



Ministry of Education
and Sports

HOME-STUDY LEARNING

SENIOR
4

AGRICULTURE

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This material has been developed as a home-study intervention for schools during the lockdown caused by the COVID-19 pandemic to support continuity of learning.

Therefore, this material is restricted from being reproduced for any commercial gains.

National Curriculum Development Centre
P.O. Box 7002,
Kampala- Uganda
www.ncdc.go.ug

FOREWORD

Following the outbreak of the COVID-19 pandemic, government of Uganda closed all schools and other educational institutions to minimize the spread of the coronavirus. This has affected more than 36,314 primary schools, 3129 secondary schools, 430,778 teachers and 12,777,390 learners.

The COVID-19 outbreak and subsequent closure of all has had drastically impacted on learning especially curriculum coverage, loss of interest in education and learner readiness in case schools open. This could result in massive rates of learner dropouts due to unwanted pregnancies and lack of school fees among others.

To mitigate the impact of the pandemic on the education system in Uganda, the Ministry of Education and Sports (MoES) constituted a Sector Response Taskforce (SRT) to strengthen the sector's preparedness and response measures. The SRT and National Curriculum Development Centre developed print home-study materials, radio and television scripts for some selected subjects for all learners from Pre-Primary to Advanced Level. The materials will enhance continued learning and learning for progression during this period of the lockdown, and will still be relevant when schools resume.

The materials focused on critical competences in all subjects in the curricula to enable the learners to achieve without the teachers' guidance. Therefore effort should be made for all learners to access and use these materials during the lockdown. Similarly, teachers are advised to get these materials in order to plan appropriately for further learning when schools resume, while parents/guardians need to ensure that their children access copies of these materials and use them appropriately. I recognise the effort of National Curriculum Development Centre in responding to this emergency through appropriate guidance and the timely development of these home study materials. I recommend them for use by all learners during the lockdown.



Alex Kakooza

Permanent Secretary

Ministry of Education and Sports

ACKNOWLEDGEMENTS

National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of home-study materials for Pre-Primary, Primary and Secondary Levels of Education during the COVID-19 lockdown in Uganda.

The Centre appreciates the contribution from all those who guided the development of these materials to make sure they are of quality; Development partners - SESIL, Save the Children and UNICEF; all the Panel members of the various subjects; sister institutions - UNEB and DES for their valuable contributions.

NCDC takes the responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for improvement. The comments and suggestions may be communicated to NCDC through P.O. Box 7002 Kampala or email admin@ncdc.go.ug or by visiting our website at <http://ncdc.go.ug/node/13>.



Grace K. Baguma
Director,
National Curriculum Development Centre

ABOUT THIS BOOKLET

Dear learner, you are welcome to this home-study package. This content focuses on critical competences in the syllabus.

The content is organised into lesson units. Each unit has lesson activities, summary notes and assessment activities. Some lessons have projects that you need to carry out at home during this period. You are free to use other reference materials to get more information for specific topics.

Seek guidance from people at home who are knowledgeable to clarify in case of a challenge. The knowledge you can acquire from this content can be supplemented with other learning options that may be offered on radio, television, newspaper learning programmes. More learning materials can also be accessed by visiting our website at www.ncdc.go.ug or ncdc-go-ug.digital/. You can access the website using an internet enabled computer or mobile phone.

We encourage you to present your work to your class teacher when schools resume so that your teacher is able to know what you learned during the time you have been away from school. This will form part of your assessment. Your teacher will also assess the assignments you will have done and do corrections where you might not have done it right.

The content has been developed with full awareness of the home learning environment without direct supervision of the teacher. The methods, examples and activities used in the materials have been carefully selected to facilitate continuity of learning.

You are therefore in charge of your own learning. You need to give yourself favourable time for learning. This material can as well be used beyond the home-study situation. Keep it for reference anytime.

Develop your learning timetable to cater for continuity of learning and other responsibilities given to you at home.

Enjoy learning

TERM ONE**TOPIC 1: INTRODUCTION TO FARM MECHANISATION****Lesson 1: Sources of Farm Power****Learning outcomes**

By the end of the lesson, you should be able to:

- i) identify the various sources of power in Agriculture.
- ii) state the advantages and disadvantages of the different power sources.
- iii) understand the functions of a tractor on the farm.

Introduction

Most of the developing countries are transiting or changing from rudimentary/traditional methods of farming to adopt modern farming technologies so as to boost Agriculture production. Modern farming requires better sources of power. The sources of farm power include; Engine power, Manual/human Power, wind power, Electric power, Animal power, Solar power, Biogas power

An engine is a device which converts chemical energy into mechanical energy. Engines are grouped under internal combustion engine. Internal combustion engines are engines where fuel is burnt inside the cylinder to produce power. Examples of such engines include; lawn mowers, motorized chain saw and a tractor

A tractor is a multi-purpose machine on the farm and it is used to provide power for cultivation, pumping water, slashing, operating grinding mills, threshers and transporting produce.

Activity

- i) Can you identify some of the common sources of power around your village?
- ii) What are the factors hindering some sources of power that are missing in your village?
- iii) How best can you advise farmers in your village to acquire those missing sources of power?

Summary

The most common source of power in Africa is human labour, because of its availability, low skill requirement and being cheap to maintain. However, there are efforts by the government to support farmers under poverty eradication programs and plan for modernization of Agriculture (PMA) to provide tractors at sub-counties throughout the country to improve Agriculture production.

