



THE REPUBLIC OF UGANDA

MINISTRY OF GENDER, LABOUR AND SOCIAL DEVELOPMENT

Youth Social and Economic Empowerment through Civil Society and Local Authorities (YSEECs)

MODULE 3 - AGRIBUSINESS

*A farmer takes care of
the soil while the soil
takes care of the crops -*

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AGA KHAN FOUNDATION



KOBOKO DISTRICT



Ministry of Gender, Labour and Social Development

Youth social and economic empowerment through civil society and local authority
(YSEECs): Project – Koboko- Module 3- Agribusiness

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FOREWORD



The Youth Social and Economic Empowerment through Civil Society and Local Authorities (YSEECs) project supported the implementation of some of the key-reforms of the national BTVET strategy, both on a national/central level, and on the local level, in Koboko district. It uniquely enhanced the Functional Adult Literacy (FAL) curriculum through introducing three modules: Life Skills, Entrepreneurship and



Agribusiness. The developed training sessions introduced essentials for increasing the productivity and sustainability of enterprises and improving working conditions and developing employability strategies. In order to secure that first job as well as navigate in the labour market, young women and men need the technical skills to perform specific tasks as well as core work skills: learning to learn, communication, problem-solving, decision making and teamwork.

Development of core skills, awareness of workers' rights and an understanding of entrepreneurship are the building blocks for lifelong learning and capability to adapt to change. Aga Khan Foundation adopted the definition of employability skills from ILO as... *the skills, knowledge and competencies that enhance youth's ability to secure and retain a job, progress at work and cope with change, secure another job if he/she so wishes or has been laid off and enter more easily into the labour market at different periods of the life cycle or ability to create their jobs.* The youth under the YSEECs program were trained in both theory and practically through apprenticeship to enable them secure that job or create it.

Employability results from several factors – a foundation of core skills, access to education, availability of training opportunities, motivation, ability and support to take advantage of opportunities for continuous learning, and recognition of acquired skills – and is critical for enabling workers to attain decent work and manage change, and for enabling enterprises to adopt new technologies and enter new markets.

As a country, we seek strategies to ensure that all young women and men get opportunities to enhance their employability and improve the productivity of enterprises. This module has been prepared to assist key stakeholders to better understand core work skills, their importance and ways in which these skills can be delivered, attained, recognized and applied.

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Special thanks to members from the above mentioned institutions who committed their time towards the production of this module. A particular debt of gratitude is owed to the FAL instructors and young women and men who were trained on the module. The FAL instructors trained the youth upon being trained on this module.

I am confident that this module will empower all the critical stakeholders with the necessary knowledge, skills and attitudes to enable them play their roles in either employment creation or self-employment.

This will go a long way in providing this country with the human resource that will contribute to the achievement of Vision 2040 and other aspirations of the Republic of Uganda.

A handwritten signature in blue ink, appearing to read 'ET' followed by a stylized flourish.

Everest Tumwesigye
Commissioner Community Development & Literacy
Ministry of Gender, Labour and Social Development

ABBREVIATIONS AND ACRONYMS

AFARD	– Agency for Accelerated Regional Development
AKF (UK)	– Aga Khan Foundation United Kingdom
AKF(U)	– Aga Khan Foundation Uganda
ACAV	– Associazione Centro Auiti Volontari
BTVET	– Business Technical Vocational Education and Training
CEGED	– Center for Governance and Economic Development
COPs	– Communities of Practice
DDP	– District Development Plan
EU	– European Union
FAAB	– Farming As a Business
FAL	– Functional Adult Literacy
GDP	– Gross Domestic Product
JAVIK	– Jabara Agricultural Vocational Institute Koboko
KDLG	– Koboko District Local Government
KTI	– Koboko Technical Institute
MGLSD	– Ministry of Gender, Labour and Social Development
NDP	– National Development Plan
PICOT	– Partners in Community Transformation
PRA	– Participatory Rural Appraisal
SNV	– Netherlands Development Organization
STWTS	– School to Work Transition Survey
UBOS	– Uganda Bureau of Statistics
UNHS	– Uganda National Household Survey
WENDWOA	– West Nile Disadvantaged Women and Orphans Association
YLP	– Youth Livelihood Programme
YSEECs	– Youth Social and Economic Empowerment through Civil Society and Local Authorities

1.0 INTRODUCTION

1.1 Background

Aga Khan Foundation (AKF) in collaboration with Partners in Community Transformation (PICOT) and Koboko District Local Government (KDLG) under the guidance of the Ministry of Gender, Labour and Social Development (MGLSD) enhanced the government Functional Adult Literacy (FAL) curriculum to include life skills, entrepreneurship and agribusiness so as to equip the vulnerable young men and women in Koboko with life skills and employability skills that can enable them get employed in the job market or start their own enterprises for a livelihood. The curriculum also builds the attitudes, skills and knowledge of the youths to be able to deal with day to day challenges. This initiative under the Youth Social and Economic Empowerment through Civil Society and Local Authorities (YSEECs) project with funding from the European Union (EU) and Aga Khan Foundation UK (AKF-UK) is a 4 –year project (2016 – 2020) targeting 1,500 youths 15 – 30 years of age. The project is aimed at improving Functional Adult Literacy and employability skills of vulnerable young women and men.

“There are those who enter the world in such poverty that they are deprived of both the means and the motivation to improve their lot. Unless they can be touched with the spark which ignites the spirit of individual enterprise and determination, they will only sink into apathy, degradation and despair. It is for us, who are more fortunate, to provide that spark.” His Highness the Aga Khan (1983)

The YSEECs spark augments the Youth Livelihood Programme (YLP) under the MGLSD that targeted youth 18 – 30 year olds. According to the 2019 YLP status report, of the 241,799 (110,322 females; 131,477 males) youth beneficiaries, Koboko district and Koboko Municipality respectively had 1,372 (790 males; 582 females) and 526 (239 females; 287 males).

According to the UBOS (2016) there are 10,239,114 Ugandans aged 15 to 30 years. With over 78 percent of the population below the age of 30, Uganda has one of the youngest population in the World. The UNHS 2016/17 indicated that the National literacy rate increased from 70% in 2012/13 to 74% in 2016/17. While in West Nile, it increased from 51.6% to 65.8%. According to the UNFPA, 8.8 million young people aged 15-24 are not engaged in education, employment or under any training. In Koboko district, the Youth form about 75% of the population, 20% are employed (KDLG DDP II).

Uganda has a big challenge of a labour force that is largely under or unemployed due to inappropriate skills and the slow labour absorptive capacity of the economy. This has resulted in a large number of unemployed youth who are a social and economic

threat. The failure to match the skills needed in the economy creates a gap in the human capital which is critical for economic and social transformation (Uganda Vision 2040). The UBOS (2016) School-to Work Transition Survey (STWTS) showed that more than half (57.2%) of employed youth are engaged in the agriculture sector which constitutes most of the informal jobs that often have low wages. National Development Plan (NDP) II puts at 72% the population in subsistence agriculture. The 2019 YLP report indicates that 32.55% of the youth beneficiaries are engaged in agriculture based enterprises. The programme targeted school drop outs comprising 34.60% (highest proportion), single parents 11.80%, youth with physical disability 2.80% and youth living with HIV/AIDS 2.50% among the nine categories (YLP 2019).

The proportion of persons engaged in subsistence agriculture increased from 36.6% in 2012/2013 to 39.5% in 2016/2017. Forty-three percent (43%) of the Households' source of earning is subsistence farming of which 54% is rural and 14% urban. In West Nile the proportion of households whose main source of earning is subsistence farming increased from 31.9% in 2012/2013 to 48.8% in 2016/2017 (UNHS 2016/2017). Agriculture contributes 23% of GDP (Compendium of Investment and business opportunities Vol 2). In Koboko district, 88% of the land is under agriculture, which employs 80% of the total population (KDLG DDP II). In Koboko district, the land holding per household is 3 acres on average (KDLG DDP I) which is a drive to support the Koboko District Transformation Agenda. Subsistence agriculture still thrives as poverty persists.

The modules are developed to implement the enhanced curriculum through the FAL structures to enable youth acquire employability skills. The modules were produced through a participatory process involving AKF, PICOT and KDLG with the technical guidance from the MGLSD. The three modules are Life Skills, Entrepreneurship and Agribusiness.

1.2 The Agribusiness Module

The agribusiness module is to empower the youth with knowledge and skills to undertake agriculture as a business. The agribusiness module is anchored on **the principle and practice of produce for the market and home consumption.**

1.3 Specific objectives of the module

The module is designed to enable the youth to: -

- i. Demonstrate knowledge and skills in agribusiness
- ii. Enable the youth undertake agricultural production as a business
- iii. Use it as reference material for non-formal agribusiness learning

1.4 Module structure

The module is divided into sessions in agribusiness and selected enterprises for practical sessions. The sessions covered are: -

- 1) Farming as a business
- 2) Agribusiness
- 3) Risks in agribusiness
- 4) Enterprise selection
- 5) Value chain agribusiness
- 6) Record keeping
- 7) Marketing of agricultural products
- 8) Savings and Financial literacy
- 9) Soil and Water Conservation
- 10) Selected agribusiness enterprises
 - a) Onion production
 - b) Tomato production
 - c) Passion Fruit production
 - d) Poultry production and management
 - e) Goat rearing

1.5 How the module is used

The module is the guiding material for the FAL Instructor to empower the youth through training at the FAL centre with precise and practical information on agribusiness as well as reference material for continuous learning. The instructor is expected to be innovative in using the module according to the situation and context by space and time. Lead farmers and agriculture extension staff within the community will be contacted to give the youth more practical experience and mentoring especially in agricultural production.

1.6 Training Methodology

The training methodology used in this module includes the following: -

- i. Presentation – activities conducted by the instructor to convey information.
- ii. Story telling – using case studies that describe life situations used for analysis and discussion

- iii. Small group discussion – learners sharing experiences and ideas or solving a problem together
- iv. Brainstorming – debating an issue for consideration
- v. Role play – two or more individuals enacting parts in scenarios as related to a training session
- vi. Simulations – enactments of real life situations
- vii. Participatory Rural Appraisal (PRA) tools – Picking from a variety of PRA tools depending on the issue.
- viii. Demonstration – showing by example using visuals, charts etc.
- ix. Field-based learning visiting sites within the community they can learn from
- x. Any other appropriate methodology where and when applicable to suit the context



2.0 FARMING AS A BUSINESS (FAAB)

Introduction

This session focuses on introducing the learners to the different types of farming and lay emphasis on drawing illustration showing farming as a business. Aware of the growing tendency of engagement in subsistence farming, this session will engage the learner in reflecting on farming as any other business. Their attitude and knowledge on farming as a business will be enhanced. According to the YLP 2019 report, 6,911 agriculture projects were funded worth 52 million reaching 84,890 (30,301 females & 46,589 males) beneficiaries nationally.

Learning Objectives:

By the end of the session, the learner should be able to: -

- i. Demonstrate understanding farming as a business
- ii. Describe the difference between subsistence farming and farming as a business
- iii. Undertake literacy and numeracy tasks related to farming as a business
- iv. Develop an action plan on farming as a business

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalks and locally available materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners and ask one to give an opening prayer 2. State the session objectives 	<ol style="list-style-type: none"> 1. One says an opening prayer 2. Active listening
II	15 Minutes	<ol style="list-style-type: none"> 1. Ask the learner to write or explain the meaning of farming. 2. Record or pin their responses and pick a few to share. 3. Explain the meaning of farming as in the notes 	<ol style="list-style-type: none"> 1. Each learner writes or explains the meaning of farming according to him or her. 2. Writing or noting.
III	30 Minutes	<ol style="list-style-type: none"> 1. In groups ask the learners to identify the businesses in their community 2. Task them to compare farming with the identified businesses allocated to each group. 3. Harmonizes the responses using the notes 	<ol style="list-style-type: none"> 1. In groups state the various businesses in their community 2. Write or state the input and activities for farming. Also write and state input and activities of the business selected by the group 3. Actively take notes.
IV	30 Minutes	<ol style="list-style-type: none"> 1. Ask 2 volunteers to read the two stories about Mr. Data and Ms. Fatuma. 2. Through brainstorming, ask the learners to answer the questions that follow the story. 3. Highlight on the differences between subsistence and commercial farming putting major emphasis on commercial farming. 	<ol style="list-style-type: none"> 1. Two learners volunteer to read the two stories 2. Respond to the questions 3. Take note
V	20 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to brainstorm on the benefits of farming as a business. 2. Ask the learners to brainstorm on the challenges of farming as a business. 3. Wrap up the session by summarizing the responses while emphasizing the benefits of farming as a business over the challenges 	<ol style="list-style-type: none"> 1. Give their responses on the benefits and challenges of farming as a business 2. Take note of the benefits and challenges
VI	10 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to individually come up with an action plan using the template provided. 2. Wrap up by encouraging the learners to implement the action plan as he or she monitors them through visits. 	<ol style="list-style-type: none"> 1. Each learner produces the action plan. 2. Each implements the action plan and reports progress to the instructor.
VII	10 Minutes	<ol style="list-style-type: none"> 1. Give literacy and numeracy tasks as in the notes 	<ol style="list-style-type: none"> 1. Perform the literacy and numeracy tasks

Session Notes

Introduce the session to learners that today “we will learn about Farming as a Business and how the approach can help us use agriculture as a decent employment to exit out of poverty”.



Farming is the activity of growing crops and rearing of animals for sale and food as an individual, family or group.



Meaning of Farming (Adopted from AFARD)

Subsistence farming: Is a low-input, low-risk and low return farming practice where farmers: -

- a) Use indigenous knowledge and technologies;
- b) Earn low yields per unit of production used;
- c) Use their harvest mainly for food consumption;
- d) Sell only small surplus yield for income; and
- e) Work in isolation of each other relying on individual farmer priority.

Farming as a business or Commercial farming is the opposite of subsistence farming. It is high-input, high-risk, and high return farming practice where farmers are profit-oriented. They focus on:

- a) Large-scale production (large land sizes of one crop enterprise, for instance)
- b) Advanced technologies and innovations than human labour (e.g, tractors);
- c) Market forces of demand and supply to achieve high profits.

Differences and similarities between farming and other business

- a) Working in small groups, ask the learners to give the differences and similarities between farming and tailoring (or any business selected) from a business perspective. They should consider inputs, outputs, costs and risks.
- b) Allow each group to present their thoughts and results. Compare the results with the Instructors' Notes.

