COMMERCIAL TEST REPORT

TRACTOR OPERATED BALER
"SHAKTIMAN-SRB 60"

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPERATION)

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5.15.1 Maintenance schedule of Baler:

The details of greasing and oiling points are given in Table 4:

Table 4: Lubricating points:

I) Greasing point:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Greasing point location</th>
<th>Number</th>
<th>Schedule time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Feeder to reel &amp; auger drive chain</td>
<td>01</td>
<td>24 hrs after operation</td>
</tr>
<tr>
<td>2.</td>
<td>Bale roller to feeder drive chain</td>
<td>01</td>
<td>-do-</td>
</tr>
<tr>
<td>3.</td>
<td>Reel drive chain</td>
<td>01</td>
<td>-do-</td>
</tr>
<tr>
<td>4.</td>
<td>Chain tensioner</td>
<td>04</td>
<td>-do-</td>
</tr>
<tr>
<td>5.</td>
<td>Thread binding unit</td>
<td>02</td>
<td>-do-</td>
</tr>
<tr>
<td>6.</td>
<td>Pickup unit</td>
<td>01</td>
<td>-do-</td>
</tr>
<tr>
<td>7.</td>
<td>Main drive chain</td>
<td>01</td>
<td>-do-</td>
</tr>
<tr>
<td>8.</td>
<td>Roller chain</td>
<td>03</td>
<td>-do-</td>
</tr>
<tr>
<td>9.</td>
<td>PTO shaft</td>
<td>02</td>
<td>-do-</td>
</tr>
<tr>
<td>10.</td>
<td>Auger drive chain</td>
<td>01</td>
<td>-do-</td>
</tr>
<tr>
<td>11.</td>
<td>Feeder unit</td>
<td>02</td>
<td>-do-</td>
</tr>
<tr>
<td>12.</td>
<td>Wheel baring cup</td>
<td>02</td>
<td>Seasonally</td>
</tr>
<tr>
<td></td>
<td>Total greasing point</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

6. FIELD TEST

The Baler operated by New Holland-3630 TX tractor at engine throttle setting corresponding to 1800 rpm was tested in the field for 36.42 hours in wheat straw field after the field harvesting by the combine harvester to assess field performance of baler with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The details of tractor used for field operation are given in Para 5.1.2 and Annexure I. The tractor pto speed was maintained at 540 rpm during operation. The performance of machine is represented in Annexure-II and the summary of the field performance parameters are given in Table-5.

Table 5: Summary of field performance:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameters</th>
<th>Observed values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tractor used</td>
<td>New Holland-3630 TX</td>
</tr>
<tr>
<td>2.</td>
<td>Type of straw</td>
<td>Wheat Straw</td>
</tr>
<tr>
<td>3.</td>
<td>Avg. Straw moisture, %</td>
<td>7.0 to 12.0</td>
</tr>
<tr>
<td>4.</td>
<td>Avg. Speed of operation, kmph</td>
<td>2.84 to 2.94</td>
</tr>
<tr>
<td>5.</td>
<td>Area covered, ha/h</td>
<td>0.306 to 0.330</td>
</tr>
<tr>
<td>6.</td>
<td>Time required for one hectare, h</td>
<td>3.02 to 3.27</td>
</tr>
<tr>
<td>7.</td>
<td>Field efficiency, %</td>
<td>81.60 to 89.15</td>
</tr>
</tbody>
</table>
6.1 Rate of work and fuel consumption
The rate of work for wheat straw was recorded as 0.306 to 0.330 ha/h at the forward speed 2.84 to 2.94 kmph, with a speed pickup rotor speed index of 3.17 to 3.24.
The time required to cover one hectare was recorded as 3.02 to 3.27.
The fuel consumption is 2.213 to 2.716 l/h.
The number of bales output recorded as 20 to 25 bales/h with bale weight ranging from 15.07 to 17.43 kg.

6.2 Quality of work:
The field efficiency and straw recovery varied from 81.60 to 89.15 and 79.40 to 89.87% respectively.
Straw output was recorded as 0.301 to 0.405 t/h with bale density from 85.23 to 104.02 kg/m³.
No. of windings observed as 09 to 17.
Percentage of coefficient of variation in weight of a bale is observed from 3.80 to 9.64%.

7. Effectiveness of sealing:
After completion of field test in straw of wheat crop, the machine was dismantled. Check sealing provided against ingress of dust/other foreign material in sub assemblies. The sealing's provided have been found effective as to ingress of dust/straw was not noticed inside the sub assemblies.

8. EASE OF HANDLING DURING OPERATION
8.1 The telescopic universal shaft has the provision to adjust the length of drive shaft which is adequate.
8.2 The implement do not have provision to vary pick up unit shaft speed to regulate input of bailing material keeping in view the moisture content in the existing unit, it is done by varying the engine pto speed.
8.3 Towing hook has enough vertical and horizontal adjustment to suit the different tractors.

9 LABOUR REQUIREMENTS
Prior to each test, about 2 man –h were required for daily maintenance of tractor and baler for operation otherwise one skilled operator is enough to operate tractor with baler.

10 DEFECTS, ADJUSTMENTS, BREAKDOWNS AND REPAIRS
No breakdown was observed during 36.42 hrs of field operation under test.

11. Special feature:-
i) Separate hydraulic system provided for bale ejector system.
ii) Twine auto wrappings and cutting system is provided.
iii) The fully automatic buzzer system for indication of bale completion.
iv) Provision for adjusting the density of baler.
v) Buzzer is provided to show the operator the progress of bailing of straw/hay inside the bale chamber.
vi) The baler tongue is easily adjustable for transported and field condition.
vii) Machine having wide pickup (wpu) unit which are feeding a straw uniformly for good quality of bale formation.
viii) Bale counter unit provided for indication of work progress by counting number of bales.

12. SAFETY DEVICES:-
1. Protection shield for bale chamber drive, reel drive, hydraulic drive and linkages.
2. Safety cover for PTO shaft.
3. Shear bolt for bale roller shaft (gear output shaft of RHS)

13. COMMENTS AND RECOMMENDATIONS
1. Quality of bale was observed to be satisfactory.
2. The field efficiency and straw recovery varied from 81.60 to 89.15 & 79.40 to 89.87% respectively, which is considered normal.
3. Maneuverability of tractor with baler was found to be satisfactory and also the quality of work was observed to be satisfactory.
4. Dimensions of splined end of power input gear and its corresponding hub shaft do not comply with the IS:4931-2004. This should be incorporated at regular production level.
5. The pto power requirement of baler was observed as 2.67 kW for bailing of wheat straw which is 7.65% pto power of the tractor.
6. Two supporting Pneumatic ribbed, wheels are provided for transportation as well as for maintaining the ground clearance of pick up tines during operation of the machine.
7. The weight of individual bale varies at different moisture content of straw.

14. LITERATURE
The manufacturer has developed the literature of machine in English language i.e. Operator’s manual, service manual, part’s catalogues etc. The literature is found to be adequate. However, it needs to be brought out in Hindi and other regional languages for guidance of users and service personnel’s as per IS : 8132-1999.