Lesson 2: Working of a Farm Tractor

Learning outcomes

By the end of the lesson, you should be able to:

- i) state the different systems of a tractor.
- ii) describe the working systems of a tractor.
- iii) describe the interlink of the different system.
- iv) state the advantages and disadvantages of the different systems.

Introduction

A tractor consists of a variety of systems which help it to carry out its functions. For a tractor to properly do farm operations the following systems should be properly functional; Fuel system, Air supply system, Cooling system, Lubrication system, Electrical system, Transmission system and Hydraulic system.

These systems are inter-linked and work hand in hand for example **air supply system** cleans air and cleaned air proceeds to the engine to support combustion of fuel (petrol or diesel) to produce power. When an engine is running it generates heat and friction. The excess heat is removed by the **cooling system** and **lubrication system**. The examples of coolants used are water, air and oil.

The lubrication system also serves other functions to the engine, for example; it cleans the engine, reduces friction, prevents rusting, absorbs shock and reduces noise and vibrations. The commonly used lubricants are oil and grease.

For the engine to be started and also to produce light it requires electric power from the battery (petrol engine) derived from **Electrical system**. The Electrical system is used to start the engine, it operates lights, horning, and battery charging

The power produced after fuel combustion is transmitted to other parts of the tractor via the **transmission system**. The transmission system consists of clutch assembly, gear box, propeller shaft, **differential** and wheels and tyres.

Locally here in Uganda farm tractors use mainly two types of fuel; petrol and diesel. Mainly diesel is used in big machines and tractors (four stroke engine) while small machines and tractors (two stroke engine) use petrol fuel

Activity

- ☐ Since you have got the background of the functioning of a tractor, visit a farm around your village, inquire and see how the tractor functions and identify each of these systems?

- ☐ What are the benefits of using a tractor in any Agricultural sector?

Summary

Uganda is an Agricultural nation which is transforming its Agricultural sector from traditional to modern and a tractor is an important machine that facilitates many activities on the farm in modern commercial Agriculture. Therefore, it is very important to maintain and manage it properly to avoid break down since it is expensive to fix. It's also important to employ skilled man power to manage it well.

Financial institutions like credit service providers/ banks offer Agricultural credit loans in kind of which a tractor is the first equipment considered for support

Lesson 3: Functioning of a Tractor Engine.

Learning outcomes

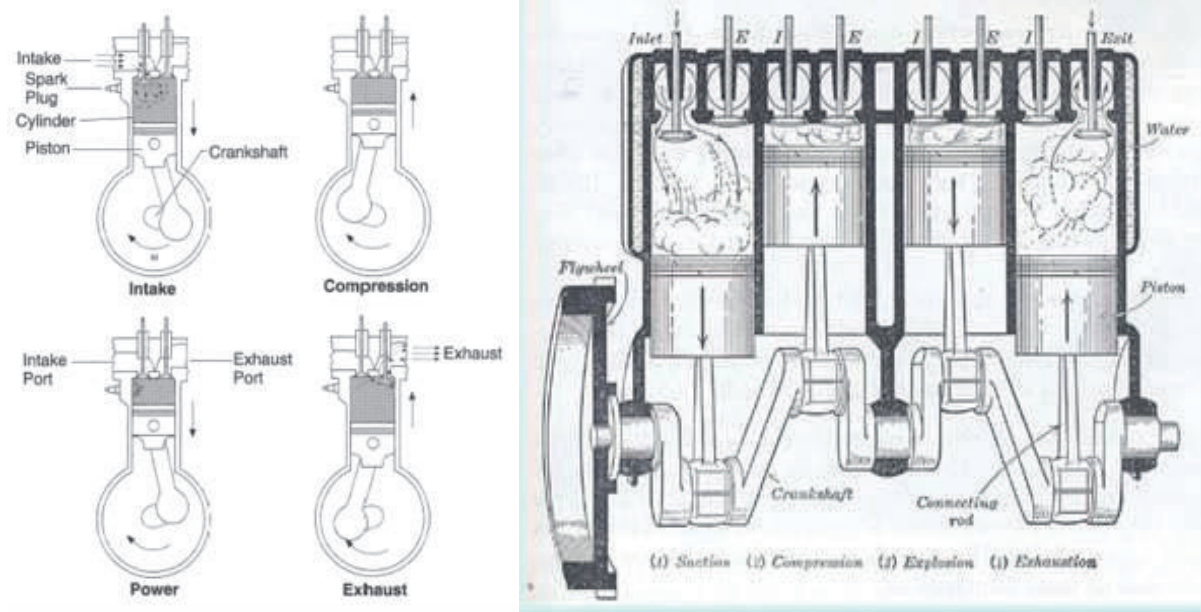
By the end of the lesson, you should be able to:

- i) describe the procedure of the four strokes from Induction to Exhaust to produce power.
- ii) identify the key components of a tractor .engine

Introduction

When a tractor engine is started, fuel is drawn from the engine tank by gravity and by the help of fuel pump. It proceeds to the engine cylinder where it is allowed in through the inlet valve, which later closes (**Induction/ inlet stroke**). At that moment the piston is at the lowest point of the cylinder (**bottom dead Centre**). This is followed by **compression stroke** where both valves must be closed to allow effective combustion. At that moment, the piston is moving from bottom dead centre to top dead Centre (At the top point of the cylinder).

When fuel or gases are compressed to the maximum, they combust/burn in an explosive manner resulting into **power stroke**. This converts linear motion (vertical movement in the engine) to rotational (horizontal movement) which pushes the tractor forward. At this moment the piston is moving down to the bottom dead Centre and outlet valve is opened whereas the inlet valve is closed. The piston then moves upwards back to the top dead Centre causing the **exhaust stroke** which gives off burnt fumes/gases.