Comparing tailoring with farming

Aspect	Tailoring	Farming
Input	<ul style="list-style-type: none"> i. Fabric ii. Sewing machine iii. Scissors iv. Measuring tape v. Thimbles vi. Thread vii. Pins viii. Paper ix. Packaging materials 	<ul style="list-style-type: none"> i. Seeds/seedlings ii. Land iii. Pesticides iv. Gum-boots v. Organic fertilizers vi. Water pumps vii. Hoes/Tractors viii. Packaging materials ix. Measuring tape x. Panga xi. Rakes xii. Value addition equipment xiii. Planting line
Operational Activities	<ul style="list-style-type: none"> i. Cutting the fabric ii. Making designs and embroidery iii. Putting final touches like seams, buttons, designs on the product iv. Packaging to suit clients 	<ul style="list-style-type: none"> i. Land preparation ii. Making the nursery and sowing seeds iii. Transplanting from nursery bed to garden iv. Providing trellises for the plants v. Applying fertilizers vi. Spraying chemicals vii. Weeding and pruning
Post-Harvest Handling	N/A	<ul style="list-style-type: none"> i. Harvesting ii. Sorting, grading and packaging iii. Processing iv. Storage v. Branding
Marketing	<ul style="list-style-type: none"> i. Requires transport ii. Specification based on demand, season, preference etc. iii. Designing and packaging iv. Market information 	<ul style="list-style-type: none"> i. Transport ii. Specification based on demand such as people's preference, season etc. iii. Market information

Learning Points

Emphasize that business characteristics are very similar regardless of the trade. Tailors do not invest in their training, operational and capital costs to clothe their families. They produce their products for the market; a market that will pay a price that includes a fair profit. Farmers must approach their businesses in the same way; they must not only produce to feed their families. The predominant current practice is that farmers take to the market incidental surpluses or unplanned portions of the harvest. This must change.

Story

Learners read the story (narrate) and the instructor allow the youth discuss as guided.

Case Story 1

Mr. Data is a 33-year-old man married with four children. He is involved in farming beans, groundnuts, maize, cassava and some green vegetables on four acres of land. Most of his harvest is consumed as food at home. His wife gets some little part of the harvest and sells in the afternoon nearby market. With the money from the sale she buys soap, sugar and other basic items for the family to live on. Data struggles to pay the fees of his children as his harvest is low because of his way of farming. Besides digging he has few chicken and three goats.

Case Story 2

Ms. Fatuma is a 38-year-old single mother with 6 children living in the same village with Data. Fatuma has land as big as that of Data. She has planted coffee, onions, tomatoes and groundnuts. She also has some chicken and five goats. The waste from the chicken and goats together with other garbage she uses in her garden. Before she plants anything she checks the prices of the crops in the markets and gets information from the sub-county agriculture officer and the prominent farmers nearby. She has engaged her children in farming. She keeps records of her farming and sells her produce at a price which gives her profit. Fatuma grows to sell and only uses the balance for home consumption. All her children are in school with their fees paid at the beginning of the term. She is a member of the women SACCO and operates a bank account in town.

From the story above, ask learners:

- 1) What is the difference between Mr. Data and Ms. Fatuma's farming (in practice and quality of life)?
- 2) Who among the two is farming as a business?
- 3) What are the benefits and challenges of farming as a business?
- 4) If you were to join Ms. Fatuma in farming as a business, what would you be keen on?

Summary

Data engaged in subsistence farming. Data engaged in traditional crops while Fatuma had high value crops. Engage in few high value enterprises in farming as a business

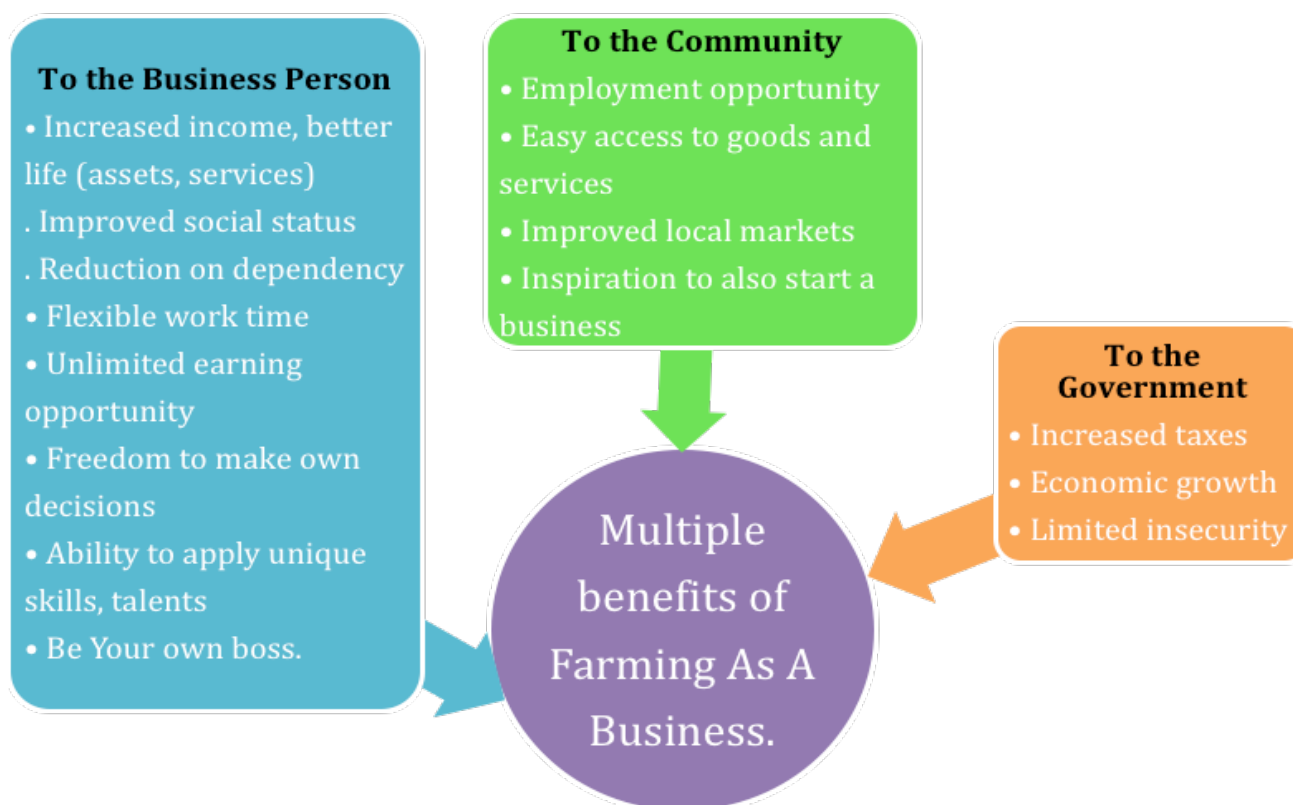
Major types of farming practices

Subsistence farming	Commercial farming
<p>Is a low-input, low-risk and low return farming practice where farmers:</p> <ol style="list-style-type: none"> Use indigenous knowledge and technologies; Earn low yields per unit of production used; Use their harvest mainly for food consumption; Sell only small surplus yield for income; Work in isolation of each other relying on individual farmer priority. Normally do not keep records It is rain fed Low value addition 	<p>It is high-input, high-risk, and high return farming practice where farmers are profit-oriented. They focus on:</p> <ol style="list-style-type: none"> Large-scale production (large land sizes of one crop enterprise, for instance) Advanced technologies and innovations than human labour (e.g. tractors); Market forces of demand and supply to achieve high profits. Engage in high value crops especially those with small land size. Practice irrigation by some Practice record keeping

Learning Points

Farming as a business is a hybrid practice that uses the “**profit thinking of commercial farming**” as the driving force for the small-scale subsistence farmers. It is a practice that ‘triggers farmers’ mind-set and attitude to engage in farming with business attitude right from planning, production and marketing. It also promotes collective action by farmer groups (producer groups) in order to attain (collection) aggregation of outputs that are attractive to the market.

Benefits of farming as a business



Key Facts about Farming as a Business

Farming as a Business basically means “Doing Business through Farming”. To achieve this, any farmer intending to or is engaged in farming as a business MUST focus on knowing and adhering to the following:

The Right enterprise	<ol style="list-style-type: none"> 1. The product that is highly demanded in the market 2. The actors (input dealers, buyers, and other supporters)
The Right standards	<ol style="list-style-type: none"> 1. The units of measurement used (e.g. acres of land [4,047 square meters]; weights used in the market e.g. Kgs, litres, etc.) 2. The quality of seeds, fertilizers, chemicals 3. The quality preferred in the market (e.g. low moisture content; no rotting; spotless tomato; etc.)
Profit maximization	<ol style="list-style-type: none"> 1. The reduction of cost of production 2. Increasing yield per unit of production (e.g. use of improved technologies – seeds, fertilizers, etc.) 3. Higher prices by accessing better paying market
Risk Management	<ol style="list-style-type: none"> 1. Mitigating all factors that cause business loss e.g. correct timing of planting, harvesting, and selling; insurance; etc.

Action Plan on Farming as a business

What are you going to do to undertake farming as a business? For example....

S/N	Activity	When	What is required	Responsible
1	Open half an acre of land for tomatoes	April	Tools (hoes, panga, axe), labour etc.	Group or individual
2				
3				
4				

Key Message

“ Many people are involved in various businesses and farming. Doing farming as a business is an important practice to improve one’s livelihood. Farming as a business means growing crops and or raising animals for the market (selling) and home consumption to improve family nutrition. Farm to get money by growing high value crops. ”

Literacy Tasks

Level 1: - Write down the crop types grown by Data and Fatuma

Level 2: - Write short sentences using anyone of the crops grown by Data or Fatuma?

Level 3: - From Fatuma’s story write or indicate the unique things about farming as a business

Level 4: - From your community narrate or write a short story of two paragraphs similar to that of Data or Fatuma.

Numeracy Tasks

- Level 1: - How many crop types is Mr. Data cultivating? How many crop types is Ms. Fatuma cultivating?
- Level 2: - How many crop types are grown by Data and Fatuma?
- Level 3: - If Data planted beans on $\frac{1}{2}$ an acre of land and Fatuma planted tomatoes on a $\frac{1}{4}$ of acre, how much land was used by the two for farming beans and tomatoes?
- Level 4: - If they are cultivating on two and half acres of land and using twelve acres. What proportion of land are they cultivating?



3.0 AGRIBUSINESS

Introduction

In Uganda close to 80% of all households in the country were involved in agriculture (UBOS, 2016). Today, agriculture offers a great potential for business and livelihoods and yet it is evident that many youths seem not to appreciate this big opportunity. It is one of the easiest ventures to take on because at least majority of the people (youths) have the necessary requirements like family land to start an enterprise. Through this course, we will be able to explore the various opportunities within the agricultural sector, and at the end youths should be able to have a change of attitude towards agriculture (agri-business).

Learning Objectives:

By the end of the session, the learner should be able to:

- i. Demonstrate the understanding of Agribusiness
- ii. Identify agribusiness opportunities in their community
- iii. Explore the requirements for a successful agribusiness
- iv. Undertake literacy and numeracy tasks related to agribusiness

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners to session and state the session objectives	1. Active response and listening
II	30 Minutes	1. In groups ask the learners to state the reasons why the youth participation in agriculture is low 2. Summarize by outlining the reasons as in the notes	1. In groups the learners give reasons for low youth participation in agriculture. 2. Learner's take note
III	25 Minutes	1. In pairs ask the learners to identify and list people in the community who are undertaking farming as a business 2. In the same pairs, ask the learners to list the agricultural products that the people mentioned above are involved in.	1. Learners identify the people and list written on the board. 2. The same pair gives the agricultural products the people are involved in.
IV	10 Minutes	1. Through brainstorming, let the learners explain the meaning of agribusiness 2. Summarize the meaning of agribusiness using the notes.	1. Responses from learners are written down. 2. Learners take note
V	20 Minutes	1. Ask the learners to think of any small business. 2. Ask them to give the requirements for the success of such a business 3. Using the notes summarize the requirements for a successful farming business 4. Explain the stages or steps to develop a business.	1. Learners give the requirements for the success of a given business 2. Learners take note
VI	10 Minutes	1. Use the Q/A method to ask the learners to explain who an entrepreneur is. 2. Use the notes to summarize who an entrepreneur is.	1. Learners explain who an entrepreneur is. 2. Learners actively take note.
VII	10 Minutes	1. Guide the learners to develop an action plan for this.	1. Learners develop action plans as being guided
VIII	10 Minutes	1. Guide the learners through the literacy and numeracy tasks.	1. Perform literacy and numeracy tasks

Session Notes

Youth participation in Agriculture

In groups let the learners give the reasons youth participation in agriculture is very low. Compare this with the table below

Youth and Agriculture

According to research conducted by SNV, AFARD and CEGED, they found out that youth are demotivated to join agricultural employment by the following factors: -

Table showing reasons for low Youth involvement in Agriculture

S/N	Reason	Percentage
1	Lack of inputs	75%
2	Unfavorable climate	75%
3	Limited market	68%
4	Low income	63%
5	Long gestation period	45%
6	Lack of modern agronomic skills	40%
7	Lack of funds for better farming	58%
8	Destruction by animals	75%

(Adopted from AFARD 2016)

Youth attitude towards agriculture is a significant factor influencing youth involvement in agriculture.

Activity

People participating in farming as a business and the products thereof

- 1) Identify and list the people in the community who are undertaking farming as a business
- 2) Identify and list the agricultural products that they are producing

What is agribusiness?

Agribusiness is a farming practice that is bigger than just tilling/cultivating the land or keeping animals. It is farming for the market to generate profit that can also be ploughed back into the farm and improve the living conditions of the farmer. In agribusiness you sell the products and 'eat' the excess. The common practice in agriculture is 'eat' the harvest and sell the excess. Farming as a business is built on the principles of improving farm production to increase profits and or ensure sustainability of farm output. Treating farming as a business helps the farmer to get the best out of their farms and their resources. Then applying the business methods such as record keeping and cost-benefit analysis, to farming can greatly improve efficiency in agribusiness. Therefore, agribusiness is engaging in agricultural production as a business with profit being the major determinant.

Business Types

A business is "any venture which involves production of goods and/or services to obtain profit". There are four types of business in rural areas which are production, processing/manufacturing, trading and services

Production	Processing
Producing goods for the market e.g. growing fruits and vegetables, livestock rearing for sale	Converting produce into value added product e.g. fruits into juice, goat into muchomo ('giria')

Trading Buying and selling of some produce and product, e.g. wholesale and retail market	Services Providing a support service e.g. harvesting, packaging, transport (boda boda) etc.
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Activity

For each business type, identify who in the community is involved in such kind of business.

Steps for Development of Business

The four stages in small business development are: -

1. Opportunity identification – What business can one do to earn money?

2. Business planning

- a) Production – What do you produce?
- b) Marketing – How do you sell it?
- c) Finance – Where do you get money to run the business?
- d) Organization – How do you organize the business?

3. Implementation

- a) Production – How do you produce?
- b) Marketing – Where are you selling and to who?
- c) Finance – How much are you getting and spending?
- d) Organization – How is the business being run?

