of the tractor; these are given in Section 5.

(2) Fuel Mixture Settings.—The engine of this tractor has only one fuel-mixture setting, at which all the tests were carried out.

(3) Governor Control.—The engine was under the control of the governor set to give maximum power and full throttle at rated engine speed.

(4) Fuel.—Distillate, Diesel Index 56, Specific Gravity 0.842; weight per Imperial gallon 8.42 lb.

The Australian Tractor Testing Committee is a joint body established by agreement between the Commonwealth, the States, and the University of Melbourne; under this agreement, the tests are carried out by the University of Melbourne. The address of the Tractor Testing Committee is: C/o. Department of Primary Industry, 301 Flinders-lane, Melbourne.
2. SUMMARY OF POWER OUTPUT

Table A

<table>
<thead>
<tr>
<th></th>
<th>At the Belt</th>
<th>At the Drawbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated engine speed, r.p.m.</td>
<td>1,800</td>
<td>1,800</td>
</tr>
<tr>
<td>Corrected maximum power(a)</td>
<td>24½</td>
<td>22½</td>
</tr>
<tr>
<td>Rated power (b)</td>
<td>21 (b1)</td>
<td>17 (b2)</td>
</tr>
</tbody>
</table>

(a) Corrected maximum h.p. is calculated by a suitable formula from observed maximum h.p. corrected to 60° F. and 29-92 (sea level) barometric pressure. No correction is applied to diesel engines because there is no suitable formula; the values shown above are therefore the observed maximum powers.

(b) Engines are not expected to run indefinitely at full or maximum horse-power, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

3. BELT TESTS

The belt tests show the power (belt horse-power, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

Table B—Belt Test Results

As there is only one fuel setting, no mention will be made of mixture settings in this table.

1. Rated engine speed, 1,800 r.p.m.
2. Fast idling speed about 2,140 r.p.m.
3. Observed maximum b.h.p. rated speed ....
4. Corrected maximum b.h.p. rated speed (a)
5. Calculated rated load (b1)
6. Test at approximately rated load ....
7. Average loading under governor (c) ....
8. Equivalent engine torque at full throttle
9. Repeat of (3) above after 41 hours

4. DRAWBAR TESTS

(1) The following tables C, D, and E, show the drawbar performance of the tractor, on the bitumen test track, wearing rear tyres 11.25 x 24, carrying standard weight (1,480 lb. front, 3,650 lb. rear; total 5,130 lb.), working in the gears named in the tables. Height of drawbar 15 inches.

As there is only one fuel setting, no mention will be made of mixture settings in the following tables.

Table C—Maximum Power, Rated (3rd) Gear

<table>
<thead>
<tr>
<th></th>
<th>DBHP (f)</th>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>Wheel Slip % (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rated engine speed, 1,800 r.p.m.</td>
<td>22 6</td>
<td>1,700</td>
<td>5.0</td>
<td>4</td>
</tr>
<tr>
<td>2. Observed maximum d.b.h.p. at rated engine speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Corrected maximum d.b.h.p. at rated engine speed (a)</td>
<td>22 ½</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Calculated rated load (b2)</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table D—Pull at Maximum d.b.hp.

All gears, rated engine speed. See note (h).

<table>
<thead>
<tr>
<th>Gear</th>
<th>D.B.H.P.</th>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>Wheel Slip %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>3,300</td>
<td>1.8</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>2,400</td>
<td>3.2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>22 ½</td>
<td>1,700</td>
<td>5.0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>22 ½</td>
<td>1,200</td>
<td>7.1</td>
<td>3 ½</td>
</tr>
<tr>
<td>5</td>
<td>22 ½</td>
<td>750</td>
<td>11.4</td>
<td>1 ½</td>
</tr>
<tr>
<td>6</td>
<td>Road gear, not tested</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(f) This is the "specific fuel consumption," the weight of fuel consumed per unit of energy developed by the engine; the unit of energy here is the h.p.-hour, similar to the electrical "unit," the kilowatt-hour. When this figure is least the engine is giving its best economy or efficiency. It is easy to change from column (c) to column (d) in Table B, e.g., in line 3 as follows:—
1-73 galls./hr. while developing 24-5 h.p. means 1-73 ÷ 24-5 = 0-071 gallon/b.h.p./hr. x 8-42 lb./gallon for this fuel = 0-61 lb./b.h.p./hr., as shown in column (d).

(g) Wheel slip can be measured by noting that, in travelling a given distance, the back wheels make more turns when working under load than when running with no load on the drawbar. The difference in these revolution counts divided by the former count gives the slip as a ratio, which can be written as a percentage.