The Four Stroke Engine

After power has been produced from **chemical energy** is converted to **mechanical energy** through the piston movement of linear to Rotational effecting the movement of fly wheel that propels/ turns the propel shaft that moves the tyres through the **Differential** hence forward or backward movement of a tractor.

Wheels and tyres on a tractor



Tyres are commonly black rubber tube like structures which may be four or six in number (two in the front and two/four at the back that move/wheel the tractor. After the rear/behind tyres have received power they move the tractor enabling it perform the different activities on the farm. The front wheels are mainly for steering /give direction of tractor and rear wheels give grip/traction /firmness on the ground. Traction can also be added through; Adding weights on rear tyres, use of twin wheels that prevent sinking of tractor when working in a water logged area, tyre ballasting where water is pumped into the tubes with in the tyres, attach stake on the rims to increase on ground. Power from the tractor can also be derived from the *power take off (PTO)* to operate/run farm implements.

Routine/ Service Maintenance Points on a Tractor

A routine is an intended practice procedure undertaken to pursue effective performance. In this case it looks at those vital areas put in consideration to maintain a tractor to perform its work well and these include; Engine oil, Fuel tank, Battery, Gear box, Fan belt, Grease points, Radiator, Air cleaner, Tyre pressure, Sediment bowl, Bolts and Nuts

Activity

- ☐ Describe the four strokes of a tractor engine
- ☐ What are the servicing points for maintenance of a tractor?
- ☐ How can traction be improved during tractor operations?

Summary

Being a machine, a tractor undergoes wear and tear of engine parts. Therefore, repairing and fixing worn-out parts is very important to enable efficiency of the tractor.

Lesson 4: Farm Tools and Implements**Learning outcomes**

By the end of the lesson, you should be able to:

- i) identify the different tools and Implements/equipment used on a farm.
- ii) describe the routine maintenance practices of the farm tools and implements/equipment.

Introduction

Farm tools and Implements are devices/machines used to simplify, speed up and create uniformity in farming activities/ work done. There are many tools and implements which are used on the farm. The choice of tools and implements to use in farming depends on purpose, availability, cost of buying the implement, maintenance costs, skills required to use them, soil condition, beliefs and preference etc.

Tools are commonly used in traditional methods of farming while equipment and Implements are complex in use and commonly used in modern and commercial farming.

Farm tools and equipment are classified as gardening tools, farm workshop tools, cultivation equipment, planting equipment, crop protection equipment, harvesting equipment and livestock equipment.

Examples of garden tools;hand hoe (jembe), forked hoe, hand rake, hand fork, sickles, panga, spade, watering can, wheel barrow, pruning saw, slasher, pick axe etc.

Examples of workshop tools;jack plane, pliers, saws (hack saw, cross cut saw, etc.), hammers (claw,ball pane, cross pane),mallet (wooden hammer),try square/squares, screw drivers, chisels ,spirit level, tape measure etc.

Examples of Livestock tools;thermometer, syringe, trocar and cannula, drenching gun, milk can, butter churn, milk strainer, measuring cup, halter, nose ring, burdizzo, rubber ring elastrator etc.

Examples of Poultry Equipment;laying box, water trough, chicken feed trough etc.

Examples of dairy Equipment; milk pail/bucket, strip cup, milk towel, milk strainer, cleaning brushes.

Other farm tools and Equipment include;knapsack sprayer, spray pump, wire strainer, splicing tool



Farm implements can be categorized into; primary tillage implements and secondary tillage implements, planting implements and harvesting implements. The ploughing (primary) implements are classified into two; tractor drawn and ox-drawn

implements. Tractor drawn implements include disc plough, mould board plough while Ox-drawn implements include ox-plough and ox-mould board plough.

Some of the implements are used for primary tillage such as disc plough and mouldboard plough. These are the first implements applied to open up soil which could be having a hard pan (compacted soil) on land. Secondary tillage implements include harrowers (disc harrower, spring-tined), Chisel plough (sub-soiler). These implements are applied to break down the big slices or clumps of soil to fine soil seedbed



Disc plough



Mouldboard plough



Spring harrow (Sub soiler)



Disc harrow

Implements which are used in planting include seeders and planters. Combine harvesters are used to harvest crop produce.

General Maintenance of Farm Tools and Implements

The main factor for low adoption of mechanization in modernizing Agriculture is failure to maintain and manage machines. So, it is important to consider this factor when you have any tool, equipment and implement on the farm. Before using a machine, check the condition of the different parts. Clean the tools, equipment and implement immediately after working, Tighten and fix the loose nuts and bolts after

work, lubricate all the moving parts and apply grease where necessary, replace broken and worn-out parts after using the machine. At the end of the working session/ season, keep the tools, equipment and implements in a clean dry and safe environment/store.

Activity

- ☐ Categorize the farm tools and implements according to their functions and uses
- ☐ Considering the farm tools or equipment, how best can you advise a farmer to maintain them safely?

Summary

A routine maintenance practice is important to be carried out every after using the tools, equipment and implements of the farm to enable durability and avoid costs and losses in repairing and fixing machines on the farm.

TERM 2

TOPIC 2: FARM STRUCTURES

Lesson 5: Farm Buildings.

Learning outcomes

By the end of the lesson, you should be able to:

- i) state the functions of different farm buildings.
- ii) describe the procedure of constructing a simple farm fence.