4. Evaluation: - Once an enterprise has completed a business cycle there are three choices: -

- a) To open a new business
- b) To continue with the existing business
- c) To cease to operate the existing business

Requirements for a successful farming business

- a) Knowledge on enterprise (business) selection
- b) Skills and knowledge necessary to grow crops or raise animals
- c) Production requirements such as land for growing crops, labour for farm activities, capital which can be in form of tools, equipment, buildings or cash and organization which enables optimal use of all the available resources
- d) Marketing skills – needed to sell the products

Farmer as an entrepreneur

An entrepreneur is

- 1) Someone who produces for the market.
- 2) A determined and creative leader, always looking for opportunities to improve and expand his/her business.
- 3) Calculated risk taker and assumes responsibility for both profits and losses
- 4) Passionate about growing his business and is constantly looking for new opportunities
- 5) An innovator. Always looks for better and more efficient and profitable ways to do things.
- 6) One who has goals and good saving skills
- 7) One who works with others to achieve goals (team spirit).

Being innovative is an important quality for a farmer entrepreneur especially when the business faces a strong competition or operates in a rapidly changing environment. Farmer entrepreneurs see their farms as a business. They see their farms as means of earning profits. They are passionate about their farm business and are willing to take calculated risks to make their farms profitable and their businesses grow.

Task

Identify in the community a farmer entrepreneur.

Key notes

Agribusiness looks at farming from a “value chain” angle. That is, it looks at employment and income generating opportunities of a given agricultural enterprise from the input supplier to the consumers. As a result, agribusiness provides job and income opportunities in agriculture in the forms of:

- Input traders who sell seeds, hoes, fertilizers, etc.;
- Farmer who produce and sell to traders or consumers;
- Traders who buy produce from farmers and sell directly to consumers or add value and sell;
- Transporters who provide transport services to producers and buyers; and
- Others that include money lending, extension services at a fee, etc.

Key messages



- Youth participation in agriculture is key
- Agriculture should be done as a business
- Farm entrepreneurship is the way to go
- Benefits of agriculture as a business are immense
- Stages of business development are important to grow ones business



Action Plan

S/N	Identify an agribusiness enterprise	What are the inputs required?	Which of the inputs are available?	Which of the inputs are not available?	How do you plan to get them?	When do you expect to get them?
1						
2						
3						

Literacy Tasks

Level 1: - List the steps for developing a farming business

Level 2: - Write a short sentence using the word **agribusiness**.

Level 3: - Write a short story using the requirements for a successful farming business with reference to one such farmer in your community.

Level 4: - Read and explain in your own words facts about farming as a business.

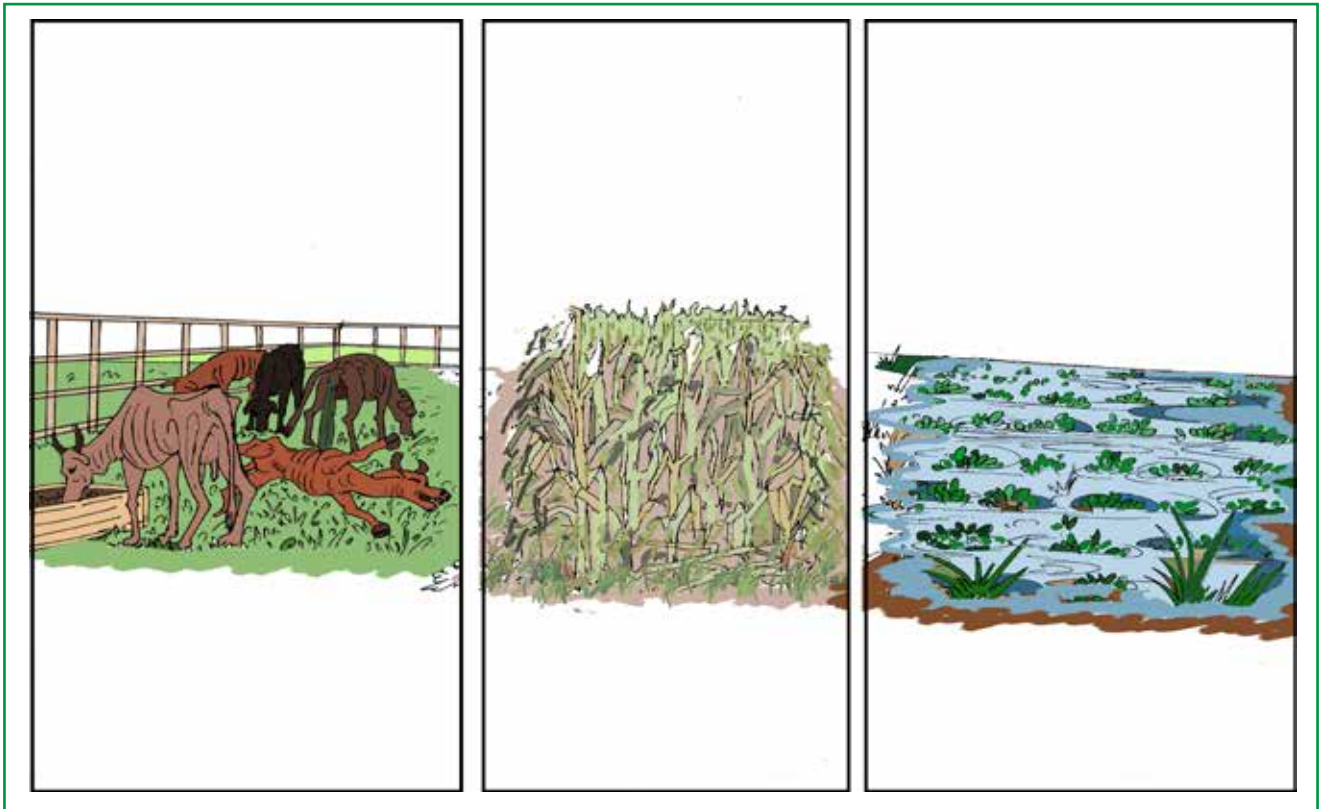
Numeracy Tasks

Level 1:- How many demotivating factors are affecting youth involvement in agriculture?

Level 2:- What is the highest percentage of the demotivating factor affecting youth involvement in agriculture?

Level 3:- From the action plan what is the total cost of input for starting a given enterprise?

Level 4:- Given that an acre of land is 4,047 square meters, how many square meters is quarter of an acre?



4.0 RISKS IN AGRIBUSINESS

Introduction

This session will focus on agribusiness and its related risks. Risks in agribusiness are those factors that make it fail. When prices are poor or when the rains do fail, crop income growth falters and consumption fails. This is what happened in Northern and Eastern regions in 2011 (IBRD-IDA, 2016). The report further states that a major factor contributing to lower rates of agricultural productivity found among women 14 to 20 years is the childcare demands they face which reduces the time they can allocate to agricultural production. According to the Youth Livelihood Programme status report July 2019, agricultural enterprises affected by natural calamities such as drought, pests and diseases and animal quarantines, impacted on youth remittance. This session will enable the learners identify the risks in agribusiness and how to manage so as to realize profit.

Learning Objectives

By the end of the session, the learner should be able to,

- i. Describe the risks in agribusiness
- ii. Identify the risks for selected enterprises
- iii. Demonstrate how to manage the risks
- iv. Undertake the literacy and numeracy tasks related to risks in agribusiness

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalks, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	20 Minutes	<ol style="list-style-type: none"> 1. Through Q/A ask each learner to write down what he or she understands by the term risk in agribusiness. 2. Write down a few responses 3. Using the notes explain the risks in agribusiness. 	<ol style="list-style-type: none"> 1. Individuals give responses 2. Take notes actively.
III	40 Minutes	<ol style="list-style-type: none"> 1. Form groups to discuss the common risks in crop and animal production 2. In their groups learners rank the occurrence & frequency of the risks 	<ol style="list-style-type: none"> 1. In their groups learners discuss and share their findings 2. Rank and share
IV	30 Minutes	<ol style="list-style-type: none"> 1. In the same groups ask the learners to discuss the measures for prevention, control or mitigation of the risks 2. Summarize using the notes 	<ol style="list-style-type: none"> 1. Share mitigation measures 2. Actively take notes
V	15 Minutes	<ol style="list-style-type: none"> 1. Guide the learners to develop an action plan as in the notes 	<ol style="list-style-type: none"> 1. Develop action plan.
VI	10 Minutes	<ol style="list-style-type: none"> 1. Guide the learners in undertaking the literacy and numeracy tasks 	<ol style="list-style-type: none"> 1. Undertake literacy and numeracy tasks as guided.

Session Notes

Risks are factors (things) that make agriculture to fail as a business if not well managed. A risk is the possibility that an event will cause damage or loss. A risk is any factor that may cause losses to the farm business.

Some risks are external, such as changes in the market prices, low rainfall, and etc. Some risks are internal, such as decisions about what to produce, the type of inputs to purchase and use, etc. While farmers can control the internal risks more easily, there are ways to also manage external risks, provided these are recognized and addressed in time. However, risk management is not a guarantee for success, and often allows the farmer to effectively minimize the negative effects to his/her business.

Summary of risks

Group Work

In groups let the learners mention the risks in crop and animal production? How can these risks be managed?

Production

Lack of production experience
Untested production methods
Yield variability
Lack of equipment or equipment failures

Market

Lack of marketing experience
Limited marketing channels
Direct competition
Indirect competition
Consumer health and safety concerns

Human Resource

Lack of farm management experience
Sick or injured farm labour or managers
Lack of appropriate labour resources
Competing goals among farm family members or partners

Natural hazards

Unpredictable weather
Drought,
Hail stones,
Floods and storms,
Pests and disease outbreaks.

Financial

Lack of financial management experience
Lack of capital to invest in needed equipment or other assets
High debt
High production to yield costs
Lack of seasonal operating cash
Insufficient revenues to cover operating expenses
Insufficient profit to provide adequate pay to owners

Rank the risks according to occurrence. i.e. which risk is most common or frequent

S/N	Risks in Crops Production	Risks in Animal Production
1		
2		
3		

Note

Ensure there is consensus around the common risks identified

Risk Management Strategy

- i. Use of irrigation
- ii. Planting resistant crops
- iii. Rearing resistant animals
- iv. Timely farm operations e.g. digging, planting, weeding, harvesting on time
- v. Getting correct and timely market information
- vi. Have fenced farms
- vii. Training as a farmer
- viii. Good soil and water management
- ix. Good pest and disease management
- x. Contract farming e.g. Tobacco growing in West Nile
- i. Insurance against some of the risks like drought, hail stones etc.

With the youth add more risk management strategy and you can separate them for crops and animals.

Action Plan

Mitigation of the top most risks in crop production and animal rearing

S/N	Risk	How do you avoid it?	How do you manage it?	What do you need to avoid or manage the risk?
1	Unreliable rainfall	Nil	Use simple irrigation	Empty bottles for drip irrigation. Harvest water and pump using pipe
2				
3				

Key messages



Like every business, farming also has risks. These risks lead to losses if not managed properly. The risks are in production, marketing, natural hazards, human resource and financial.



Literacy Tasks

Level 1: - Write or spell the five major risks in farming business

Level 2: - Write short sentences, using the word **risk**

Level 3: - Explain verbally or in written one risk management measure

Level 4: - Using one of the major risks in farming business, tell or write a short story of two paragraphs.

Numeracy Tasks

Level 1: - How many letters does the word **weather** have? How many letters are repeated?

Level 2: - How many risks have been identified in crops and animal production. How many risks apply to both crops and animals?

Level 3: - Pick one of the top most risks (crop or animal) and calculate the financial cost of managing or avoiding the risk.

Level 4: - From the above cost of risk management, what is the percentage of the costliest item in the risk management?



5.0 ENTERPRISE SELECTION

Introduction:

This session is to enable learners know how to select and prioritize an agribusiness enterprise so as to venture into it. Agriculture is cited as the main sector of employment for 72 percent of the workforce in 2013 and 81 percent of households report engaging in some agricultural production (IBRD-IDA, 2016). According to the YLP status report 2019, the top five enterprises selected by the youth and funded are agriculture 32.55%, trade 28.80%, service 22.68%, industry 5.48% and vocational skills 4.92%. Agricultural enterprise is the most popular enterprise in YLP youth engaged in. Knowledge in agricultural enterprise selection is therefore essential as the youth venture into farming business.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Identify factors for profitable agribusiness enterprise selection
- ii. Prioritize and select the most viable agribusiness enterprise
- iii. Access information on the existing opportunities in development programmes.
- iv. Undertake literacy and numeracy tasks related to enterprise selection

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	50 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to identify the farming activity they are engaged in as individual or family. 2. Allow them outline why they are engaged in the particular farming activity. 3. Summarize by explaining the factors considered when selecting an agribusiness for both crops and animals as in the notes 	<ol style="list-style-type: none"> 1. Individuals give responses as picked by the instructor. 2. Take notes actively.
III	40 Minutes	<ol style="list-style-type: none"> 1. In groups, ask the learners to undertake enterprise selection for the selected crops and animals. Have separate group for crops and animals. 2. Explains the selection criteria 3. Summarizes using the notes on methods for agribusiness enterprise selection. 	<ol style="list-style-type: none"> 1. In groups learners undertake enterprise selection for either crops or animals. 2. Each group gives a report 3. Take note actively
IV	15 Minutes	<ol style="list-style-type: none"> 1. Guide the learners to undertake implementation of the selected enterprise, engaging them to brain storm on the opportunities available in government, NGO or community 	<ol style="list-style-type: none"> 1. Draw an action plan and source for more information outside the session.
V	10 Minutes	<ol style="list-style-type: none"> 1. Guide to undertake literacy and numeracy tasks 	<ol style="list-style-type: none"> 1. Undertake literacy and numeracy tasks

Session Notes

In groups ask the youth to identify the farming activity they are engaged in as individual or family. Allow them outline why they are engaged in the particular farming activity.

Ask the youth what they would consider when selecting an agribusiness venture from preparation to selling of the products.

Factors to consider for enterprise selection

- 1) Farmers practical knowledge and skills on the enterprise
- 2) Land availability
- 3) Marketability i.e. existence of available (local) market

- 4) Profitability/Cost of production
- 5) Risks associated with the enterprise
- 6) The gestation period – time taken to produce a product or fruit or harvest

Methods for selecting an agribusiness enterprise

1. Socio-environmental analysis method: -This method uses preference ranking method for the selected crops and assigns a score for the enterprise for each of the criteria and the total score will determine what to select.

Note: -

Instructor should guide the learners to select the enterprise that is common in the community where the training is held for both crops and animals. Those selected herein are examples.

Enterprise Selection Criteria

Crop Husbandry

Crop production refers to the science or art of growing crops. Crops categorized into

- Annual crops, these are crops that complete their life cycle in a year for example cereals (millet, sorghum, rice etc.), legumes (groundnuts, beans, soya beans etc.), solanacea (tomatoes, tobacco, egg plants, green paper etc.), brassicas (cabbage, spinach, Sukuma wiki etc.).
- Perennial crops; these are crops that complete their life cycle in more than one year for example coffee, cocoa, tea etc.

Animal Husbandry

Animal husbandry is the branch of agriculture concerned with animals that are raised for meat, fibre, milk, eggs, or other products. It includes day-to-day care, selective breeding and the raising of livestock. Examples of animal husbandry are: Beekeeping, Dog breeding, Horse breeding, Pig farming, raising cattle, sheep farming, goat farming, poultry etc.

