

Introduction

Selecting the correct size and type of equipment is important to maximize field efficiency and farm profitability. Matching equipment to a farm or business is a step by step process that requires an understanding of the most important tasks, the time required for their completion and the efficiency of each operation.

The Matching Process

1. Determine the most critical operation

For each farm, there will be a number of critical operations that must be done on time during the cropping cycle. In many rice growing localities the critical operations will be land preparation and harvesting.

2. Determine the area to be completed per hour

The size of the equipment is determined by knowing what area must be covered in the time available and the field efficiency of the operation.

3. Field Efficiency

When undertaking a task not all of the time is spent in productive work. For example when plowing, field efficiencies may range from 50-75% depending on the shape of the field, the soil conditions, the overlap of equipment and the number of stops taken by the operator.

4. Speed of operation.

The speed of operation depends on the power source, the type of equipment, soil type and moisture contents. A 4-wheel tractors can operate efficiently from 5-8 km/h where as a 2-wheel tractor's speed will be 1-3 km/h. The speed of operation using an animal will be determined by the animal and the operator- normally 1-2 km/h

5. Width of equipment

Once the speed of operation and the area per hour is known it is a mathematical calculation to work out the width of the implement. By dividing the area in m²/hr by the speed in speed in meters /hr the width of the implement can be calculated.

6. Determine power requirement of the tractor

For each implement type and soil conditions the total draft requirement can be calculated. This requires some understanding of soil implement relationships. Most primary tillage implements will require between 400-600 kg pull per 1m width of plow. Secondary tillage requirements will be about 75% of this,

7. Power requirement

The power required is determined by the width of the implement, draft required to pull the implement, the forward speed and the efficiency of the tractor in converting engine power to drawbar power. The equation to determine engine power becomes:

Engine power = Total draft x speed x tractor efficiency/ 3.6

8. Other considerations

When selecting the tractor there are many other factors that need to be considered. These factors include, gear ranges available, traction capabilities, versatility of use and service and spare parts facilities. This also applies to all equipment with spare parts and service backup being much more important than the initial purchase price.

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