Introduction

These are structures constructed on the farm to facilitate various farm activities like; post-harvest practices (food crop storage, silos), livestock protection from bad weather condition, protection of farm tools, equipment and implements from harsh conditions, protect vulnerable animals like poultry and young stock from wildlife and theft, increase real estate value, ease animal activities like routine livestock operations.

Common structures on a farm include;

Animal handling structures: -Fences, crush, plunge/cattle dip, spray race, silos, dairy ban/unit, pig sty, poultry units, fish ponds, bee hives)

Crop handling structures (irrigation facilities like overhead tank, sprinkler, valley dams, reservoirs, green houses, nursery bed shades etc.).

Fences

These are farm structures established/erected around and within the farm area with an intention to exclude intruders and provide security on the farm. A fence can be **dead** (established using barbed wire, woven wire, wall/stone, electric materials) or **live** (established using live hedges such as Kei apple, Prickly pear, cactus (*Opuntiaspp*), Tick berry, Sisal (*Agave spp*), *Euphorbia spp*, *Cypress spp*, *Acacia spp*, Mauritius thorn, *Ficus spp*, *Bougainvillea* etc) depending on its **use/purpose** e.g. Livestock fences can preferably be made of barbed wire, electric and live hedge (provided not poisonous), crop husbandry fences can be woven, wall, or barbed depending on the **cost, value, availability of material** and **environmental factors**.

(Different pictures of fences on a farm)
Add the illustrating pictures.

Activity

1. Now that you have known what a farm is, I request you visit any farm in your locality and observe as you take note; i) Type of fence, ii) Materials used in construction, iii) Type of animals/crops on the farm.
2. Ask the farm manager/owner to explain to you the procedure of constructing a barbed wire fence or wall fence.
3. What are the benefits of that fence to the farm?

Lesson 6: Animal Handling Structures

Learning outcomes

By the end of the lesson, you should be able to:

- i) describe the different animal handling structures.
- ii) describe and manage operations at a cattle crush.

Introduction

Animal handling structures are farm structures used by farmers to carry out routine livestock farm operations. They make it easy for farmers to handle and perform certain operations on farm animals and they include; Crush, Cattle plunge/dip, Spray race etc. These animal handling structures are intended to undertake the following animal handling practices/operations; spraying to control ecto-parasites (ticks, lice etc.), castration, vaccination, drenching, dehorning etc. in the same facility/unit.

(Pictures of a cattle crush, plunge dip, spray race) Please add them here. They are missing...



Photo 9: Cattle/Plunge Dip

Note: You are required to read more about cattle/plunge dip and spray race.

1. Procedure of dipping livestock
2. Precautions undertaken on a cattle/plunge dip
3. Demonstrate/draw a well labelled cattle dip and explain the function of each part

Activity

1. Visit a livestock farmer/cattle on a day on spraying or dipping the animals. Observe and note down the following;
 - i) Where he/she sprays the animals from,
 - ii) How he carries out the spraying procedure and why
2. Request the farm manager/ stockman/ farm owner to show you how the following practices are carried out; castration vaccination, dehorning/ debudding, hoof trimming etc.

TOPIC 3: LAND TENURE

Lesson 7: Introduction to Land tenure systems

Learning outcomes

By the end of the lesson, you should be able to:

- ☐ describe the different land tenure systems in Uganda
- ☐ give advice to farmers on how land tenure affects Agriculture production
- ☐ explain land fragmentation and consolidation

Introduction

Agriculture in Uganda requires all factors of production to be present to achieve production. The main factor is land and it has guide lines and rules which are followed to access and possess it. Land is a sensitive matter in this country which needs to be handled carefully because it has a great impact on the social & economic wellbeing of livelihood and directly affects the development of the Agricultural sector in Uganda. This is what land tenure tries to address through its systems.

Land tenure is defined *as how to access or be granted the right to use, control and transfer land and its associated responsibilities and restraints.*

Land tenure has the following systems; Private ownership (Mailo land), lease hold/Agreement, state ownership, communal ownership/customary land tenure, cooperative land tenure. Each of these systems has merits and challenges which need to be studied and solved to allow proper utilization of land for Agriculture production. In Uganda every region has its own system for instance in Central Uganda (private/Mailo), Eastern (communal/customary), Northern (communal/customary) and Western (communal/customary).

Land Fragmentation: *refers to having many small scattered plots of land or a system of land use where land is subdivided into small scattered plots.* This culture/practice is brought about by the following causes; shifting cultivation, traditional inheritance practices, population pressure, expansion of farming business from one to many enterprises, poverty etc. These causes have given rise to many challenges like; failure to implement and apply mechanization, difficult control of pests and diseases, Agriculture extension programs hard to carry out, land title acquisition becomes hard, endless land wrangles and conflicts etc.

Land Consolidation is defined *as a planned re-adjustment or re-arrangement of small pieces of land, joining them together so that the farmer has one large/merged piece of land instead of so many small plots, to support modern Agriculture for higher productivity.* Land consolidation has a number of merits which include; save

money and time, allows Agriculture mechanization, easy farm planning, increases efficiency and productivity in Agriculture, easy control of pests and diseases. The measures to consolidate land require consideration in change in land tenure, Education and sensitization of farmers, provision of Agricultural development funds, setting up settlement schemes and Agricultural schemes.

Activity 1

In your location, consult the elders and the farmers about the land tenure systems in your locality. Record in your note book;

How those systems have benefited or challenged Agricultural development in your village.

The advice you give to the local authority to manage these challenges and advocate for a better system.

Activity 2

Move around your village and identify some smallholder farmers with fragmented gardens and one with a bigger farm. identify the advantages and disadvantages of these farmers.