Activity

Using a score of 1 to 5 where score one is the least preferable and 5 the most preferred, produce the scores for the selected enterprises below. Which is the most viable enterprise?

Preference Ranking Table - Crops

S/N	Core Factor	Pointer	Onions	Tomatoes	Groundnuts	Cabbage
1	Market potential	The higher the local market demand and price stability the better				
2	Initial Capital / profitability	The lower the cost of investment or start-up capital required the better				
3	Knowledge and skills of the farmer	The more knowledge the farmer has the better.				
4	Land Available	The smaller the land size and startup costs required for high return the better				
5	Gestation period	The shorter time to produce returns (quick return period) the better				
6	Risks	The lower the risks - weather, diseases, fire, theft, wild animal the better				
Total Score						

Animal Husbandry

S/N	Core Factor	Pointer	Goats	Rabbits	Pigs	Chicken
1	Market potential	The higher the local market demand and price stability the better				
2	Initial Capital / profitability	The lower the cost of investment or start-up capital required the better				
3	Knowledge and skills of the farmer	The more skill and management the better				
4	Land Available	The smaller the land size and start-up costs required for high return the better				
5	Gestation period	The period of development during the carrying of an embryo or fetus inside viviparous animals				
6	Risks	The lower the risks – weather, diseases, fire, theft, wild animal the better				
Total						

Points of emphasis

Agro-ecological conditions: -

- i. Soils- Are the soil types supportive of the enterprise and are they fertile to sustain yield increase?
- ii. Rainfall- Is the amount adequate to support the enterprise? Is it reliable? Or will irrigation be useable due to a nearby water source?
- iii. Climate – Is the weather favorable or are there erratic changes?

Local resources

- i. Availability of land is key – this can be owned or hired
- ii. Availability of labour – family/hired is critical. But labour of women and children should not be exploited
- iii. Other agro-inputs on the market like seeds, fertilizers, chemical, etc. is critical

Risk:

- i. Small land size that do not allow enterprise expansion
- ii. Weather changes are erratic to support business
- iii. High perishability may create marketing pressure
- iv. Poor quality of inputs on the market reduces yield
- v. High price fluctuations make returns unstable
- vi. Few and small capacity buyers means stock overload

Knowledge and skills:

Does the entrepreneur have the necessary knowledge and skills; if not are there opportunities of accessing the knowledge and skills required in developing the enterprise for profit gains

2. Financial Analysis Method

Financial analysis looks at the profitability of the enterprise. Profit is the difference between the production/marketing cost and the sales/revenue.

a) Estimating production and marketing cost

- i. List all production and marketing inputs that are required to run the enterprise e.g. land, labour, farm tools, seeds, poles, agro-chemicals, advisory/technical services, bags, transport etc.
- ii. Quantify all inputs that are listed in the right amount needed
- iii. Establish the unit cost (price) of each input
- iv. Estimate the total cost of production for the enterprise by multiplying the total quantity of inputs by the cost price of each input

b. Estimating sales revenue

- i. Estimate the total yield of the enterprise
- ii. Establish the average market price per unit of yield (e.g. by comparing prices for 2 seasons)
- iii. Estimate the sales revenue by multiplying yield by the average market price per unit of output.

c. Estimating gross margin

Subtracting the total cost from the sales revenue gives the gross margin. A profitable agribusiness has a positive gross margin. The amount must be reasonable. For instance, an enterprise with profit of 100,000/= is less attractive compared to that of 1 million. i.e. Total sales/Revenue – Total cost of production = Gross margin.

Activity

M/s. Zaitun spent 250,000 shillings to produce 3 bags of onions. If she sold each bag at 200,000/=. What is her gross margin?

Note: -A table can be used for the financial analysis calculation

Key messages

“ Undertaking agribusiness venture requires selection of the most viable enterprise. Such choice is arrived at through a detailed process of consultation, calculation and consideration of one’s capacity and resource availability. Learning from others’ experience is important too. ”

Action Plan

After the enterprise selection, the learners should draw an activity plan. Activity plan is the list of activities generated by the farmer with the time frame attached, inputs to be used and the individuals involved. An action plan showing the activities is drawn.

For the enterprise selected, the instructor should guide the learners to undertake implementing it.

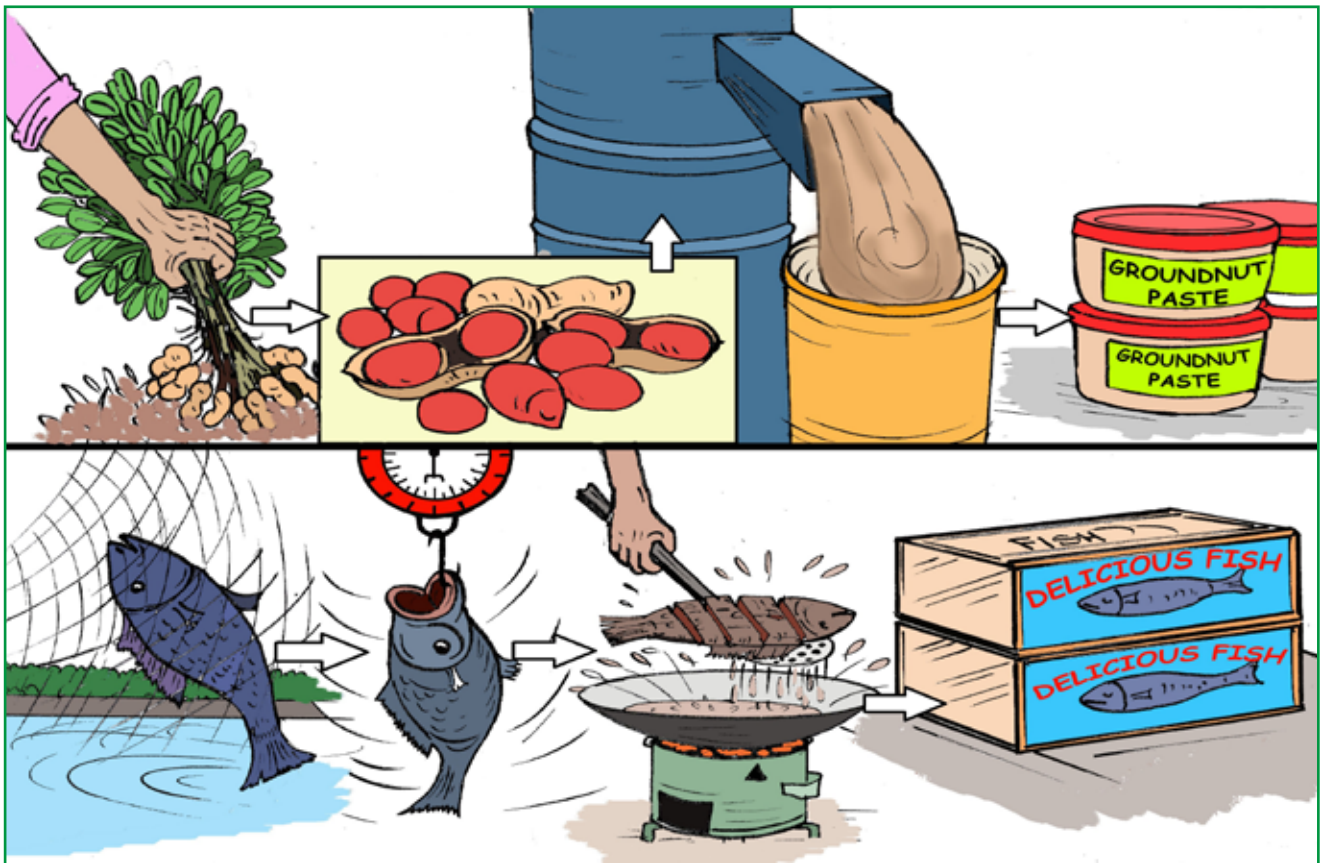
S/N	Activity	Input	Time	Responsible
1				
2				
3				

Literacy Tasks

- Level 1: - Write or spell the methods for selecting an agribusiness enterprise
- Level 2: - Write down the five most common agribusiness enterprises in your community.
- Level 3: - With reference to the above agribusiness enterprises, select any two and write short sentences on why people have chosen them as an investment.
- Level 4: - If you are allowed to select an enterprise from among the above, describe how and why you will choose the most viable enterprise.

Numeracy Tasks

- Level 1: - How many variables are used in the table above for enterprise selection?
- Level 2: - From the scores above which enterprise has the highest and lowest scores for crops and animals?
- Level 3: - Looking at the core factor in preference ranking for crop and animal husbandry, which factor is most important?
- Level 4:- From the above table calculate the average score for crops and animals' enterprises.



6.0 VALUE CHAIN AGRIBUSINESS

Introduction

Agricultural products increase in value from the farm to the market and even home where they are consumed. This session will put emphasis on the opportunities at all stages in agribusiness such as preparation, production, harvesting, storage, processing, marketing etc. The value the agricultural product gains at these stages is the area for discussion.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Demonstrate the understanding of the agribusiness value chain
- ii. Identify the opportunities along the agribusiness value chain
- iii. Select the feasible activities along the agribusiness value chain they can engage in
- iv. Undertake literacy and numeracy tasks on value chain

Materials to use

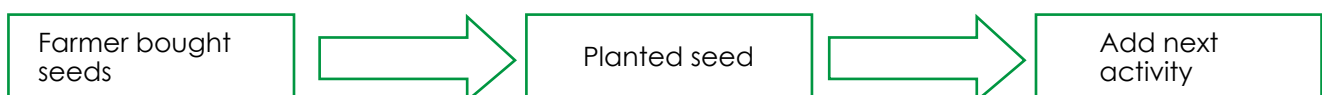
Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners to the session 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	45 Minutes	<ol style="list-style-type: none"> 1. Bring in any three products (for example sugar, mango juice, posho, etc.) that was packaged and produced in Uganda (from your locality). 2. Divide learners into groups. Using a flow chart, ask them to describe the steps taken to produce the final product. 3. From the notes, describe the value chain as illustrated. (differentiating between the Supply chain and Value chain) 	<ol style="list-style-type: none"> 1. Observe 2. Describe the steps taken to produce the final product 3. Take note actively
III	45 Minutes	<ol style="list-style-type: none"> 1. Divide learners into three groups: 1. Farmers 2. Processors/Manufacturers 3. Retailers 2. Ask them to consider the value chain of the product from the last activity. Tell them in this activity they will need to think about the tasks involved at the three different stages and the kind of jobs needed at each of these stages. 3. Ask each group to use the example product and list all of the activities that should happen at their stage and all of the jobs they can think of that are associated with that stage. 4. Once the groups have finished, ask each group to present, fill in any gaps, and discuss. Explain and clarify the differences at each stage (using the examples that were generated in the groups) of "on farm "and "off farm" activities: 	<ol style="list-style-type: none"> 1. Groups formed 2. Take instructions and seek for clarification where necessary 3. List all the activities for the selected product 4. Makes presentation as instructor fills the gaps
IV	15 Minutes	<ol style="list-style-type: none"> 1. Ask each learner to identify a product and develop a workable value chain as an action plan 	<ol style="list-style-type: none"> 1. Choose a product and develop the value chain as an action.
V	10 Minutes	<ol style="list-style-type: none"> 1. Guide in literacy and numeracy tasks 	<ol style="list-style-type: none"> 1. Undertake literacy and numeracy tasks

Session Notes

- Bring in a product (mango juice, for example) that was packaged and produced in Uganda (or a product from your locality).
- Divide the participants into 3 or 4 groups.
- Using a flow chart, ask learners to describe the steps they took to produce the final product (i.e. farmer bought the seeds and planted crops, crop was harvested, crop was processed, etc.).



- Instructor must have the following tools: marker pens, flip charts, masking tapes
- The Instructor must ensure participation of all members.
- He or she should probe the learners on the subject matter

What is a value chain in agriculture?

Agriculture value chain refers to all the activities needed to bring a product from production to delivery (finished product).

Production refers to all the activities involved in the field level like land preparation, planting, weeding and other general field management practices up to harvesting.

It is the full range of activities that are required to bring a product or service from initial stage, through the intermediary phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use.

This includes activities such as

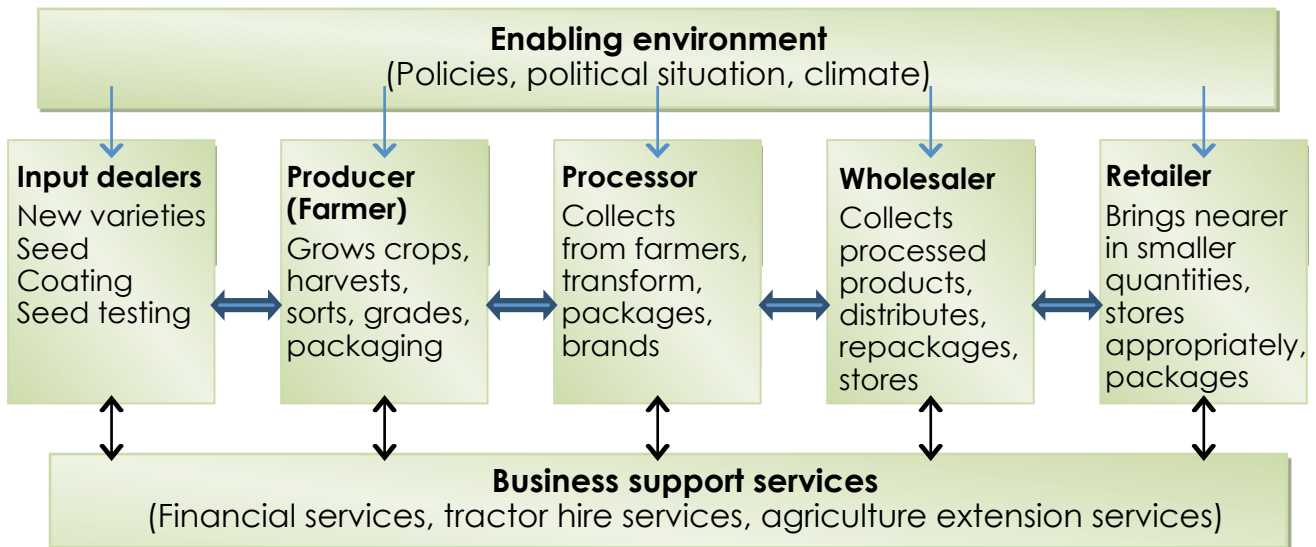
- 1) Preparation
- 2) Identification
- 3) Design
- 4) Production
- 5) Marketing
- 6) Distribution
- 7) Support services up to the final consumer (and often beyond, when recycling processes are taken into account).

The term 'value chain' refers to the fact that value is added to the preliminary product through combination with other resources (for example tools, manpower, knowledge and skills, other raw materials or preliminary products). As the product passes through several stages of the value chain, the value of the product increases.

There is a tendency to confuse value chain with supply chain. The two concepts have significant difference. The value chain has a larger focus and scope.