(h) These are not the maximum pulls available in the gears (i.e., not the maximum sustained pulls), but the pulls at maximum d.b. power, i.e., at full-throttle at rated engine speed.
Table E—Fuel Consumption, Various Loads, Rated (3rd) Gear

<table>
<thead>
<tr>
<th>Pull lb.</th>
<th>Speed m.p.h.</th>
<th>DBHP</th>
<th>Per cent. of Maximum d.b.h.p.</th>
<th>Slip %</th>
<th>Fuel Gall./b.d.h.p. hr. lb./b.d.h.p. hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>750</td>
<td>5-7</td>
<td>11</td>
<td>48</td>
<td>3</td>
<td>0-7</td>
</tr>
<tr>
<td>950</td>
<td>5-5</td>
<td>14</td>
<td>61</td>
<td>4</td>
<td>0-8</td>
</tr>
<tr>
<td>1,200</td>
<td>5-3</td>
<td>17</td>
<td>75+</td>
<td>5</td>
<td>0-9</td>
</tr>
<tr>
<td>1,500</td>
<td>5-2</td>
<td>21</td>
<td>92</td>
<td>5</td>
<td>1-1</td>
</tr>
</tbody>
</table>

† The rated drawbar load.

(2) **Interpretation of Drawbar Tests.**—
(i) Drawbar tests are carried out on a hard prepared surface. Most field conditions present higher resistance to the tractor's motion, so that, in the field, the maximum drawbar pulls available in any gear will usually be less than those shown in the tables.

(ii) Wheel slip may also be greater in the field; to that extent tractor speeds in miles per hour in the field will be less than those shown in the tables.

(iii) Because of (i) and (ii) above, the drawbar horse-power available in any gear in the field will usually be less than those shown in the tables.

5. **OTHER OBSERVATIONS**

(1) **Duration of Test.**—41 hours including running-in.

(2) **Repairs and Adjustments.**—The test tractor had been idle some six months in transit. Evidence of slight damage due to rust was noted on some parts of the injection equipment and among the stock of spares shipped with the tractor.

Before the belt tests it was found necessary to reset the sealed fuel pump to obtain optimum performance with local distillate fuel.

(3) **Engine.**—
Radiator water used—negligible.
Lubricating oil—type used, S.A.E. 30.
Weight to engine, 15.1 lb.
Weight from engine after tests, 13.7 lb.

(4) **Tractor Weights (lb.).**—

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Rear</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum weight, unballasted</td>
<td>1,480</td>
<td>3,380</td>
<td>4,860</td>
</tr>
<tr>
<td>Added weights</td>
<td>Nil</td>
<td>270</td>
<td>270</td>
</tr>
<tr>
<td>Weight, as usually supplied</td>
<td>1,480</td>
<td>3,650</td>
<td>5,130</td>
</tr>
<tr>
<td>Water ballast</td>
<td>Not recommended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Standard weight</td>
<td>1,480</td>
<td>3,650</td>
<td>5,730</td>
</tr>
</tbody>
</table>

* Weight used in drawbar tests. This weight less driver, was used in finding centre of gravity.

(5) **Wheels and Tyres.**—

<table>
<thead>
<tr>
<th>Tyres</th>
<th>Front</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Rib</td>
<td>Open centre bar tread</td>
</tr>
<tr>
<td>Size</td>
<td>5·50 x 16 x 4 ply</td>
<td>11·25 x 24 x 6 ply</td>
</tr>
<tr>
<td>Pressure</td>
<td>26 p.s.i.</td>
<td>14 p.s.i.</td>
</tr>
</tbody>
</table>

(6) **Steering.**—With track widths, front 50", rear 60". Wheel base 75".

Turning circles: Without brakes, 20' L.H., 21' R.H.; with brakes, 17½' L.H., 17½' R.H.

Comment: Easy to steer under load, sensitive to steering wheel.

(7) **Centre of Gravity,** with tractor in standard weight condition with driver—1" above, 22½" forward of rear axle.

(8) **Driver's Accommodation.**—Access to seat: from back, and step at front of left rear wheel. Foot-room and support: adequate, flat floor. Comfort: spring seat, adjustable fore and aft, back rest. Accessibility to controls: clutch and brake pedals 19" apart, centre to centre, pedal treads approximately 9" below loaded seat. All controls conveniently placed and easy to operate. Foot throttle for use with road gear.

(9) **Instruments.**—Clearly marked (metric units). Indications were consistent throughout tests.

(10) **Inspection of Engine and Transmission after Test.**—After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(11) **Instruction Books.**—Owner's manual in English is adequate and well illustrated.

(12) **Tools and Spares.**—Standard accessories with each tractor include box of tools and set of spares.