What advise can you offer to these farmers as a way to embrace modernization of Agriculture?

TOPIC 4: FARMING ORGANISATIONS

Lesson 8: Role of Farm Organizations in Agriculture

Learning outcomes

By the end of the lesson, you should be able to:

- i) identify the organization that relate to farming and their roles.
- ii) describe the principles of the working of cooperatives.

Introduction

Farming organizations are bodies that bring together the smallholder farmers and the less resourced farmers to support them access farming inputs for better production. Farming organizations give rise to many farmer groups of which Agricultural cooperatives are the commonly known of in Uganda. Cooperatives are registered organizations of people who decide to work together for mutual economic benefit. There are a number of types of cooperatives namely; Transport cooperatives, credit saving cooperatives, consumer cooperative, producer cooperatives.

Cooperatives have their own principle namely:

Open and voluntary membership (free entry and exit of members), **Democracy** (democratic principles), **Interest and profit** (low interest on borrowed capital), **Capital shares** (to raise capital), **Co-operation** (working together), **Neutrality** (no bias of any kind), **Promotion of members** (done on merit), **Promote education of members**, **Continuous expansion**, **Share of dividends**, **Price moderation** (buy produce and sell when prices are better), **Capital investment**, **Protect member exploitation**, **Bargain**

Cooperatives are faced with many challenges which include; Dishonesty, Inadequate skills of management, Inadequate funds, Embezzlement and corruption, Inadequate transport facilities, Shortage of storage facilities, Fluctuating prices for agriculture produce, High risks and uncertainties in agriculture, Political interference, Political Instabilities, individual competition, etc.

Activity

1. After being enlightened about how cooperatives operate and challenges, you as future Agriculturalist, how can you advise these farmer organizations?
2. Can you identify any cooperative society that is or was in existence in your region and the challenges it is facing or faced in the past?

Summary

Farmer organizations play a big part in ensuring there is Agricultural development in the country. But most of them were broken down or are frustrated by the poor governance, selfish mentality and corruption. Those farmers who still believed in their working and benefited in them have tried to start up small farmer community-based organizations in their villages today.

TOPIC 5: AGRICULTURE ECONOMICS

Lesson 9: Introduction to Agricultural Economics

Learning outcomes

By the end of the lesson, you should be able to:

- i) state the Agriculture Economic terms like production, scarcity, choice, scale of preference.
- ii) describe the factors of production in Agriculture.

Introduction

In Uganda, Agriculture is the most important economic activities, providing employment, income and foreign exchange to the Economy. The Agriculture sector is dominated by food production though partly contributing to raw materials for industry from about three million small holder farmers.

Agriculture economics explains how humans can utilize the limited/scarce resources to produce products so as to meet the customer demand for example food, milk, cotton and energy with minimum loss of the resources.

Agriculture Economics is guided by three principles; **Scarcity** (resources are limited in supply in relation to demand i.e. produce and services available are scarce to what is demanded to satisfy human needs at all times), **Choice/preference** (Human demands are many, therefore one has to make a choice among the alternatives and the resources available. So one makes a choice to satisfy the most pressing need first), **Opportunity cost** (foregoing the value of an alternative of his choice and chooses one alternative/sector which brings maximum value or satisfaction to him).

In production of Agriculture products, we look at transforming inputs (resources) into outputs (supply) to satisfy human demands. There are majorly four factors of production Land, labour, capital and management/ entrepreneurship

Law of Diminishing Returns

Agriculture economics principles tend to give an oversight picture of what should be expected in the future. Here it explains why despite the fact that a farmer might have a variable input like labour, fertilizer etc. that when added during production has a potential of a double increase in output **BUT** a point is reached when even if that variable input is added, there could be no more increase, instead, a decrease starts to take place in what is considered as the *law of diminishing returns*.

The law states that if a variable input is increased while all other inputs are fixed (constant), a point is reached where the continued addition of extra unit of variable

inputs will give less than the proportional returns to each successive input of the variable factor. This applies to all forms of agricultural production and useful to determine profitable level of production

Summary

Many of our farmers still practice Agriculture as norm and traditional survival practice which has affected its growth, yet, it has many opportunities that can help overcome the problem of unemployment in this country. It is very important that if we change that thinking/ mind-set. We need to encourage our local farmer to know the importance of understanding the principles of Agriculture Economics so that they can do their farming as a commercial enterprise to improve their standard of living.

Diminishing returns help the farmer to relate input to the output obtained from an Agricultural enterprise.

Activity 1

- i) Considering that knowledge in Agriculture Economics, identify some of the resources used in Agriculture production basing on your home garden/Agriculture enterprise around you.
- ii) How are the factors of production affecting Agricultural production of any Agricultural enterprise?

Activity 2

Visit a poultry (layers) farmer who manages his birds well on your village and ask him/her about how he feeds his poultry, ask the following questions;

- i) How many times he/she feeds the poultry?
- ii) What happens if he gives the poultry an extra or surplus meal; does he receive extra eggs from the birds? Take note of his experience.

Lesson 10: Risks and Uncertainties

Learning outcomes

By the end of the lesson, you should be able to distinguish between Risks and Uncertainties and how they affect Agriculture production

Introduction

Nowadays farmers are known to using chemicals to control /kill pest, parasites using pesticides and weeds using herbicides. The application of a pesticide like *rocket* to kill pests in vegetables may cost the farmer at the time of marketing the vegetables for export because of the health hazards rocket to humans. The **decision** made by

farmer to use *rocket* after knowing that it affects the demand/marketing of his vegetables on international market is called a risk.