Supply chain is simply the transfer of a commodity from one stakeholder to another in a chained manner. The value chain is the value addition at different stages of transfer. In different stages of value chain, different stakeholders add value to the product to increase the end product value.

Value Chain Chart



Note:

- There can be fewer or more actors in one value chain
- One actor can do more activities of other actors e.g., farmer packaging produce, processing them first or processor distributing products like the wholesaler and the retailer

Key note

The word 'value' means usefulness of a product and 'chain' is a set of interconnected parts. Value chain therefore means the steps or stages a product goes through and in each step, the product becomes more useful. More value is added to it. The activities such as removing the cover of groundnuts, grinding maize, putting tomatoes in fridge is called the "value addition" and the person who removes the cover of groundnuts, or grinds the maize or puts the tomatoes in the fridge is the "value chain actor"

The supply chain model is listed below: -

						Consumer sales
					Whole selling	8
				Transportation	7	
			Processing	6		
		Grading, Packing, Storage	5			
		Harvest and post-harvest handling	4			
	Farm Production	3				
Input	2					
1						

Identifying jobs within the value chain

Activity

Ask learners to consider the value chain of the product from the last activity. Tell them in this activity they will need to think about the tasks involved at three different stages and the kind of jobs needed at each of these stages.

Divide learners into three groups: 1. Farmers 2. Processors/Manufacturers 3. Retailers

Ask each group to use the example product and to list all of the activities that should happen at their stage and all of the jobs they can think of that are associated with that stage.

Once the groups have finished, ask each group to present, fill in any gaps, and discuss. Explain and clarify the differences at each stage (using the examples that were generated in the groups) of “on farm “and “off farm” activities:

- On Farm: improved production; seed multiplication/germination; value addition
- Off Farm: post-harvest handling/storage; transportation; collective marketing; sales of improved seeds; fertilizers; marketing; storage

What can I do along the value chain?

Ask learners: **Think about the last activity you just did where we discussed different activities and tasks along the value chain. What activities would you like to be involved in along the value chain?**

Ask each learner to select an on-farm **or** off-farm activity that they think they would be interested in (using the crop of their choice).

Task: Develop an action plan for the value chain of a product that you can implement

Action plan

S/N	Activity	Input/requirement	Source of inputs	Time frame	Responsible
1	Seed multiplication	Potting bags, manure, pesticide	Input shops, agric officers	1 st week of April 2018	Group C/ person
2	-				
3	-				
4	-				

Key Messages



Value chain agribusiness means you sell a product whose value has increased beyond the farm. Knowing the value chain enables one to be proactive in value addition. Agribusiness products increase in value as they get closer to the final consumer.



Literacy Tasks

- Level 1: - Write a short sentence on the words **value chain** and **supply chain**.
- Level 2: - Identify an agribusiness product and write its value chain and supply chain
- Level 3:- Describe the value chain of an agribusiness product you would love to undertake.
- Level 4:- From your community choose the most commonly consumed agricultural product and develop its value chain to generate high returns.

Numeracy Tasks

- Level 1: - Find the value of $181 + 111 = \underline{\hspace{2cm}}$; $200 \times 20 = \underline{\hspace{2cm}}$; $156 \div 12 = \underline{\hspace{2cm}}$
- Level 2: - If two (2kgs) of beans can plant 1 quarter of an acre, how many Kgs of beans can plant three quarters of an acre.
- Level 3: - If half a kilogram of packaged groundnut paste is as a result of grinding one hand washing basin of unshelled groundnuts, how much paste would one get from 10 hand washing basins of unshelled groundnuts? How much does it cost to process the groundnuts into paste and package?
- Level 4:- Considering the market in your community, using the cost of a kilogram of groundnut paste, what was the proportion of the value addition for the final product in level 3 above?



7.0 RECORD KEEPING

Introduction

This session will guide the learners on record keeping as one of the critical factors for the success of an agribusiness venture. Record keeping is about documenting what is happening in the business. To be successful, farmers need to be good producers. Farmers also need to be financial managers; that means keeping accurate farm records (FBC, 2017). Just keeping proper paperwork can earn you as much as 65 to 85 percent of the points you need to pass a particular section of the U.S. Department of Agriculture's good agricultural practices and good handling practices audit. If You Don't Write It Down, It Didn't Happen (LSU, 2015). According to the Journal of Agriculture (2015), in a study conducted in Mbale, over 60% of the farmers keep production records but also think it is a time wasting venture.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Identify the different types of agribusiness records.
- ii. Demonstrate understanding of various record keeping formats.
- iii. State the importance of records in planning and decision making
- iv. Undertake literacy and numeracy tasks in records keeping

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none">1. Welcome the learners2. State the session objectives	<ol style="list-style-type: none">1. Active listening
II	45 Minutes	<ol style="list-style-type: none">1. Through brainstorming, ask the learners to think of the various types and tools of farm records.2. Note down their responses and illustrate to them as in the notes3. Put two empty flip charts on the wall. One indicating type of farm records and the other use of farm records4. Allow each learner to note down at least one storage practice and one use of farm records5. Summarize by the use of the notes the various uses and types of farm records as in the notes	<ol style="list-style-type: none">1. Give their responses.2. Take note actively
III	50 Minutes	<ol style="list-style-type: none">1. Divide learners into four groups for role play2. Each group should select one enterprise and "run" their business.3. Ask learners in each group to assess their performance in their business and ask them questions as in the notes.4. Summarize by emphasizing the importance of record keeping in agribusiness	<ol style="list-style-type: none">1. Groups formed2. Each group acts the play3. Take note actively
IV	10 Minutes	<ol style="list-style-type: none">1. Guide the learner to undertake literacy and numeracy tasks	<ol style="list-style-type: none">1. Undertake literacy and numeracy tasks
V	10 Minutes	<ol style="list-style-type: none">1. Guide them to draw and implement an action plan on record keeping	<ol style="list-style-type: none">1. Draws an action plan on record keeping

Session Notes

Ask the learners to identify an agricultural enterprise and list down all the information to be kept in the stages of input, production and marketing.

Meaning of Records Keeping

Record keeping is the systematic compilation of certain types of information. Reliable and accurate records are used to make better decisions affecting the farm. A record is a written proof of what happened, what is happening, or what is anticipated to happen. A record can also be a written proof of what was said, and who said it. Some examples are: Minutes of a meeting, a report on the number of group members who worked in the group project, a record of the names of members who have brought in their membership contribution.

Types of farm records

Input record details the materials purchased and invested in the business. This should include the name of the input, the date of purchase, the price of the input, the amount of input(s) obtained, the total expenditure and where possible the expected useful life of the input.

Farmer labour record

This type of record details the labour used for the various tasks on the farm. Information in the record includes the activities, the period when the activities took place, the duration of the activities, the amount of labour used and the cost of the labour.

Farm production record

This record details the output from business in a given period. It is advisable to record information in the production records at regular intervals e.g. weekly, bi-weekly, monthly or quarterly.

Sales record

The sales record is used to capture information on the sales made. It should include the volumes of the produce sold, date of the sale, the average selling price, the type of buyer and the mode of payment.

Storage of Farm records

- Farm records should be stored in files
- Ledger books
- Cupboards
- Counter books
- Computers (where affordable).

Inventory records

Inventory is an accounting term that refers to goods that are in various stages of being made ready for sale, including: Finished goods (that are available to be sold); Work-in-progress (meaning in the process of being made); Raw materials (to be used to produce more finished goods)

Use of farm records

- Farm records will guide on timely planting or seasonal calendar
- Helps the farmer to track costs and prices of inputs
- Helps the farmer to track and assess whether the farm is operating on profit or loss
- Enables the farmer to know the history of the farm or business
- Farm records are requirements to access credits e.g. loans, etc.
- Helps in planning and budgeting

- Farm records can help in tracking creditors, debtors and settling disputes.
- Helps in equal sharing of profits and losses in case of a group farm/enterprise

Production activity / activity records

Activity	Start date	End date	Cost (UGX)	Remarks

Expenditure records

Date	Description	Quantity	Unit cost	Amount (UGX)

Income records

Date	Description	Quantity	Unit cost	Amount (UGX)

Inventory sheet

Item	Purchase date	Quantity	Value/Cost	Condition

Tools for keeping farm records

- Visitors book
- Receipt book
- Reports
- Activity record book
- Income and expense record book
- Vouchers

Activity (Role Play)

- 1) Divide learners into four groups
- 2) Each group should select one enterprise and “run” their business.
- 3) Group one should not keep proper records for their business
- 4) Group two should not keep records at all
- 5) Group three should record everything related to their business and store the records in a safe place.

- 6) Group four should have more members than other groups divided into:
- Good Customers – who buy on both cash and credit terms and honour their payments
 - Bad customers – who buy on credit and then neglect to pay (theft).
 - Friend of a shop/business employee – who misleads the employee into giving them goods/services without paying (and no intention of paying) and even convinces the employee to steal business property.
 - Owner of the business.
 - Bank/MFI/SACCOS – who will take the property of the business if the owner fails to pay back the loan.

Allow each group to run their business.

Instructors' Note

For a class of 20-25 learners group 1, 2 and 3 should have 2 - 4 members each and group 4 should have 13 members.

Reflection: Ask learners (each group) to assess their performance in their business. Questions to be asked:

- 1) Did they succeed in their business or not?
- 2) What were the indicators of their success?
- 3) What made them succeed or not succeed?
- 4) If the business did not succeed, what factors should the owners consider for them to succeed?

Common terms in agricultural production

Acre –land measuring 4047 square meters i.e. 90m by 45m or one football ground is 90% of an acre. The ordinary farmer takes an acre to be 70m by 70m. Standard is 40m by 100m. According to the ordinary farmer quarter acre is 35m by 35m

1 hectare = 2.5 acres

1 Acre = 40% of Hectare

Potential yield per acre and Cost

S/N	Crop/Enterprise	Yield per Acre	Inductive Market Price (2018)
1	Beans	800 – 1000 Kgs	3000 per Kg
2	Maize	1200 – 1500 Kgs	800 Per Kg
3	Tomatoes	120 – 150 Boxes	180, 000 per box
4	Onions	4,900 Kgs	3,000 per Kg
5	Ground nuts	2,000 Kgs	4,500 per Kg
6	Cassava	4,000 Kgs	1,500 per Kg

Key messages



Keeping farm records enables one to know whether the business is profitable or not. Such records need to be deliberately planned and implemented consistently. Use them to make decisions.



Action plan

SN	Activity	Requirements	Time frame	Responsible
1	Keeping of farm records	Files, Visitors book, Receipt book/ vouchers, Cash books, etc.	January – December	Farm manager
2	-			
3	-			
4	-			

Literacy Tasks

Level 1: - Write down the example of farm records.

Level 2: - Write a short sentence using the word **record** or any of the farm records

Level 3: - Describe using a paragraph how you would use one of the farm storage tools

Level 4: - 'Farm records make you succeed or fail in agribusiness'- explain the meaning of this statement as a farmer.

Numeracy Tasks

Level 1: - If one acre of land gives a yield of 900kg of beans, how many kgs will one get from two and half acres?

Level 2: - If a farmer planted maize on one acre, Beans two acres, Tomatoes on Two acres and onions on one acre, how many acres did the farmer plant in total?

Level 3: - If one acre of land is equal to 4047 square meters, 12141 square meters will be equal to how many acres?

Level 4: - A farmer has 4 acres of land and would wish to plant beans, maize, tomatoes and groundnuts. Using the 'potential yield per acre table' above, distribute the crops in the land and calculate the approximate yield.



8.0 MARKETING OF AGRICULTURAL PRODUCTS

Introduction

Producing agricultural products with the aim of selling is the major focus of agribusiness. Understanding the marketing of the agricultural products is key to successful agribusiness. In this session learners will learn about marketing of agricultural products and the value of group marketing.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Explain ways of marketing agricultural products to maximize profit
- ii. Undertake group marketing
- iii. Identify and access market information in agribusiness
- iv. Undertake literacy and numeracy tasks related to marketing

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	25 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to identify the markets for agricultural products 2. For each market let them state the agricultural product sold 3. State how it is sold 4. Summarize using the notes 	<ol style="list-style-type: none"> 1. Give their individual responses 2. Take note actively
III	40 Minutes	<ol style="list-style-type: none"> 1. In groups let the learners brainstorm on what they understand by group marketing, its challenges and how can they overcome them. 2. Summarize using the notes. 	<ol style="list-style-type: none"> 1. Form groups and brain storm on group marketing 2. Take note actively
IV	30 Minutes	<ol style="list-style-type: none"> 1. Through brain storming discuss market information 2. Summarize using the notes 	<ol style="list-style-type: none"> 1. Give responses as the instructor guides 2. Take note actively
V	10 Minutes	<ol style="list-style-type: none"> 1. Guide learners to develop action point on marketing 	<ol style="list-style-type: none"> 1. Develop action point on marketing.
VI	10 Minutes	<ol style="list-style-type: none"> 1. Guide learners to undertake literacy and numeracy tasks 	<ol style="list-style-type: none"> 1. Undertake literacy and numeracy tasks.

Session Notes

- Ask the learners to identify the markets for agricultural products
- For each market let them state the agricultural product sold

What is agricultural marketing?

- Market is a place (platform) where buying and selling of produce or services take place. Market is made up of buyers, sellers, products and prices.
- Marketing is a set of activities that direct the flow of produce and service from producers to the customers or end users.
- Marketing is the process of exchange between the producer (farmer) who sells, and the consumer who buys.
- Agricultural marketing is about finding out what the consumer needs and then making a profit by satisfying those needs.
- It includes all the activities and services involved in moving an agricultural product from the farm to where it is sold to a consumer. This is the value chain that links farmers with consumers. Many people provide services that make the value chain work smoothly. It is often thought that marketing begins only after the harvest. No!
- The activities commonly associated with marketing include cleaning, drying, sorting, grading and storage, as well as things like transport, processing, packaging, advertising, finding buyers and selling the product.

Market demand

Market demand is the amount and quality of the products and services that customers are willing and able to buy.

Types of Market

- 1) On farm market
- 2) Assembly Markets
- 3) Wholesale Markets
- 4) Retail Markets
- 5) Online markets
- 6) Road side markets

The Marketing Mix

The key components of the marketing mix therefore include product, place, price and promotion; this is commonly known as 4Ps.

- ❖ **Product** refers to the produce that the individual/group is producing for sale to earn income i.e. potatoes
- ❖ **Place** refers to the point of exchange between buyers and sellers or the market e.g. morning and evening markets.
- ❖ **Price** refers to the monetary value of the specific value chain produce. It is the cost at which the buyers are willing to pay for the specific value chain produce.
- ❖ **Promotion** is deliberate effort by the seller to make known to potential customer's existence of his/her specific value chain produce. This is advertising of the product to be sold.

