CHAPTER 14
Farm Mechanization

OBJECTIVES

At the end of this chapter, students should be able to:

â state the meaning of agricultural mechanization.
â list the advantages and disadvantages of agricultural mechanization.
â state the limitations of agricultural mechanization.

13.1 Introduction

Agricultural production has been improved through the transformation from the use of crude farm tools to mechanised implements. This has improved the effectiveness and efficiency of all farm operations. The breaking and loosening of soil in preparation for a suitable seedbed has been the oldest and basic operation on the farm. Prehistoric man accomplished this by using crude tools like wood and stones. Later, the wood was made into ploughs and animals were employed to drive these ploughs.

With time, the wooden ploughs were transformed into metal ploughs with greater efficiency. Today, the technology has improved tremendously with farm power developed to draw these implements.

14.2 Meaning of Agricultural Mechanisation

Farm mechanisation is the application of engineering techniques to agricultural production. Agricultural production has improved greatly through the use of mechanised implements with increased effectiveness and efficiency of all farm operations to the extent that more hectares of land can be put under cultivation using less labour and time. Farm mechanisation is the application of machines to agricultural production involving the substitution of mechanical power and equipment for human efforts.

Farm mechanisation embraces all aspects of agricultural production such as crop, livestock, fisheries and forestry productions. It also involves the application of engineering principles and technology in storage and processing on the farm. The use of machines in farming in Nigeria is gradually increasing although most of these are hired from local governments and few wealthy individuals

14.3 Mechanised Agricultural Operations

Farm mechanisation covers almost all agricultural operations such as land preparations, planting, fertilizer application, animal care and management, milking, egg collection as well as processing and storing of farm produce. For all these operations appropriate farm machinery is used.

14.3.1 Bush Clearing

The bush is cleared by attaching different types of implements such as the K/G blade, the tree pusher and the bulldozing blades.

14.3.2 Land Preparation

(a) Ploughing: This can be done with various types of ploughs such as the mouldboard plough, chisel plough and the standard disc ploughs.

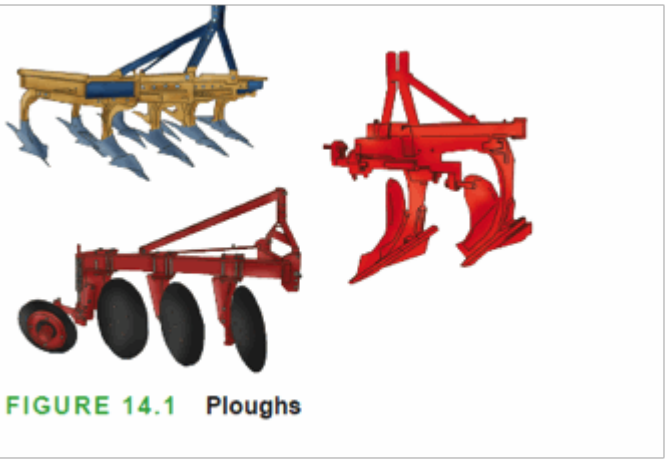


FIGURE 14.1 Ploughs

(b) Harrowing: This operation is carried out after ploughing. It is done by using different types of harrows. Examples are disc harrows, spike-toothed or spring-toothed harrows.

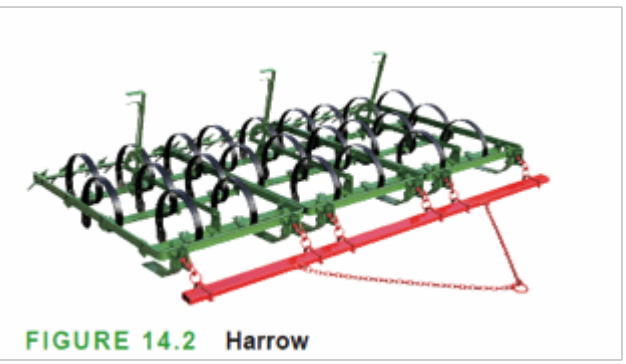


FIGURE 14.2 Harrow

(c) Ridging: This operation is carried out with ridgers.

FIGURE 14.3 Ridger

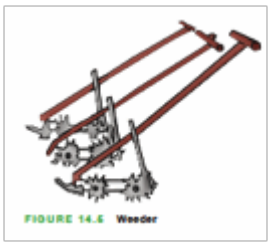
14.3.3 Planting

This operation is usually done with planters.

FIGURE 14.4 Planting machine

14.3.4 Weeding

This is achieved with the use of rotary weeders.



14.3.5 Harvesting

There are combine harvesters that perform multiple operations such as harvesting, shelling or de-husking and winnowing especially for cereals.


FIGURE 14.6 Harvester

14.3.6 Processing

There are different types of machines and equipment that are used for processing agricultural produce and products. Common examples are threshers, separators and cleaning machines.