Risk

In Agriculture production a risk is defined as an *avoidable* circumstance that affects the outcome of an investment and can be measured in an assessable manner. Since the risks are measurable, they can be *insured* against. These are some of the risks common in the Agriculture sector which include; Pests and diseases, fire outbreak, theft, strike by labourers, low crop yield, poor health of livestock, accidents on the farm etc.

These risks can be controlled /managed using the following measures; Insurance, choosing less risk enterprise, diversification, flexibility in production etc.

On the other hand a farmer might experience a situation which is unavoidable for instance if he grows crops and in the due process floods are experienced in his locality destroying his crop, such a circumstance is referred to as uncertainty.

Uncertainty It's therefore defined as unavoidable and unforeseen circumstances or hazard that affects the outcome of an investment but cannot be measured in an assessable manner hence cannot be insured against. These are some of the uncertainties common in the Agriculture sector; Price fluctuation, change in demand, change in technology, change in government policy, breach/ failing to honour contracts, floods, unavailable labour etc. These uncertainties may be managed using the following measures; Producing on contract, diversification, flexibility in enterprise, improving storage facilities, value addition of Agricultural produce through processing, input rationing etc.

TERM 3**TOPIC 5: AGRICULTURE ECONOMICS****Lesson 11: Specialization & Diversification****Learning outcomes**

By the end of the lesson, you should be able to apply the concepts of specialization and diversification to determine an enterprise combination.

Introduction

Specialisation is a situation where some decisions are taken to influence action and improve agriculture production through concentration of the available resources into one enterprise. The farmer performs better through to maximizing returns/profit. Specialization has different forms such as; specialization by craft (activity), by process, by region and international specialization.

Specialization has a number of **benefits** like time saving, high efficiency in production, enables natural talent exploitation, encourages machinery use, allows full use of natural resources e.g. fertility; employment opportunities created for specialist e.g. Breeders; profit/ income maximization etc. Specialization is also faced with the following challenges; Limited market for surplus supplies, unemployment caused by technology changes, may cause over dependence on specialists, loss of craftsmanship/talent loss replaced by machines.

Diversification is a situation where Agriculture is transformed from traditional to commercial sector through shifting the traditional products to high standard products with high potential to stimulate production rate. This transformation can be achieved through government policy, improved transportation ,irrigation and other infrastructure development. In Agriculture, diversification is the raising of the variety of crops or animals as opposed to one enterprise.

There two aspects of diversification; i) *change in cropping pattern* and ii) *Transformation of the man power from Agriculture work to other associated activities like poultry, livestock etc. and other non-Agriculture sectors.*

Diversification has the following **benefits**; Resources are effectively utilized in the production process, it reduces risks that are associated with producing one type of crop or animal.

It increases a variety of products produced in a country, it encourages the participation of many people in the production process to produce the different goods, It reduces over dependence on products from one place or country.

Diversification has **challenges** like; its limited due to inadequate capital to engage in different enterprise, Limited market for a variety of products may affect diversification, Limited farm implements may discourage diversification, It's very difficult to carry out research on a variety of crops and animals to increase their production, Climate may not favour the production of various products, It encourages subsistence farming which is less

Activity

1. Considering livestock production, study it well and identify the various sectors that can be developed into levels of specialization to enable the farmer achieve maximum profit.
2. Compare and contrast between the developed levels of specialization to the current general enterprise.
3. Basing on the results above, advice a local farmer on which level of specialization to select to obtain maximum profits from that enterprise.
4. Identify the major diversification strategies the government of Uganda has under taken to improve the Agriculture sectors in Uganda.

TOPIC 5: AGRICULTURE ECONOMICS

Lesson 12: Price Theory

Learning outcomes

By the end of the lesson, you should be able to:

- i) describe the relationship between supply, demand and the price of a commodity.
- ii) give reason for price fluctuation of Agriculture commodities and how they can be averted/prevented.

Introduction

Price is the amount of money paid in exchange for a good or a service. Price theory is concerned with the determination of price of any commodity. The price of agriculture commodities is mainly determined by the principles of demand and supply.

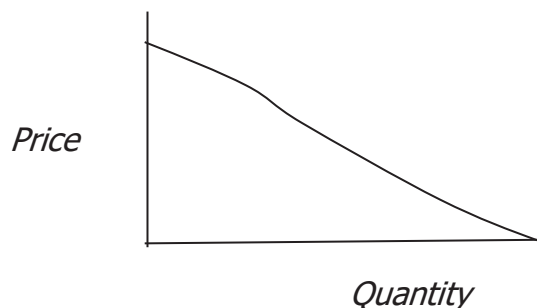
Demand

It refers to the quantity of a commodity a buyer is willing and able to buy at given price within a given time. This is called effective demand.

During this covid-19 period it has been realized that there is plenty of the fresh food like matooke, sweet potato, cassava etc. and the prices are low. This is because the number of consumers in the urban centres (demand) is low. This clearly explains the ***law of demand***. The law states that; the quantity of goods and services demanded varies inversely with the price. The quantity demanded rises when the prices fall and quantity demanded falls when the prices rise.