Value Addition

Let us now turn to what happens to a crop after it is harvested. The principles apply to any farm product. We will look at how a farmer can earn more money by doing each of these activities. Adding value is one way farmers can earn more from their product. Below are few examples of value addition:

- ❖ **Drying and shelling** – Many traders will refuse to buy a product that contains moisture or will offer a lower price if it is more than this.
- ❖ **Cleaning and sorting** – Traders often pay a higher price if the produce does not contain foreign matter such as sand, straw, stones or empty grains. They will also pay more for product that is sorted according to variety, size, colour, shape, amount of impurity and ripeness
- ❖ **Bulking** – Many farmers have only one or two sacks of product to sell. But traders find it time consuming and expensive to negotiate with lots of farmers to buy a

small amount of produce from each. Bulking is where farmers put their products together and sold as one whole.

- ❖ **Packaging** – Most products need to be packaged if they are to be sold in market. Packaging prevents the product from being damaged, contaminated or stolen.
- ❖ **Storage** – Prices are low immediately after harvest, so if possible, it is a good idea to store products until the price has recovered. Sometimes it is necessary to store for a few weeks until the price is right.
- ❖ **Processing** – It is possible to add value to many crops by processing them into other products. For example, milled rice fetches a higher price than paddy, cassava flour is worth more than roots and meat is worth more than live animals.
- ❖ **Branding** – Most products and services attract high demand because of branding
- ❖ **Transport** – This can add value by transporting produce/products from area of plenty to areas of scarcity

Group Marketing

Group marketing is the coming together of farmers to sell their produce collectively. This means all the farmers of the agribusiness value chain gather their products like potatoes, cassava together and market collectively.

Importance of group marketing

- Low storage and transport costs
- High farm gate price due to high bargaining power
- Higher profits are realized as produce are sold at high price
- Wide range of market for agricultural produce
- This minimizes the exploitation by the middle men. Farmers would make more money if they by-passed the middlemen by coming together to market their produce themselves. For example, groups may opt to form and register as;
 - Associations
 - Companies
 - Societies

Activity

In groups what are the challenges of collective marketing?

How can they be overcome?

Instructor's notes

Challenges	Mitigation
<ul style="list-style-type: none">• Difficult to agree on all crucial issues if there is mistrust• Dishonesty and non-transparency• Poor record keeping• Lack or inadequate safe collection and storage centres or facility• Theft and losses in poorly secured central facility• Lack of good road infrastructure in the rural areas• Quality assurance• Inability to sustain quantities demanded throughout in an agreed period	<ul style="list-style-type: none">• Have clear rules in the group (constitution)• Have accountable leaders• Ensure proper records kept as individuals and group• Secure storage facility in advance• Have clear roles for each member with responsibilities• Lobby partners like Gov't and development partners on improvement of infrastructure e.g. roads.• Have registered group with official documents• Set and adhere to standards• Outsource from other out growers

Activity

Through brain storming learners discuss: -

- a) What is market development?
- b) What is market information?
- c) Tell the benefits of market information to farmers
- d) Mention main sources of market information to farmers

Market development

- Market development is a deliberate effort to build a market for their products
- It involves carrying out market survey to determine the types of products demanded, potential buyer, quantity, quality of products demanded, prices offered and the time of the year that the demand is higher.
- Once this is known, farmers tailor their production to meet the market demand
- They also need to watch out for potential competitors and put in place measures to out compete them
- Where the competition is high, farmers may link up with consumers/processors to enter into production contracts.

Market information

- This refers to all the relevant information that farmers require to make decision that enables them to realize profitable production. Profitable agricultural production is what translates farming into business.

Importance of market information to farmers

- To know what products are on demand and in what quantities
- To know who the potential buyers or consumers are

- To know at what price to sell;
- To know who else is producing or selling the same product (competitors)
- To know at what time of the year the product is most demanded, noting period of scarcity and plentiful supply of products required by the market

Main sources of market information for the farmer

- Neighboring farmers/other members of farmer group
- Local market
- Middlemen or produce dealers
- Radio and television
- News papers
- Trade development and information office
- Service providers contracted by farmer groups/ organization
- Telephone, including mobile phones and internet, among others

Key messages

“ Agribusiness being production for the market, being armed with the market information to optimize profit is vital. Market driven agriculture is worth promoting taking into account value addition measure and bulking to improve profitability. ”

Action plan

Activity	Requirements	Time frame	Responsible
Registration of the groups	Constitution, registration fees	1 st week of April	Group C/person
Cleaning and sorting	Labour, racks	2 nd week of April	Group C/person
Bulking	Sacks, labour	3 rd week of April	Group C/person
Storage	Shelter, labour	4 th week of April	Group C/person
Packaging	Packaging materials, labour	1 st week of May	Group C/person
Branding	Name, logos, patent	2 nd week of May	Group C/person

Literacy Tasks

- Level 1: - Write down the meaning of marketing of agricultural products to you.
- Level 2: - Describe the 4Ps in marketing in relation to an agricultural product of your choice.
- Level 3: - Describe in short sentences how you would want to market the agricultural product you desire to produce.
- Level 4: - Write at least five things you would do to increase the value of the above product before marketing.

Numeracy Tasks

- Level 1: - From the action plan above, the activities take 6 weeks, if one month has 4 weeks, how many months are in these 6 weeks?
- Level 2: - If one woman can pack 20 packets of a product in a day, how many women will it take to pack 1200 packs a day if they work at the same rate?
- Level 3: - According to the District Commercial Officer, the prizes of onions, tomatoes and ground nuts are respectively 3,500/=, 7,500/= and 4,500/= per kilogram. Scopers one of the young farmers has harvested 80kg of onions, 120kg of tomatoes and 5 sacks of shelled groundnuts. How much will he be paid when he sells the above items?
- Level 4:- From the above products, what is the percentage of income from the sale of tomatoes?



9.0 SOIL AND WATER CONSERVATION

Introduction

According to NARO, about 46% of Uganda's soils are degraded and 10% is very degraded. This session will focus on introducing the youth to the different types of soil. How the fertility of the soil is managed and how soil and water can be conserved in farming? ***A farmer takes care of the soil while the soil takes care of the crops – Didier Van Bignoot (AKF).***

Learning Objectives

By the end of the session, the learners should be able to;

- 1) Understand the types of soil
- 2) Explain the bad and good practices in soil fertility
- 3) Explore the methods of soil and water conservation
- 4) Undertake literacy and numeracy tasks in relation to soil and water conservation

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none">1. Welcome the learners2. State the session objectives	<ol style="list-style-type: none">1. Active listening
II	20 Minutes	<ol style="list-style-type: none">1. In pairs let the learners discuss the meaning of soil and its types.2. Summarize using the notes	<ol style="list-style-type: none">1. Give their responses as the instructor guides2. Take note actively
III	35 Minutes	<ol style="list-style-type: none">1. In groups, ask learners to discuss factors leading to loss of soil fertility.2. Summarize using the notes	<ol style="list-style-type: none">1. Groups give their responses as the instructor guides2. Take note actively
IV	50 Minutes	<ol style="list-style-type: none">1. Brain storm on measures of soil and water conservation2. Summarize using the notes	<ol style="list-style-type: none">1. Give their responses as the instructor guides2. Take note actively
V	10 Minutes	<ol style="list-style-type: none">1. Guide the learners to undertake literacy and numeracy tasks	<ol style="list-style-type: none">1. Undertake tasks as instructor guides

Session Plan

Soil and water conservation

Soil is the medium from which plants obtain their food elements/nutrients.

It's very important as a farmer to understand that soil is living organism which should be handled with care to avoid the possible ways of destroying its life.

Soil is considered a living entity because for it to support plants for its healthy growth, it should have water, air, micro and macro organisms and elements.

Soil comprises of parent rock, mineral matter, water, air, organic matter and living organisms (micro and macro organisms). These materials when decomposed, they provide humus which increases the water holding capacity of the soil and nutrient availability.

Soil in farming

Soil is the medium from which plants obtain nutrients and water to grow and yield. It is very important for the farmer to ensure that the soil remains fertile to sustain farming for many years. Soil has three main different types; clay soil, sand soil and loam soil. Different crops grow well in different types of soil.

Soil fertility refers to the ability of soil to supply/provide all plant nutrients in a given period of time.

What shows that a given soil is fertile?

- The vigor of vegetation growing in it. Faster growth and deep green colour of vegetation in a given soil shows good fertility.
- The dark colour. Dark soil in most cases is more fertile.
- Organic matter accumulation

- Presence of micro/macro organisms like termites, earth worms etc.
- The soil depth in that particular soil. Deep soils are more fertile compared to shallow soils.

Soil erosion

Refers to the removal or carrying away of the fertile topsoil from one place to another.

The agents of soil erosion

- Water
- Wind
- Man
- Animals

Explain the factors that influence the rate of soil erosion

- Rain fall intensity; During heavy rain fall, little amount of water infiltrate into the soil hence this results in large volumes of water flowing as surface run off carrying away large amount of soil.
- Topography: The longer and steeper the slope, the greater the velocity and erosive power of the erosion.
- Type of soil
- Nature of vegetation cover
- Farming practices
- Wind velocity
- Prolonged drought

Types of soil erosion

- Splash or rain drop erosion
- Sheet erosion
- Rill erosion
- Gully erosion
- Wind erosion
- River bank erosion

Effects of soil erosion.

- Top soil is removed which contain organic matter, plant nutrients and living organisms. This make the soil less fertile hence lower crop yields.
- Leaves the soil bare hence hard to cultivate.
- Destabilizes the soil profile by carrying soil particles from one place to another. This leads to exposer of the subsoil that is not suitable for farming.
- Infertile soil being carried by erosion can be deposited on fertile soils elsewhere hence reducing its productivity.

- It may uproot the entire crop especially the young plants and shallow rooted ones
- Crops at the bottom of slopes may be buried by the eroded soil and debris.
- Gully erosion makes some of the field operations impossible i.e. mechanization, damage road net works
- It increases the cost of production i.e. maintenance of roads, putting in place control measures
- Weed/weed seed can be carried from one place to another by erosion water.
- Exposes roots of crops hence reducing their stability into the soil. Root crops like carrots, sweet potatoes, Irish potatoes etc. when exposed they form green colour, hence lowering their quality.
- Washes agrochemicals into streams thereby causing pollution
- Silting as result of erosion blocks drainage and irrigation channels and reduces their effectiveness.
- Crop pests and diseases may be carried from one place to another.

Factors leading to loss of soil fertility

Soil erosion; this results into loss of the fertile top soil which is rich in plant nutrients, organic matter and soil micro/macro organisms.

Mono cropping; this is where the same crop type is planted in the same garden over a long period of time. The same crops draw similar nutrients from the soil, they also draw nutrients from the same depth making that garden deficient of the specific nutrients. Such soils become infertile in future.

Bush burning; is where the bush is set on fire burning plant matter and microorganisms. Plant matter decompose to form organic matter which is food for crops and microorganisms break down the organic matter. The practice of bush burning also leads to soil erosion hence soil infertility.

Over grazing; this is grazing a large number of livestock on a piece of land (for long) leading to reduced plant cover, emergence of unpalatable weeds and soil erosion. This leads to soil infertility and shortage of pasture for livestock.

Wetland cultivation; this refers to digging in the water valleys/near rivers and swamps. This makes the water catchment areas very narrow, unable to hold enough water. This further leads to flooding which destroys crops, siltation or blockage of the water bed making the river shallow and dry off.

Deforestation; This is cutting of trees without replacing where they occur. This practice exposes the soil to agents of erosion, reduced attraction of rainfall due to reduced transpiration and changes in number of microorganisms. The overall results are soil infertility and climate change.

Wrong use of agro chemicals; when agro chemicals are used wrongly can affect the life of soil living organisms which play a key role in the breakdown of organic matter and their activities that help in the aeration of the soil. It also changes the chemical nature of the soil (soil PH) which may not favor the growth of certain crops and availability of soil nutrients in the soil.

Soil pollution; soil pollutants today are many including plastics, polythene materials (kavera) spills of oils/lubricants.

Methods of soil and water conservation

These are the measures taken to promote efficient use and maintenance of soil and water in the farm land.

1. Mulching is the act of covering the soil surface with dry vegetative material. It plays the following roles in soil and water conservation.

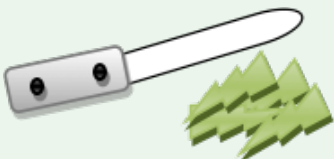
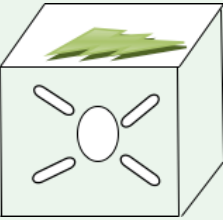
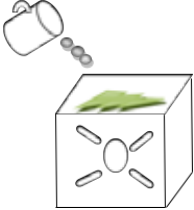
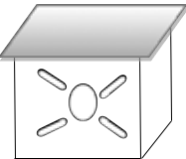
- Checks (reduce) the surface run off of water,
- It also minimizes the direct impact of rain drops on the soil
- Reduce rate of evaporation of soil moisture.
- Enables infiltration of water into the soil
- Suppress weed growth in the tomato garden

2. Trash lines this is the practice of placing plant residues in a line across the field to check or reduce surface run off hence reducing soil erosion.

3. Stone lines this is the practice of placing stones along contour lines to check or reduce surface run off hence reducing soil erosion.

4. Addition of organic manures

a) Plant tea

<p>Cut green leaves into small pieces for easy decomposition (leaves with hairy surface are better)</p> 	<p>Place this materials in a container</p> 
<p>Add some water</p> 	<p>Place the container under a shade, cover and turn at least after every two days. it is ready for use after seven days</p> 

Mix in the ratio of 1:3 (mix the crude 1 cup with three cups of water)

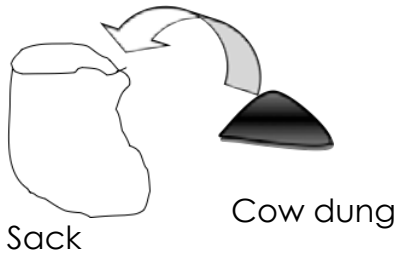


Apply one nice cup of liquid manure per plant. The manure should be poured around the root zone of the plant.

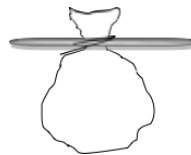


b) Liquid fertilizer

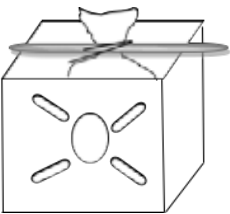
Fill the sack with cow dung as shown below



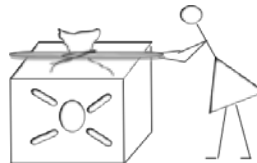
Tie the sack as shown below



Hang the sack filled with dung into a container filled with water.