FIGURE 14.7 Processing machines

14.4 Machines Used for Animal Production Operations

The following equipment and machines are examples of machines used in animal production.

14.4.1 Battery Cage

These are used for keeping and feeding domestic birds by mechnical means.

FIGURE 14.8 Battery cage

14.4.2 Incubators and Hatcheries

These are used for mass production of day old chicks.

FIGURE 14.9 Incubator and hatchery

14.4.3 Automatic Calf Feeders

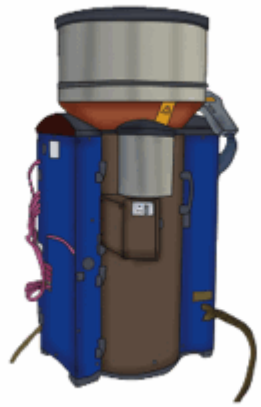


FIGURE 14.10 Automatic calf feeders

14.4.4 Feed Mixers

These are used to mix animal feeds.

FIGURE 14.11 Feed mixer

FIGURE 14.12 Sheep shearing machine

14.5 Advantages of Agricultural Mechanisation

Agricultural mechanisation has the following advantages:

(i) It reduces farm drudgery. It makes it easy to avoid unpleasant manual jobs.

(ii) It increases productivity. Use of farm machinery makes it possible for the farmer to increase his output as more hectarage can be put under cultivation.
(iii) It facilitates timeliness of operations. It ensures that all farm operations are done and completed within a short period of time.
(iv) Farm mechanisation encourages large scale farming.
(v) It increases farmerâ€™s income since he is able to increase farm production with relatively less labour and short time.
(vi) It reduces the cost of production and labour on the farm.
(vii) It improves the quality of produce through proper processing.
(viii) Farm mechanisation saves time and translates quickly the products of manâ€™s brain into reality.
(ix) There is reduction in health hazard of the farmers due to manual or overlabour in the farm. For example, accidental cuts from knifes and cutlasses are reduced with mechanisation.
(x) It enables people to become specialized in certain operations within the farm.
(xi) It increases output per unit of land. Yield per hectare is greater when mechanization is employed.
(xii) It permits additional cropping each season by rapid harvesting and seedbed preparation.

14.6 Disadvantages of Agricultural Mechanisation
(i) Displacement of workers: When farming operation is mechanised, very few workers are required and this makes many people jobless.
(ii) Destruction of soil structure: Continuous movements and usage of machines on the farm lead to destruction of soil structure.
(iii) Environmental pollution: Use of machines on the farm causes pollution due to smoke emanating from machines, chemicals and fertilizers.
(iv) It causes compaction of soil due to movement of heavy machines. This affects water infiltration in the soil.
(v) Few crops can be mechanised. As such farmers still have to use manual labour.
(vi) It causes redundancy of farm labour since farm machines can easily complete the work.
(vii) The cost of operating farm mechanisation is high since numerous machines are involved.
(viii) Most crops are usually damaged during mechanised farm operations especially if care is not taken.
(ix) Mechanisation helps to spread pests and diseases through contaminated machinery, especially when it is not disinfected.

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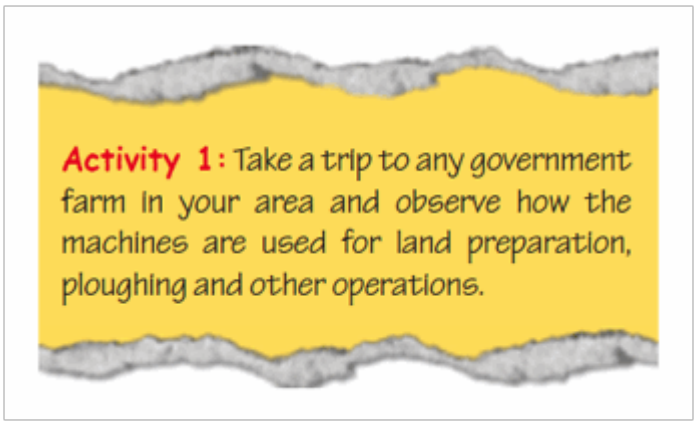
14.7 Limitations/Problems of Farm Mechanisation

