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FARM POWER

beginning

Since the dawn of civilization, three major shifts in sources of field power have been human to animals, animals to external combustion engines (steam) and external to internal combustion engines. Very likely the fourth power shift will be internal combustion engine to electrical power. The farm machinery shafts will be turned by electric energy the source for which may be gas turbines, fuel cells, solar cells, atomic energy or some other source unknown at the present.

2.1 ANIMAL POWER

The production of food and fiber to meet the needs of the population is a basic requirement of any civilization. For many centuries the majority of the population in most countries was engaged in producing food and fiber. Application of power in agriculture other than human muscles has been a matter of great importance. Animals have been used in agriculture for farming operations well before the recorded history. Egyptians first used the ploughs and animals for agriculture. Later on the people of Indus Valley used such animals for power. They were amongst the pioneers of the world in agriculture at that time.

2.2 EXTERNAL COMBUSTION ENGINE

Transition from animal power to mechanical power began early in the twentieth century. The first tractor was steamed powered. Steam engine was invented in the middle of the 19th century and efforts were made to use it for farming. The early steam engines supplied belt power only and had to be transported from one field to another by horses or oxen. It is generally considered that the steam traction tractor was first developed successfully in USA in 1876. The steam tractor was though forceful but was quite bulky and cumbersome to use for many of the jobs found on farms.

2.3 INTERNAL COMBUSTION ENGINE

Near the end of 19th century (1889-1900), I.C. engine using petrol (gasoline) was invented. The earlier I.C. engines were bulky and were as cumbersome to use as the steam engines. But later on, improvements were made and in 1903 gas traction engines were commercially produced. Up to 1906-1907, the word "tractor" became familiar and popular. In 1919, Nebraska Tractor Test law was developed. With the advent of power take-off shaft (PTO) in early 1920, field machines no longer needed auxiliary engines. Tractor power could be applied directly to harvesting and threshing machinery. By 1924, a highly successful all purpose farm tractor was developed. Low-pressure rubber tires were

introduced for farm tractors in 1932-35. In the same period diesel engine was introduced in farm tractors. More improvements in transmission, hydraulic lifts, PTO and remote controls were introduced by 1959. Then air-conditioned cabin and power steering became widely available in 1962. In 1970 all tractors possessed diesel engines except vintage tractors.

TRACTOR TYPES

Tractor is a machine, which develops traction for the purpose of pulling loads/implements. Traction is developed under the rear wheels of tractor when powered by an engine. Tractors may be of the following types.

2.4.1 General Purpose Tractor

- It is an **ordinary wheel** type tractor.
- It has **less clearance** between the ground and the lowest part of the tractor.
- It is designed to operate several implements such as disc plow, M. B. plow, harrow, cultivator, etc.
- It can operate **threshers** and supplies power to other jobs.
- It can be used for **harvesting**.
- It is a **multi-purpose tractor**.
- It may have small size front wheel or may have equal wheels or may have 4-wheel drive system (F.W.D.).

2.4.2 Row Crop Tractor

- It is used for **performing row crop operation** such as planting of row crops and performing **intercultural operations**.
- It has **high clearance**.
- Its **front wheels are adjustable** for different row spacing.

2.4.3 Orchard Tractor

- They are medium size tractors from **12 to 20 drawbar horse power**.
- They are **limited in height** so as they have to operate under and around the trees.
- They are **limited in width** due to the space between the trees.
- They have a short turning radius.

2.4.4 Garden Tractor

- They range in size from **1 to 12 horsepower**.
- Air-cooled engines are usually used.
- They have low clearance and are designed for light duty.
- Traction is limited because of its weight.
- Its cost per horsepower is relatively high.
- It cannot perform deep tillage operations.
- More skill and greater effort is required to operate the tractor.
- Maintenance charges are high.

Figure 2.1
Schematic diagram of a tractor showing different parts

