

ABE 311- FARM POWER AND MACHINERY I

WEEK 1: ANALYTICAL STUDY OF FARM POWER SOURCES

Introduction

Power is needed on the farm for a variety of operations which may be either mobile or stationary. Examples of mobile operations are transportation of produce and field operations like ploughing, spraying, etc. stationary applications include threshing, extraction, irrigation, etc. human power is by far the earliest source of power and continues to be important. However, as civilization progressed, man harnessed other sources of power to supplement or replace the power he was able to produce and thus reduce drudgery of farm work.

Farm Power sources

1. Manual power
2. Animal power
3. Wind power
4. Water power
5. Solar power
6. Electric power
7. Mechanical Power

Note: wind power, water power and solar power are referred to as renewable energy.

Manual Power:

1. Important for operating small or simple implements and tools.
2. Stationary operations like cutting, lifting water, threshing, winnowing, etc are done by human power.
3. An average man can develop maximum power of about 75 watts (0.1 Hp.) for farm work.

Advantages

1. Easily / readily available
2. Applicable to all types of farm operations

Disadvantages

1. Low efficiency
2. Affected by weather condition and seasons
3. Must be properly maintained even when not in use

Animal Power

This is still used in several countries, and may be derived from oxen, buffalos, donkeys, camels or horses. Such power may be used for both stationary and mobile operations. Animals have a capacity to be overloaded for a short periods of time and they provide good traction (grip) even in difficult conditions.

The output available from animals is dependent on; food intake, breed of animal and yoke used for hitching.

Advantages

1. Easily / readily available
2. Used for all types of work
3. Low initial investment
4. Supplies manures to the field and fuels to the farmers
5. Lives on the farm products

Disadvantages

1. Low efficiency
2. Can be affected by season and weather
3. Requires full maintenance when not in use
4. Slow in operate

5. Creates unhealthy atmosphere near the residence
6. Cannot work at a stretch

Wind Power

Wind power has been successfully used for raising water. The natural breeze is used to turn the blades of a windmill which in turn operates a pump to lift water. It has also been used to generate electricity for use on the farm.

Solar Power – most tropical countries are blessed with abundant sunshine all year round. Solar energy can be used for processing fruits and vegetables and for general drying of crops. Solar power can also be converted to electricity directly by semi-conductor devices called solar cells or by producing steam to drive power producing turbines. Another application is in solar operated pumps.

Water Power

Energy available from water falling from one level to a lower level can be harnessed to run a few farm operations such as feed grinding, or to operate a generating plant to produce electricity.

Electric Power

If electricity is available on the farm, it is extremely useful for a number of operations. Electricity is used for; heating, refrigeration, water supply, practically all stationary operations e.g. shelling, grinding and drying of crops.

Advantages

1. Very cheap
2. High efficiency
3. Can work at a stretch
4. Maintenance and operating cost is low
5. Not affected by season and weather.

Disadvantages

1. Initial capital investment is high
2. Requires good technical knowledge
3. If handled carelessly, it can cause great danger.

Mechanical Power

This includes;

- i. Tractors. ii. Power tillers, iii. ICE (diesel and petrol engines), iv. Self-propelled combines.

Advantages

1. Efficiency is high
2. Not affected by season
3. Requires less space

Disadvantages

1. Initial capital is high
2. Maintenance and operating cost is high
3. Requires technical knowledge

CLASS WORK 1:

1. What are the sources of farm power for Nigerian agriculture
2. Discuss the merits and limitations of farm power sources mentioned in 1 above.