The **demand schedule** is the relationship between demand and price. And this can be illustrated using a demand curve as below;

Demand curve



Factors that affect/influence demand of a commodity:

Tastes and preferences (a commodity which is liked/preferred is more demanded),

Price of the commodity (the lower the price the higher the demand.),

Income of the consumer (increase in the income leads to increased demand of the commodity),

Price of complementary commodities (increase in price of one leads to decrease in demand of the other commodity),

Sex (particular commodities are demanded more by particular sex e.g. ladies demand for eating matooke),

Age (certain commodities are more demanded by youngsters than elders e.g. chocolate),

Population size in the market (the more the number the more commodities demanded),

Quality of the commodity (high quality commodities are highly demanded and vice versa),

Nutritional value (more nutritious products are highly demanded than those of low nutrition value.),

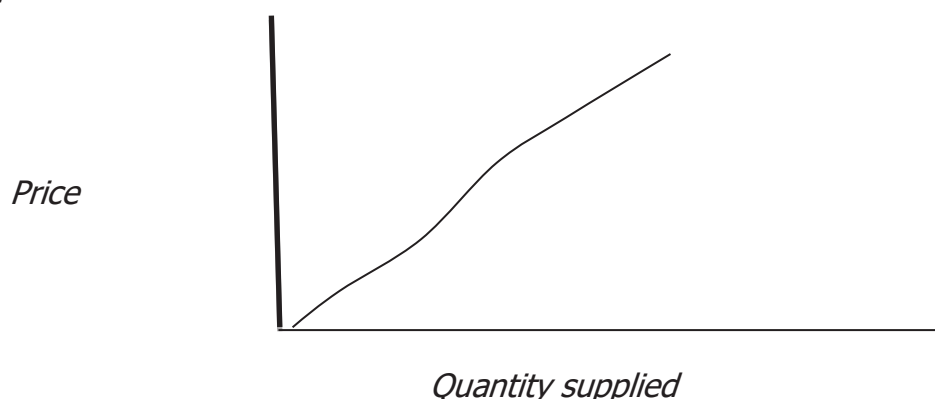
Festivities/seasons (during certain seasons the demand of certain commodities increase)

Supply:

We realise that during the festive season (Christmas, Easter, Eid day) many farmers particularly the poultry farmers bring a lot of their chicken/birds to be sold in the market. This is because during that time the buyers/ customers are willing to pay a higher price. This directly benefits the farmer so he/ she will produce a lot to be bought in the market. This is what we refer to as **supply** and its law states that; when price rises, quantity supplied increases and when price falls the quantity supplied decreases

The **supply schedule** is the relationship between the price and quantity supplied. This can be illustrated by a supply curve. It rises from left to right upward. This means that people are willing to offer more for sale at higher prices as shown below;

Supply curve



Activity

In your village, identify any Agricultural enterprise (poultry, dairy, vegetable etc.). Consider one enterprise and study its performance in the areas of;

- i) How its produce is demanded by the consumers in the village and what are the factors affecting the demand
- ii) How does the manager cope/manage his farm supply and what affects supply on the farm?

Relationship between demand, supply and price

Equilibrium price

This is the price at which demand and supply are equal. This means, whatever is offered for sale at market is bought. The balancing of supply and demand at a certain price level can be illustrated with the following example for meat.

Price per kg	Meat demanded(kg)	Meat supplied(kg)
2500	85	200
2000	95	185
1500	120	120
1000	140	60
500	165	45
250	196	0

A price of 2500 per kg will attract plenty of meat (200kg) but the consumer can only afford to buy 85kgs. At a price of about 1500 per kg, consumers will take up 120 kgs of meat and this is just what is attracted from suppliers. So, shs 1500 is the equilibrium price and 120 kg is the equilibrium quantity. If the price is higher than sh 1500, then, the supply will be greater than demand and there will be surplus hence prices will fall. If, on the other hand, the price is less than 1,500 shs, demand will be greater than supply hence shortage and rise in price.

Activity

During a market day, find one of the traders dealing in Agricultural produce and ask him /her to share experience of how he buys from the farmer and how he sells his product; Then take note of at least the cost and price of 5 commodities

Lesson 13: Marketing of Agricultural Produce

Learning outcomes

By the end of the lesson, you should be able to;

- i) advice farmers on price fluctuation of Agricultural commodities and how they can be prevented.
- ii) describe the marketing functions and problems of Agricultural marketing.

Introduction

In the year 2020 during the COVID-19 lockdown, I travelled by taxi from Kampala to Masaka. While in the taxi the driver and the conductor started a conversation. In their conversation, the driver was telling the conductor that the market for taxi business has fallen.

My 8-year old daughter was surprised to hear of a taxi market! In her mind she thought that a market is a place with structures like stalls where commodities are paraded for sale. Did you have the same thinking?

However, I was able to remind her of the old woman who sales us milk every evening at home. Does she have a stall or permanent location where she's found? But isn't she able to sale her milk at a price to us? I asked her.

From there, I tasked her to tell me what a "market" is. This was her response;

"It's a situation which enables the seller and the buyer to interact and exchange a product or service for and an agreed price". Of course her response was correct.

Marketing involves all those processes involved in the transformation and flow of Agriculture produce and services from the farm to the consumer. These are referred to as **marketing functions**. These include; processing, sorting, storage, assembling, transportation, advertising, etc.

Activity

Visit a nearby trader of agricultural products, find out from him/her the stages these products undergo to reach the final consumer.

Poem

*Mangoes mangoes!
I love mangoes
Too many during some seasons
Price go down
And very less in other seasons
Prices go up
Do you love mangoes?*

The price of mangoes between May and July 2020

I managed to buy 15 mangoes at sh.1000 in the month of May 2020. By July of the same year, sh.1000 could only buy three mangoes. Do you know why? Re-read the poem above!