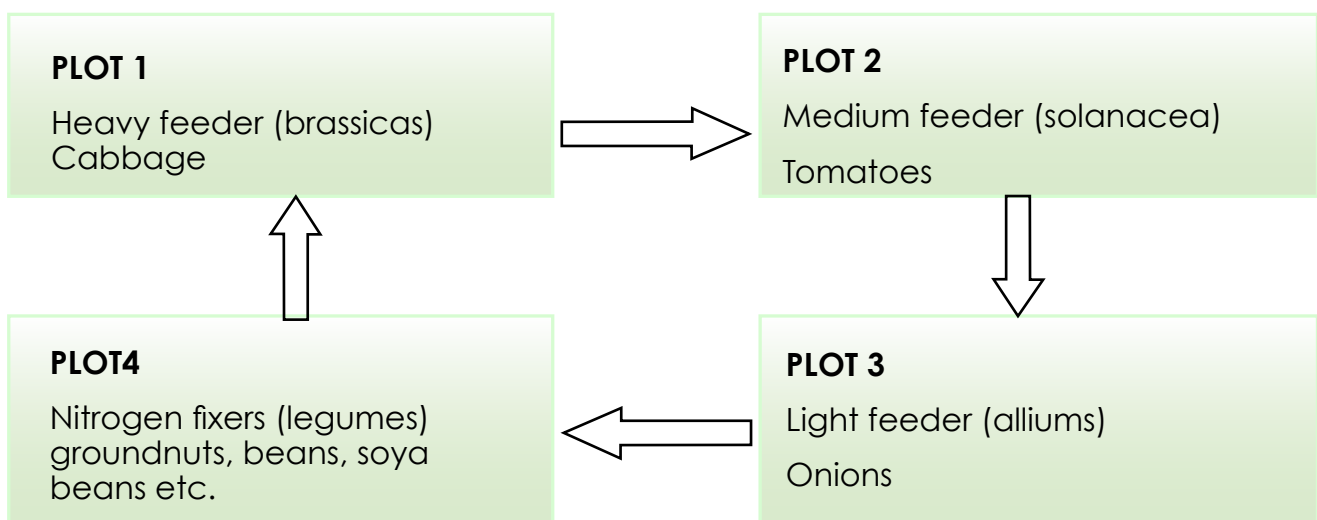
Cover, put under shade and lift the sack up and down at least after every two days to increase release of nutrients into the water. It is ready for use after seven days



Dilute one cup of manure with three cups of water before applying to the crops

Apply one nice cup of liquid manure per plant. The manure should be poured around the root zone of the plant.

Crop rotation



Rotate the crop planting from plot 1 to plot 4 in different seasons.

Factors to consider in crop rotation

- Heavy feeder crops should alternate with light feeder crops
- Deep rooters should alternate with shallow rooters
- Crops of the same family should not follow each other
- Crops with similar pests and diseases should not follow each other
- Include legumes in the cycle
- End the rotation with fallowing the land

Key Message



Take care of the soil and the soil will take care of your plants. Our actions are responsible for the quality of soil we have and use. Use the various means to improve the soil and water conservation.



Literacy Tasks

Level 1:- What are the local names of the soil types?

Level 2:- What are the local ways of soil and water conservation?

Level 3:- Explain how you would make organic manure locally

Level 4:- Write at least five good soil and water conservation practices.

Numeracy Tasks

Level 1:- How many days does the liquid fertilizer take to be ready for use?

Level 2:- If you have 30 plants of tomatoes and you want to apply liquid fertilizer, how many litres of water will be needed to mix this liquid manure so as to apply to all the plants?

Level 3:- If you have five litres of water, how many litres of liquid fertilizer will you have?

Level 4:- How many plants can such amount of fertilizer serve?



10.0 SELECTED ENTERPRISES

Introduction

This session is to introduce learners to selected agricultural enterprises for practice. The crops selected herein are onion production, tomatoes production and passion fruit production. In the animal husbandry category, poultry production and goat rearing have been detailed herein. These enterprises need small initial capital the youth can raise and manage. Besides, they are considered high value short term enterprises.

10.1 ONION PRODUCTION AND MARKETING

Introduction

In this session we are going to have an introduction to onion growing.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. To mention the importance of onion growing
- ii. Explain the weekly activity plan in onion production

- iii. Select and prepare land for onion growing.
- iv. Prepare the Nursery bed, sowing and watering
- v. Handle Weeding, pests and disease control in the onion nursery
- vi. Explain Onion Field Management
- vii. Undertake Onion harvesting and post-harvest handling

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals etc.) etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	20 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to mention why onions are grown. Record their responses on a flip chart. 2. Emphasize the importance as in the notes 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
III	40 Minutes	<ol style="list-style-type: none"> 1. Using Q&A and illustration discuss the activities in onion production following a weekly calendar. 2. Use the notes to guide the discussion. 	<ol style="list-style-type: none"> 1. Actively participate in the discussion. 2. Actively take note
IV	30 Minutes	<ol style="list-style-type: none"> 1. From experience sharing, ask learners to share their experiences on the type of land they have ever grown onions on. 2. Emphasize the land type suitable for onion growing. 3. Highlight using the notes procedure of preparing land for onion growing. 	<ol style="list-style-type: none"> 1. Share experiences 2. Take note actively
V	40 Minutes	<ol style="list-style-type: none"> 1. Through experience sharing, let the learners tell the various steps involved in nursery bed preparation 2. Summarize as in the notes. 	<ol style="list-style-type: none"> 1. Share experience 2. Take note actively
VI	40 Minutes	<ol style="list-style-type: none"> 1. Using Q&A, let the learners show how they can manage their onion fields through transplanting, gap filling, weeding and earthing (soiling up) (take them through the above various ways). 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
VII	35 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to brainstorm on the pests and diseases that they know affect onions and how they can be managed 2. Guide using the notes 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively

Step	Duration	Instructor's Activities	Learner's Activities
VIII	30 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to note down the signs of maturity and harvesting of onions 2. Using their responses, guide them as in the notes 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
IX		<ol style="list-style-type: none"> 1. For practical exercise, the learners should have a nursery bed for demonstration. 2. A piece of land for transplanting be identified and used as a demo garden. 3. Learners should have similar individual or group gardens. 	<ol style="list-style-type: none"> 1. Take note and implement

Session notes

In this session we are going to have an introduction to onion growing. Most of the aspects ought to be practical in the garden.

Importance of onion growing

Ask the learners to mention why onions are grown. Record their responses on a flip chart.

The following should be emphasized.

- For food – they form an important ingredient of various dishes as sauce or salads
- For money - they are high income crops and easy to sell
- They require small acreage (small piece of land)
- They take a relatively short time to mature (120 days)
- They require small initial capital.
- They have a relatively longer shelf life

The common varieties of onions are Bombay red and red Creole.

Onion growing weekly activity plan

Week (S/N)	Growth Stage	Critical Activities	Recommendations
8 weeks before trans-planting	Nursery bed preparation Germination 7-10 Days	<ul style="list-style-type: none"> • Prepare the transplant bed • Monitoring • Watering • Raise the shade • Thinning • Pest and disease • Management (Hardening). 	<ul style="list-style-type: none"> • Soil sterilization • Water twice (morning and evening) • Slant the shade West-East to a height of 10 – 15 cm and a width of 1 m immediately after germination • Reduce watering gradually • Remove the shade

Week (S/N)	Growth Stage	Critical Activities	Recommendations
1	3-5 leaves 6-8 weeks	Transplant	<ul style="list-style-type: none"> • Use clean material for carrying the seedlings • Transplant in the evening
2		Gap fill	<ul style="list-style-type: none"> • Keep the field free of weeds all the time • Use vigorous seedlings for faster growth
3	The fourth and fifth leaves emerge	<ul style="list-style-type: none"> • First weeding • Monitoring for pests (crickets) 	<ul style="list-style-type: none"> • Remove the weeds from the ridges and bury them in the furrows
4	Vegetative growth	Monitoring for pests and diseases (mole crickets, downy mildew, onion thrips)	<ul style="list-style-type: none"> • Spray with organic concoctions/ Pyrethroid and dimethoate derivatives Fungicides (mancozeb, dithane M45) • Phytosanitation
5	Vegetative growth Continues	<ul style="list-style-type: none"> • Second weeding • Monitoring for pests and diseases (mole crickets, downy mildew, onion thrips) 	<ul style="list-style-type: none"> • Phytosanitation • Reduce movement in the field • Do earthing-up
6	Bulbing starts	<ul style="list-style-type: none"> • Monitoring for pests and diseases (mole crickets, downy mildew, onion thrips) 	<ul style="list-style-type: none"> • Spray with dimethoate • Do earthing-up • Phytosanitation • Avoid movements in the garden • Start constructing a store for curing
7	Bulbing continues	<ul style="list-style-type: none"> • Weeding continues • Monitoring for pests and diseases (mole crickets, downy mildew, onion thrips) 	<ul style="list-style-type: none"> • Minimize movements in the garden • Earthing -up continues
8	Bulb expansions increase in size	Field monitoring to check for exposed bulbs	<ul style="list-style-type: none"> • Earthing -up exposed bulbs • Reduce movement in the field Phytosanitation • Avoid foreigners from accessing the field
9	Bulb expansion Continues	<ul style="list-style-type: none"> • Weeding continues • Monitoring for pests and diseases (mole crickets, downy mildew, onion thrips) 	<ul style="list-style-type: none"> • Guard against thieves • Avoid movements in the garden • Phytosanitation (good field hygiene) • Earthing-up for exposed tubers continues
10	Physiological maturity signs appear (10% maturity)	Field monitoring for exposed bulbs.	<ul style="list-style-type: none"> • Guard against intruders (thieves) • Earthing -up for exposed tubers continue • Reduce movement in the field • Phytosanitation (good field hygiene) • Organize the items used during harvesting and drying

Week (S/N)	Growth Stage	Critical Activities	Recommendations
11	Physiological maturity signs intensify (50% maturity)	Field monitoring for theft	Bend the leaves to fasten Maturity
12	Maturity continues (70%)	Start selective harvest in case bending wasn't done	Guard against theft
13	Harvesting	Go for the harvesting	<ul style="list-style-type: none"> • Lifting the bulbs • Take care to avoid bulb injury
14	Post-harvest handling	<ul style="list-style-type: none"> • Drying/ Curing • Storage 	<ul style="list-style-type: none"> • Cure under shade • Well ventilated stores

Land Selection and Preparation

Introduction

Introduce the session by telling the learner that in this session, we are going to learn about land operations in onion production.

Land selection for onion growing

- i. Land that is suitable for onion growing has sandy loam soils with good fertility. Fertility can be seen from the vegetation growing in the area
- ii. Soils with small gravels are suitable for onion production
- iii. The land should not be prone to flooding and it should have a gentle slope to facilitate drainage
- iv. There should not be many trees as they will lead to lots of shade in the field and yet shades affect the development of onions
- v. The land should not have been used for production of onions or ginger in the last 6 months. This will help minimize pests and diseases.

Land preparation for onion growing

- i. The land must be dug and allowed to rest for at least one month. During this period, there is also decomposition of the trash/rubbish to manure for improved soil fertility
- ii. Deep ploughing by use of hand hoe or tractor is recommended to remove most of the weed roots and soften the soil for easy movement of water and air in the soil, but also make it easy for bulb formation and expansion
- iii. Second tillage is then done to produce a fine bed. This will improve crop establishment and growth



- iv. Apply mulch to conserve soil and water and reduce evaporation
- v. If you are planning to plant in the second rains, open your land (first digging) at the end of the first rains. This will enable you to have the land ready for planting by the time the second rains start.

Nursery Operations

Introduction

The learners are going to learn about nursery operations in onion production

Qualities of a good nursery bed

- i. A flat, fertile and well drained piece of land
- ii. Close to water source
- iii. Located in less weed infested area
- iv. In areas with a lot of water, raise the nursery bed 10 -15 cm above the ground (raised bed)
- v. During dry season make a sunken bed (bed is below the ground level)
- vi. The soil should be dug deeply
- vii. Not neighboring ginger and garlic to avoid crossover of diseases or pests (consider cycle of rotation)
- viii. The site should be free from stray animals.
- ix. Should be an open place without a shade

Nursery bed preparation and sowing (Do this practically in the garden)



The steps are:

- 1) Carry out first and second digging. Then do harrowing.
- 2) Set the nursery bed 1m wide and of any length (any length depending on the seeds you have).
- 3) Align the bed considering the slope (across not along the slope) and direction of the sun (north – south)
- 4) Sterilize the soil by burning the top of the bed using dried vegetation at least 5 hours before planting. Chemicals can also be used but they are expensive
- 5) Allow the bed to rest for at least one day
- 6) Mix manure with the soil
- 7) Sow in drills (farrows) 10cm apart at 0.5cm depth and cover lightly. Seed rate is 1.0 - 1.5kgs/acre.
- 8) Mulch the nursery bed with dry vegetation and water it immediately where the soils are dry

Management of nursery

- 1) Immediately after the emergence of the seedlings, raise the shade on the beds slanting eastwards
- 2) Water twice a day in the morning and evening only
- 3) Seeds germinate 7 - 10 days after sowing.
- 4) Start reducing the shade and watering frequency when the seedlings are at least two weeks old. This process is referred to as hardening off.

- 5) Stop watering completely one week before transplanting
- 6) Before watering, it is important to gently pull any weeds that are growing in the nursery bed to soften the soil for easy root establishment. Such weeds compete with the seedlings for nutrients, sun light and water in the soil.
- 7) Keep at least one meter free around the nursery to avoid pests. Spray the nursery with recommended pesticide (duducyper, cypermethrine etc.) to avoid any pest attack.
- 8) One of the most common diseases of onions in the nursery are damping off and blight which are fungal diseases. Damping off causes the stem to rot at the crown, leading to seedling death. To avoid this, one week after germination, spray with mancozeb or Dithane M45 is recommended. Mix one tea spoonful in 5 litres of water. On the day of spraying, ensure you water first and then spray after watering so that the chemical is not washed off the seedlings during watering. Spraying should be done at least 3 hours before or after any rain.

Activity

Divide the class into suitable number of demo groups

This training should be done on a small piece of land, not more than 1m wide and 3 m long. The learners should physically do the work with the instructor giving guidance. It is advisable that at each stage, explanations are given why things are done the way they are done.

Make furrows or planting lines of 10 cm apart across the bed and place (sow) the seeds

Note each group should establish and manage their own nursery

Key message

- a) Indicators of good soils for a nursery bed
- b) Deep cultivation of the field (first digging)
- c) Second cultivation, cleaning and beating up to produce a fine tilth
- d) Laying one-meter width of land for the bed
- e) Soil sterilization
- f) Sowing (sow half a meter of the bed)
- g) Shade construction
- h) Watering
- i) Nursery bed fencing

Onion Field Management

Transplanting and gap filling

- 1) When properly managed in the nursery bed, seedlings are ready for transplanting 6 - 8 weeks after germination. The seedlings will be pencil thick at the base of the stem.
- 2) The seedlings should have not been watered in the nursery for at least 7 days to strengthen them.
- 3) Water the bed heavily on the day of pulling to ease lifting of seedlings and reduce injury to them.
- 4) Pick out the seedlings and transplant into the main garden in the evening in order to avoid long day heat stress.
- 5) Spacing: 30cm x 10cm (1 plant per hole)
- 6) Gaps fill within one week of transplanting for even growth.
- 7) Add water to the planting hole before planting for better establishment.