G. H. VASEY,
Officer in Charge Tractor Testing.

W. F. BAILLIE,
Tractor Testing Officer.

University of Melbourne.

24th October, 1957.
6. BRIEF SPECIFICATIONS: Zetor 25A Diesel
(Based on Information Supplied by Manufacturers)

(1) **Engine**—Zetor, Serial No. 125-46071.
4-stroke; 2 cylinders, vertical; crankshaft along tractor; indirect injection.
Bore, 4.134”; stroke, 4.724”; compression ratio, 18 : 1.
Rated speeds: Belt work 1,800 r.p.m.; drawbar work, 1,800 r.p.m.
Fuel type: Distillate.
Fuel system: 2-cylinder pump and injectors. Two filters with replaceable elements. Tank capacity, 10 gallons.
Air Cleaner: Oil bath, centrif. pre-cleaner.
Governor: Centrifugal.
Electrical system: 12-volt.
Starting: Electric glowplugs, decompressor on inlet valves.
Cooling: Water—fan, pump, thermostat, radiator blind.
Exhaust: Baffle-type muffler fitted.
Lubrication: Gauze and laminated paper filters.

(2) **Chassis**—
4-wheel; frameless; pneumatic tyres.
Wheel base, 75”.
Track width: Front, 48”-60” x 6 steps; rear 47”-60” any width.
Tyre sizes: Front 5.50 x 16; rear 11.25 x 24.
Steering Gear: Single worm.
Weight: Maximum weight, 5,130 lb. (see Other Observations, part 5).

(3) **Belt Pulley**—
Left side, rear working, anti-clockwise.
Diameter 9.8”; face width 5.5”. Speed (at rated engine speed), 1,230. r.p.m.

<table>
<thead>
<tr>
<th>Gear</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>R₁</th>
<th>R₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio</td>
<td>106.5</td>
<td>88.8</td>
<td>65.6</td>
<td>45.4</td>
<td>32.4</td>
<td>20.9</td>
<td>13.9</td>
<td>8.5</td>
</tr>
<tr>
<td>M.P.H.</td>
<td>2.3</td>
<td>3.5</td>
<td>5.3</td>
<td>7.5</td>
<td>11.7</td>
<td>17.6</td>
<td>1.6</td>
<td>5.2</td>
</tr>
</tbody>
</table>

(4) **Power Take-off**—
Rear, left of centre, clockwise.
Speed: 600 r.p.m., not in accordance with overseas standards (namely, 536 ± 10 r.p.m.). At engine speed 1,600 r.p.m. P.T.O. speed would be 533.

Dimensions: 6 spline, 13/8” diameter.

(5) **Drawbar**—
Swinging, 15”, 16”, 17” high, adjustable. Trailer hitch fitted 27” above ground. Linkage drawbar optional.

(6) **Transmission**—
Conventional gears, 3-speed and ratio change; differential lock.
Clutch: Single dry plate; 11” diam.
Gear ratios and road speeds (assuming no wheel slip) on 11.25 x 24 tyres, at rated engine speed, as advertised:

(7) **Hydraulics**—
Gear pump driven from P.T.O. shaft; 1,100 p.s.i. pressure.

(8) **Three-point Linkage**—
Generally to B.S.S. 1841-1951, category 2.

(9) **Spark Arrester**—
Muffler fitted as standard equipment.

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<table>
<thead>
<tr>
<th>Nominal Capacity Bushels</th>
<th>Actual Capacity Bushels</th>
<th>Silo £</th>
<th>Steel Earth Ring £</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>240</td>
<td>54</td>
<td>6 10</td>
</tr>
<tr>
<td>500</td>
<td>580</td>
<td>87</td>
<td>11 10</td>
</tr>
<tr>
<td>1,000</td>
<td>1,520</td>
<td>154</td>
<td>20 5</td>
</tr>
<tr>
<td>2,000 (Tall)</td>
<td>2,510</td>
<td>236</td>
<td>27 15</td>
</tr>
<tr>
<td>2,000 (Squat)</td>
<td>2,410</td>
<td>236</td>
<td>27 15</td>
</tr>
<tr>
<td>3,000</td>
<td>3,360</td>
<td>306</td>
<td>36 0</td>
</tr>
<tr>
<td>3,500</td>
<td>3,780</td>
<td>333</td>
<td>36 0</td>
</tr>
<tr>
<td>4,500</td>
<td>4,850</td>
<td>511</td>
<td>45 10</td>
</tr>
<tr>
<td>8,500</td>
<td>9,250</td>
<td>768</td>
<td>55 10</td>
</tr>
</tbody>
</table>

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