

STUDIES ON THE ECONOMIC PERFORMANCES OF TRACTORS AND AGRICULTURAL MACHINES USED FOR PLANTING AND PROCESING POTATOES

Mariana DUMITRU.

"Lucian Blaga" University of Sibiu,
Romania

REZUMAT. Aceasta lucrare studiaza trei aspecte legate de performanța economică a tractoarelor și mașinilor agricole, care sunt: performanțele mașinii, performanța de putere și performanța operatorului, cercetarea modului în care fiecare dintre aceste aspecte afectează performanța generală a mașinii

Cuvinte cheie : performanța economică, costuri, eficiență

ABSTRACT. The paper studies the 3 aspects connected to the economic performance of tractors and agricultural machines, which are: machine performance, power performance and operator performance, researching the way in which each of these aspects affects the overall performance of a machine.

Keywords: economical performance , costs , efficiency

1. INTRODUCTION

The performance of a machine system is profitable only when it can add value to products and processes beyond the systems cost of operation. A minimum cost would appear to be an optimum economic goal, but overall profit maximization is the true goal of business and on the farm this does not necessarily occur with a minimum cost system of operations. Good machinery management requires that the individual operations in a machine system must be adjusted and combined in a manner such that their overall performance returns the greatest profit to the farm business.

The three components of economic performance are the following:

- Machine performance
- Power performance
- Operator performance.

2. MATERIAL AND METHODS

Machine performance

Measures of agricultural machine performance are the rate and quality at which the operations are accomplished. Rate is an important measure because few industries require such timely operations as agriculture, with its sensitivity to season and bad weather. As most of agricultural materials are fragile and many are perishable, the amount of product damage or reduction in product quality due to a machine operation is another important measure of machine performance. Quality as well as quantity must be considered when evaluating machine performance.

A rate of machine performance is reported in terms of quantity per time. Most agricultural field machine performance is reported as area per hour. Harvesting machine performance is sometimes quoted as quintals per hour or tones per hour, and in the case of balers, bales per hour (Dumitru, M., 2005).

Capacity, when expressed only as area per time, is usually not a sufficient indicator of a machine true performance. Differences in crop yields and crop conditions can mean that one machine may have a low area per hour capacity when compared with an identical machine in a different field. In this case, a valid comparative capacity would be mass per hour.

Combines, potato harvesters and similar machines that separate desired material from undesirable material need a special capacity comparison term. Rather than a report on the weight of material harvested, the weight of material handled is the proper capacity measure. Time efficiency is a percentage reporting the ratio of the time a machine is effectively operating to the total time the machine



Fig. 1. Machine for potato planting on 4 rows

is committed to the operation. Any time the machine is not actually processing the field is counted as time waste. Such time waste are: machine preparation time, travel time to and from the field, turning time, time to load or unload the machine containers, maintenance time, etc (Dumitru, M., 2007).

Considerable time and space are required to turn large machines at a headland. The turning radius of implements is an important factor effecting the time lost in end travel and at corners.

The radius is of most concern to the machine operator in irregular or contoured fields.



Fig.2. Ditch machine, used after potato planting



Fig.3. Tractor used for different operations for planting and processing potatoes

3. RESULTS AND DISCUSSION

Power performance

A second measure of a machine economic performance is the effectiveness with which power is applied to accomplish the farm production objectives. Tractor power on farms will continue to be an absolute necessity for agricultural production.

Tractor delivers power in several ways. Pulled or towed implements are powered through the traction of drive wheels and the pull or draft from the drawbar. Rotary power is obtained from the power take-off shaft or from a belt pulley. Both linear and

rotary power can be reproduced by a tractor hydraulic system (Hunt, D., 1995).

A typical tractor engine performance is shown in fig.4. The power ratings for the engine alone are shown with dashed lines. The performance is different when the engine is mounted in a tractor and is shown by solid lines.

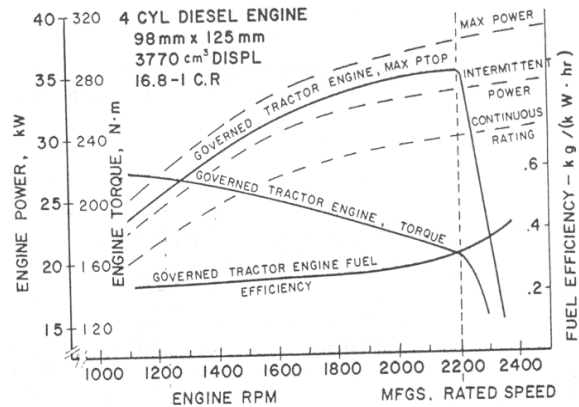


Fig.4. Typical diesel engine performance (Dumitru, M., 2007)

4. CONCLUSIONS

If we want to appreciate correctly a machine performance, we must consider all 3 factors which contributes to its efficiency: machine performance, which consists in its real capacity of working, time efficiency, machine maneuverability and crop and soil conditions. The second factor is power performance, which is the effectiveness with which power is applied in the agricultural process, and the last factor is operator performance. This last one has a great importance, especially in a modern agriculture, in which machines are more and more complex, so the operator must know to use the machine corectly and at full capacity.

REFERENCES

- [1] Hunt, D. ,1995, *Farm power and machinery management*, Iowa State University,USA, p.259-275
- [2] Dumitru, M., 2005 , *Tractoare agricole*, Ed. Alma Mater, Sibiu
- [3] Dumitru, M., 2007, *Power performances of tractors and agricultural machines*, , "Agriculture and Food Industry within the Context of European Integration" April 26-28, , Sibiu, ISSN 1843-0694