The ultimate aim of every farmer is to maximize profits all year round. But is this possible? The major determinant of profit maximization is the price at which farmers sale their produce on market. They tend be high at a certain time and low later, this is **price fluctuation**.

Prices have never been stable because of so many factors ranging from the season, income of consumers, location, and quality among others.

Activity 2

Pay a visit to a dairy or poultry farmer in your community; ask them for the scenarios in their businesses when prices are high and when low. Note the responses in your notebook and to present them to your teacher when schools resume.

Prepare a speech that you would deliver to an audience of farmers who are experiencing the problem of price fluctuation

Summary;

Marketing in the Agriculture sense means all the Agriculture activities the farmer gets involved in from harvest to the consumer like assembling, sorting, storage, branding, transportation etc.

Lesson 14: Agricultural Credit**Learning outcomes**

By the end of the lesson, you should be able to;

- i) describe the types and sources of Agricultural credit.
- ii) advise farmers on how to make Agricultural credit effective.

Introduction

Agriculture being big business requires the practitioner to be more creative and innovative. These two aspects in business require some financial support. This kind financial support can be obtained from financial institutions like Commercial banks, Cooperative banks, Micro finance institutions, Marketing boards, Individual money lenders, Insurance companies, Cooperative societies, Wealthy businessmen, Friends and relatives (in form of informal credit) and other Agricultural support organizations .In Agricultural production, this financial support is referred to as ***Agricultural Credit***.

Agricultural credit is the financial assistance given to farmers either in kind or cash as loans to finance their farm projects and repay it with interest in the near future. Agriculture credit can be categorized into three types;

Short term credit: - Cater for smaller expenses on a farm e.g. buying fertilizers, purchasing seeds, fuel, hiring labour etc. it's normally repayable within a year,

Medium term credit: - for minor land improvement e.g. fencing, purchase of machinery and livestock. It is normally repayable over 2 – 15 years,

Long term credit:to purchase land or making major improvements on the land e.g. soil conservation works and land reclamation. It's normally repayable over 15 – 30 years.

Note: Credit can also be classified as hard and soft credit.

Hard credit can only be offered after presenting a substantial security.

Soft credit may not require a substantial security (require less security).

It has been noticed that many Agricultural credit support programs fail because the farmers cannot comply well and the credit financial institutions are not competent enough to manage their obligation, so it is important to lay better strategies/measures to manage agricultural credit.

Strategies for effective management of agricultural credit

Agricultural credit should be offered in kind (inputs) not cash to farmers e.g. giving animals, drugs, seeds, machines, and fertilizers etc. to avoid temptations of misusing the credit.

The security required by credit institutions should match with the Agricultural enterprise for which the credit is offered to make the farmer work hard to pay back.

Credit institutions should ensure regular visits to farmers to supervise the utilization of the credit effectively and advise where there is need.

Loans/credit should be given to farmers in time in order to cope up with season patterns.

Farmers should be given a reasonable grace period before beginning to make repayments.

The interest charged by lending institutions should be fair and to be paid within a reasonable period of time.

Farmers should be helped/advised to pick up enterprises that are viable or with less risks and uncertainties.

Government should also work on the infrastructure like roads, transport and communication to facilitate marketing of the produce.

Training on how credit can be effectively used should also be offered to farmers before giving them loans for proper utilization.

Credit should also be accompanied by measure to stimulate financial management and saving culture, book keeping/taking farm records etc.

Activity

Visit various farmers with enterprises such as poultry, livestock, fish horticulture ,bee keeping etc.) and share their experience on Agriculture loans/credit.

1. From all you have learnt from Agriculture credit, can you give reasons why a farmer should request for Agriculture loan/credit
2. Basing on the history and experience you have obtained from the farmers, why do you think they fail to service or pay back these loans?

Summary

Agriculture credit is one of the modern strategies under taken to modernize Agriculture. Farmers need it but they should be conscious and ensure financial discipline if they are to achieve their goals in line with improving productivity in Agriculture.

SENIOR FOUR

TERM ONE

TOPIC 1: INTRODUCTION TO FARM MECHANISATION

Lesson 1: Sources of Farm Power

Learning outcomes

By the end of the lesson, you should be able to:

- i) identify the various sources of power in Agriculture.
- ii) state the advantages and disadvantages of the different power sources.
- iii) understand the functions of a tractor on the farm.

Introduction

Most of the developing countries are transiting or changing from rudimentary/traditional methods of farming to adopt modern farming technologies so as to boost Agriculture production. Modern farming requires better sources of power. The sources of farm power include; Engine power, Manual/human Power, wind power, Electric power, Animal power, Solar power, Biogas power

An engine is a device which converts chemical energy into mechanical energy. Engines are grouped under internal combustion engine. Internal combustion engines are engines where fuel is burnt inside the cylinder to produce power. Examples of such engines include; lawn mowers, motorized chain saw and a tractor

A tractor is a multi-purpose machine on the farm and it is used to provide power for cultivation, pumping water, slashing, operating grinding mills, threshers and transporting produce.

Activity

- i) Can you identify some of the common sources of power around your village?
- ii) What are the factors hindering some sources of power that are missing in your village?
- iii) How best can you advise farmers in your village to acquire those missing sources of power?

Summary

The most common source of power in Africa is human labour, because of its availability, low skill requirement and being cheap to maintain. However, there are efforts by the government to support farmers under poverty eradication programs and plan for modernization of Agriculture (PMA) to provide tractors at sub-counties throughout the country to improve Agriculture production.

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National Curriculum
Development Centre,
P.O. Box 7002,
Kampala.

www.ncdc.go.ug