

Farm Mechanization FACTSHEET



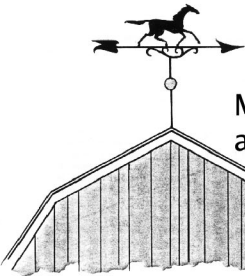
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Matching Tractor Horsepower and Farm Implement Size

FARMING KNOW-HOW
Guidelines to Better Family Farming



Matching Tractor Horsepower and Farm Implement Size

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Obtaining a satisfactory match between tractor horsepower and implement size is an important phase of farm machinery management on both large and small farms. Implements that are too large for the horsepower available will cause tractor overloading, excessive tire slippage, a higher incidence of tractor breakdowns, and unsatisfactory performance in general. Implements that are too small will result in inefficient operation, low production, and increased costs—and may encourage the operator to use a ground speed too high for either good machine performance or safety.

Due to the wide range of implements found on any one farm, it is seldom possible to match all implements perfectly to the tractor horsepower available. The objective should be to match as effectively as possible the tractor horsepower available and the power requirements of the majority of the "heavy-draft" machines. Obviously, some of the lighter-draft machines will not utilize all of the tractor power available. With light-draft machines, select an implement size that is convenient to use, or adequate for the job to be done, recognizing that there may be a distinct mismatch between the horsepower of the tractor and the power requirements of the machine. If more than one tractor is available, plan to use those machines with low power requirements with a smaller tractor.

TRACTOR HORSEPOWER

Currently, most farm tractors are rated powerwise according to the maximum observed power-take-off (PTO) horsepower, as determined by the Nebraska Tractor Tests. Therefore, when one casually states that he owns a 100-horsepower tractor, he usually means that the tractor is capable of delivering 100 horsepower at the PTO outlet. It should be pointed out, however, that a significant part of this 100 horsepower is not available for drawbar use in the field. The question then becomes, where does this part of the horsepower go, and how much is actually left available for use in field operations?

It should be pointed out that some of the larger four-wheel-drive tractors do not have a PTO outlet and, therefore, do not have a maximum observed PTO horsepower rating in the Nebraska Tractor Test Reports. For these units, multiplying the maximum observed drawbar horsepower by a factor of 1.2 will give a very close approximation of the maximum observed PTO horsepower potential.

HORSEPOWER LOSSES

Drawbar horsepower is the horsepower actually available to be transmitted by traction through the tractor drawbar to the implement. Drawbar horsepower is always less than the PTO horsepower. This is due to a combination of power losses through the transmission train and "rolling resistance" and slippage losses of the tires when operating on a traction surface.

At the Nebraska Tractor Test site, the traction surface for drawbar tests is always concrete. According to Nebraska Tractor Test figures, these losses average approximately 15 percent, leaving roughly 85 percent of the maximum observed PTO horsepower available for use at the tractor drawbar, when operating on concrete. But since we are dealing with maximum observed PTO horsepower, it is neither practical nor advisable to load the tractor to the maximum for normal field operations.

Variations in soil and soil moisture conditions, slopes, safety requirements, etc., make it mandatory to hold some horsepower in reserve to take care of fluctuating load situations which always occur in normal field operations. Standard practice indicates that a power reserve of 17 percent of the original 100 percent

This publication contains information on obtaining a satisfactory match between tractor horsepower and implement size farm machinery management on both large and small farms. To obtain a copy, please contact:

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