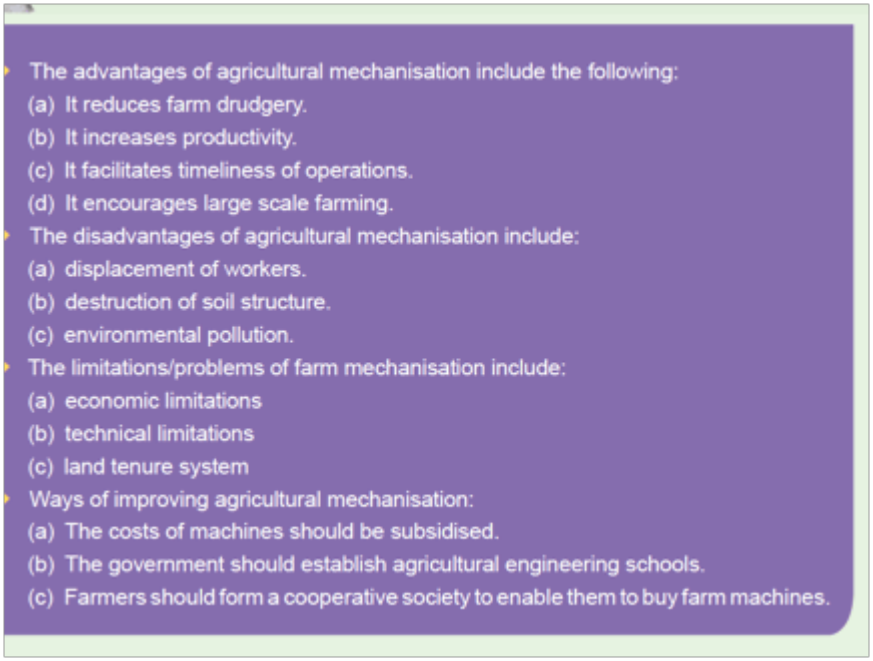
Factors limiting farm mechanisation in Nigeria are many and classified under major headings.
(a) Economic Limitation
(i) Most farmers are poor and cannot afford the machines.
(ii) Cost of hiring machines is high.
(iii) Cost of maintenance is high.
(iv) There is also inadequate machinery in the country.
(b) Technical Limitation: This is another problem of farm mechanisation. The manpower to operate and service the farm machines and implements is not sufficiently available. Spare parts are not available for the repair of damaged parts of machines. Most of the machines are not adapted to our local environment and needs.
(c) Land Tenure System: This system in Nigeria poses problem to farm mechanisation.
It encourages fragmentation of land which cannot be mechanised.
(i) Farm holdings are small and scattered; hence it is not economical to embark on mechanisation.
(ii) The traditional land tenure systems practised in Nigeria do not allow for large farm holdings suitable for mechanisation.
(d) Lack of Maintenance:
(i) Replacement parts are not available.
(ii) Facilities for repair and maintenance are lacking.
(iii) Most machines are imported.
(e) Social Problems: Many people who would have been employed on the farm are rendered jobless and constitute social problems as armed robbers.
(f) Deforestation: is another major problem arising from mechanisation.
Other limitations of farm mechanisation
(i) Bad topography makes it difficult to work with machines.
(ii) Varied soil type.
(iii) Problems of stumps and logs. The stumps and logs must first be removed before farm machines can be used and this is sometimes very expensive.
(iv) Problems of bad roads.

14.8 Ways of improving Agricultural Mechanisation

In order to overcome the limitations /problems of farm mechanisation, the following should be adhered to:
(i) The cost of machines should be subsidized by the government to enable farmers afford them.
(ii) The government should establish agricultural engineering schools or

stations to train personnel for fabricating simple machines.
(iii) Farmers should form a cooperative society to enable them to pull their resources together and buy farm machines.
(iv) The land tenure system should be reviewed to enable farmers acquire large hectares of land.
(v) Simple and less expensive machines should be developed.
(vi) Farmers should be educated to accept modern systems of farming in areas of mechanisation.





Revision Questions
Essay Questions
1. Describe five operations and machines that are used to carry out such operations on the farm.
2. What is farm mechanisation?
3. State six advantages of using farm machines.
4. Enumerate five disadvantages of using farm machines.
5. Describe four ways by which agricultural mechanisation can be improved.

Objective Questions

1. The following are ways of improving agricultural mechanisation except
(a) The costs of machines should be Subsidized
(b) The government should establish agricultural engineering schools.
(c) Farmers should form cooperative societies to enable them buy farm machines.
(d) The land tenure system should not be reviewed.

2. The disadvantages of agricultural mechanisation include the following except:
(a) displacement of workers.
(b) destruction of soil structure.
(c) environmental pollution.
(d) all crops can be mechanised.

3. The following are mechanised agricultural operations except
(a) bush clearing.
(b) destruction of soil structure.
(c) land preparation.
(d) planting.

4. Farm mechanisation is the application of machines to agricultural production involving the substitution of mechanical power and equipment for
(a) human equipment.
(b) human effort.
(c) animal effort.
(d) animal equipment.

5. The following are land preparation operations except
(a) ploughing.
(b) harrowing.
(c) ridging.
(d) planting.

1. (d) 2. (d) 3. (b) 4. (b) 5. (d)