Weeding and soiling up

- 1) The crop stand should be kept free of weeds at all time, because weeds compete for nutrients and are also vectors for disease. Weed onion field 3-5 times (not after every rain i.e. at least once after every two weeks)
- 2) Hand weeding is recommended as the hoe could lead to damage to the tender plants
- 3) Immediately after each weeding, the soil around the crop is softened and heaped around the crown (soiling up). This facilitates bulb formation and expansion.
- 4) It is also recommended that even when there are no weeds, as long as it rains, soiling up should be done.
- 5) When leaves start yellowing and drooping (bending away from the plants), and the soil around the plants cracks, it is a sign of physiological maturity. The leaves should be bent for faster and uniform maturity. This normally occurs 90 – 100 days after transplanting

Activity



This training should be done on a small piece of land, not more than 3m wide and 5m long. The learners should physically do the work with the instructor giving instructions. It is advisable that at each stage, explanations are given why things are done the way they are done.

Eight skills to learn should include:

- a) Lining up
- b) Lifting the seedlings (watering the seedlings before lifting) – use seedlings raised during the nursery operations practical exercise
- c) Transportation of seedlings from nursery to the garden.
- d) Right size of seedlings
- e) Depth of transplanting
- f) Digging the correct size of planting holes
- g) Correct spacing
- h) Materials for mulching (avoid those with seeds) and the mulching process itself.

Onion Pests and Disease Management






General pest and disease management practices

The onion crop is not attacked by many pests and diseases as other horticultural crops. This is because of its smell which repels some of the pests and disease vectors. It is however not completely immune to attack. It is therefore recommended that the following general practices of pest and disease management be used.

- 1) **Crop rotation** – break the pest lifecycle.
- 2) **Early planting** – your crop escapes by the time pest/disease incidences rise, you are harvesting.
- 3) **Use resistant varieties** – they resist damage

- 4) **Weed control** – weeds affect crop vigor which is related to damage. Weaker crops are more damaged.
- 5) **Scouting** – To spot pests/diseases early and control them in time
- 6) Correct identification of pest or disease so as to use the right control strategy

Common Onion Pests and their Control

S/N	Pest	Photo/Picture	Control
1	Onion Thrips – - Feed at the base of the plant, within the leaf sheath causing sunken leaves and silvery patches. - Excreta of the insects appear as black spots on the leaves.		Crop rotation, Timely planting, Spray with spinosad (an organic pesticide) or cypermethrin.
2	Onion Crickets – They cause serious damage to the crop particularly at the beginning of the season, both in the nursery bed and after transplanting in the main field.		Field hygiene by timely weeding especially immediately after transplanting.
Common Onion Diseases and Their Control			
1	Downy Mildew – - Lesions form near tips of old leaves (elongated yellowish patches) - Leaves die back and this extends to younger leaves		Crop rotation, Use clean propagules, Spray every seven days with a fungicide when signs of infection appear.
2	Purple Blotch – Small white spots form on the foliage expanding rapidly under moist conditions.		Crop rotation, Use clean propagules, Spray every seven days with a fungicide when signs of infection appear.
3	Yellow Dwarf – This is a viral disease transmitted by aphids; symptoms appear as short yellow streaks at the base of the first leaves as it emerges through the neck of the bulb.		Timely planting, Improved field hygiene and sanitation

Onion Harvesting and Post- Harvest Handling

Signs of maturity and harvesting of onions

- a) Onions take 165 – 170 days to mature including days in the nursery bed
- b) Bulb necks become thin
- c) Leaves bend over/droop
- d) Leaf bending can be done by the farmer during the last month of maturity (to fasten ripening)
- e) Harvest during dry weather

Post – harvest handling of onions

- a) Dry in open sided bands or under tree shade on a raised platform that allows air circulation from the bottom of the heap. Onions should be cured for at least two to three weeks or until the tops neck are completely dry and the outer skin on the onion becomes slightly crisp. Cut tops off to within one inch after drying is complete
- b) Drying under hot sun leads to scorch burns on bulbs
- c) Delayed drying after harvest can cause rotting
- d) Store until required for sale or use
- e) Store in good houses, well ventilated for further curing
- f) Tie bunches by the leaves and hang in an onion store which is well ventilated, cool and dry

Quality considerations and marketing of onions

- a) Onions are accepted in the local market, supermarkets and other institutions because of their quality
- b) When targeting specific markets, grade before selling by sorting according to size, variety, colour and weight
- c) Onion can be delivered to markets in bags, baskets or any other packaging that is specified by the customer
- d) Always have contacts of customers and share information with them e.g. expected quantity to sell, quality, time of harvest, variety planted, price and packaging
- e) Marketing should be done after establishment of the demand and price at a given market and individual farmers are encouraged to bring together their produce so as to have better bargaining power.

Note: get additional information from;

- Supplementary materials from the production department
- Market information from the district commercial office
- Information on weather from production department
- Technical advice and guidance from the experts, extension workers

Cost benefit analysis for one acre of onions cultivation (Assuming yield is 10 tons/acre)

Expenditure		Ushs
Seeds	1 kg x 100,000	100,000=
Nursery Bed Management		200,000=
Fertilizers	50 kg x 2,000	100,000=
Slashing		60,000=

Expenditure		Ushs
1 st Digging		80,000=
2 nd Digging		80,000=
Planting		200,000=
Hand Weeding	50,000 x 2	100,000=
Chemicals		100,000=
Chemical Spraying	2 x 50,000	100,000=
Harvesting		100,000=
Drying & Storage		300,000=
Sacks		200,000=
Transport		300,000=
Total		2,020,000=
Income		Ushs.
10,000 kg	10,000 kg x 1,000	10,000,000=
Income – Expenditure	10,000,000-2,020,000	7,980,000=

Source: Koboko District Agriculture Office

Onion Enterprise

Capital Investment Costs

Item	Units	Qty	Unit Cost	Amount
Seedlings	Sacks	3	120,000=	360,000=
Spray Pump		3	60,000=	180,000=
Organic Manure	Sacks	3	70,000=	210,000=
Pesticides			120,000=	120,000=
Total				870,000=

Operating Costs for 3 Months

Item	Units	Unit Cost	Amount
Rent (Land Hire)	1 Acre/Season	100,000=	100,000=
Labour	3	100,000=	300,000=
Total			400,000

Expected Yields & Profits (3 Months)

Profitability Item	Units	Unit Cost	Amount
Total Revenue	9 Sacks=630kgs	3000/Kg	1,890,000=
Less: Production & Operation Costs			400,000=
Profit			1,490,000=

Source: UWEP Compendium of Business Enterprise Models Vol 1, 2018



10.2 TOMATO PRODUCTION AND MARKETING

Introduction

This session is going to be an introduction to tomato growing.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. To mention the importance of tomato growing
- ii. Know the weekly activity plan for tomato production
- iii. Select and prepare suitable land for tomato growing

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals etc.) etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	25 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to mention why tomatoes are grown. Record their responses on a flip chart. 2. Emphasize the importance as in the notes 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
III	30 Minutes	<ol style="list-style-type: none"> 1. Through discussion list the 10 different activities to carry out in tomato production. 2. Use the notes for guidance 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
IV	30 Minutes	<ol style="list-style-type: none"> 1. From experience sharing, ask learners to share their experiences on the type of land they have ever grown tomatoes on. The instructor takes the learner to a nearby suitable site. 2. Emphasize the land type suitable for tomato growing. Land selection criteria from the notes 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
V	30 Minutes	<ol style="list-style-type: none"> 1. Through discussion ask the learners to give the procedure of preparing land for tomato growing. 2. Emphasize using the notes. 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively

Importance of tomato growing

Ask the learners to mention why tomatoes are grown. The following should be emphasized.

- a) For food – they form an important ingredient of various dishes as sauce or salads
- b) For money – they are high income crops and easy to sell
- c) They require small acreage (small piece of land)
- d) They take short time to mature (90 days)
- e) They require small initial capital

Tomato varieties

Non hybrid: - Cal J, Tengeru, money maker, Marglobe, Riogrande etc. and hybrid includes; Nuru F1, Fortune maker F1, Asila F1, Bingwa F1 etc.

Tomato growing weekly activity plan

Through discussion outline activities to be carried out in tomato production. The activities should be recorded in the order they occur in the season.

Week/SN	Growth Stage	Critical Activities	Recommendations
8 weeks before trans-planting	Nursery bed preparation Germination 5-7 Days	<ol style="list-style-type: none"> 1. Prepare the transplant bed 2. Monitoring 3. Watering 4. Raise the shade 5. Hardening 6. Pest and disease management. 	<ol style="list-style-type: none"> 1. Soil sterilization 2. Fence the nursery bed after sowing 3. Water twice (morning and evening) 4. Slant the shade West-East to a height of 15 – 30 cm and width of 1m immediately after germination 5. Reduce watering gradually 6. Remove the shade
1	Tomatoes are ready for transplanting when they have 3-5 leaves or when 3 weeks old	<ol style="list-style-type: none"> 1. Transplant and provide a temporary shade immediately after transplanting. 2. Remove the shade after 3-4 days 	<ol style="list-style-type: none"> 1. Use clean material for carrying the seedlings 2. Transplant in the evening 3. Use a recommended spacing 4. Provide temporary shade
2		Gap fill	<ol style="list-style-type: none"> 1. Keep the field free of weeds before gap filling 2. Use vigorous and healthy seedlings for faster growth
3	The fourth and fifth leaves emerge	<ol style="list-style-type: none"> 1. First weeding 2. Monitoring for pests - crickets, cut worms (aphids, red mites) 	<ol style="list-style-type: none"> 1. Remove the weeds from field, taking care not to injure the plants 2. Spray with organic concoctions/ Pyrethroid/ pesticides
4	Vegetative growth	<ol style="list-style-type: none"> 1. Monitoring for pests i.e. cutworms, red mites, aphids and diseases i.e. bacterial wilt, late blight 2. Staking starts 	<ol style="list-style-type: none"> 1. Spray with organic concoctions/ Pyrethroid and dimethoate derivatives 2. Fungicides (mancozeb, dithane M45) 3. It is recommended to practice mulching
5	Flowering starts and production of suckers A sucker is a plant growth from the rootstock. Grows like small leaves in tomatoes.	<ol style="list-style-type: none"> 1. Monitoring for pests and diseases (aphids, thrips, late blight, bacterial wilt) 2. Pruning should start. 	Reduce movement in the field
6	Flowering	<ol style="list-style-type: none"> 1. Monitoring for pests and diseases (Bacterial wilt, late blight) 2. More pruning – with care to avoid flower damage). 	<ol style="list-style-type: none"> 1. Phytosanitation 2. Avoid movements in the garden 3. Spray with organic concoctions/Pyrethroid and dimethoate derivatives

Week/SN	Growth Stage	Critical Activities	Recommendations
7	Fruit formation starts	<ol style="list-style-type: none"> Monitoring for pests and diseases (Bacterial wilt, Late blight) More pruning - with care to avoid flower damage) 	<ol style="list-style-type: none"> Spray with organic concoctions/ Pyrethroid and dimethoate derivatives Keep the field weed free Avoid movements in the garden
8	Fruits increase in size	Field monitoring to check for diseases/ pests (Boll worms, fruit canker)	Limit movements in the field, and where necessary, move carefully in the garden
9	Physiological maturity signs appear (10% maturity)	Field monitoring for diseases/pests	<ol style="list-style-type: none"> Guard against intruders (thieves) Reduce movement in the field Phytosanitation Organize the items used during drying
10	Start of harvesting	Field monitoring for theft	Guard against intruders (thieves)

Land Selection and Preparation

Introduction

Introduce the session to the learners that today, we are going to learn about proper land selection and preparation for good tomato production.

Activity

Divide the learners in to demo groups to select their suitable site

Land selection for tomato growing

- Land that is suitable for tomato growing has sandy loam soils with good fertility. Fertility can be seen from the vegetation growing in the area. **(Ask the learners to mention the characteristics of vegetation indicating good soil fertility).**
- The land should not be prone to flooding and it should have a gentle slope to facilitate drainage.
- There should not be many trees as they will lead to lots of shade in the field and yet shades affect the development of tomatoes.
- The land should not have been used for production of egg plants, pepper, Irish potatoes, in the last 6 months. This will help minimize pests and diseases build up.

Activity

Use the demo groups to prepare their sites for tomato growing.

Land preparation for tomato growing

- The land must be dug and allowed to rest for at least one month. During this period, there is also decomposition of the trash/rubbish into manure for improved

soil fertility

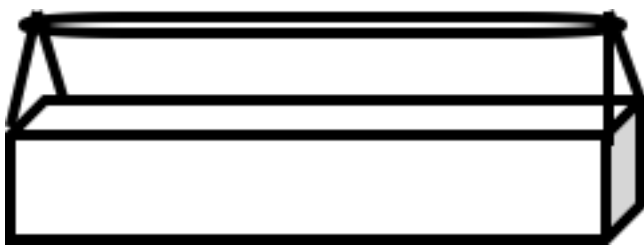
- b) Deep ploughing by use of hand hoes or tractors is recommended to remove most of the weed roots and soften the soil for easy movement of water and air in the soil, but also make it easy for roots to grow.
- c) Second tillage is then done to produce a fine bed. This will improve crop establishment and growth.
- d) Apply mulch to conserve soil and water and reduce evaporation.
- e) If you are planning to plant in the second season, open your land (1stdigging) at the end of the 1st season. This will enable you to have the land ready for planting by the time the second season start.

Nursery Establishment

Introduction

Introduce the session by telling the learners that in this session, we are going to learn about nursery operations in tomato production

Learning Objectives



, the learner should be able to: -

- 1. Establish and manage a good tomato nursery.
- 2. Do correct transplanting and effective field management.

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin) etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners 2. State the session objectives	1. Active listening
II	15 Minutes	1. Ask the learners to mention factors to consider for a good nursery bed through brainstorming 2. Using the notes, highlight on the qualities as in the notes.	1. Give responses 2. Take note actively

Step	Duration	Instructor's Activities	Learner's Activities
III	20 Minutes	<ol style="list-style-type: none"> 1. Through discussion ask learners to outline the steps involved in the preparation of tomato nursery bed, sowing and watering 2. Allow them present their work 3. Use the note to give a general summary on the steps as in the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
IV	10 Minutes	<ol style="list-style-type: none"> 1. Highlight on the importance of weeding in the nursery bed 	<ol style="list-style-type: none"> 1. Take note actively
V	30 Minutes	<ol style="list-style-type: none"> 1. Through brainstorming, ask the learners to tell some of the ways of managing a tomato nursery bed 2. Summarize by emphasizing the ways of managing tomato nursery bed as in the notes 	<ol style="list-style-type: none"> 1. Give their responses 2. Take note actively
VI	Field Work	<ol style="list-style-type: none"> 1. This training should be done on a small piece of land, not more than 1.5 m wide and 2.5 m long. The learners should physically do the work with the instructor giving guidance. It is advisable that at each stage, explanations are given why things are done the way they are done. 2. Emphasize the nine skills that the learners should learn 	<ol style="list-style-type: none"> 1. Take note
VII	25 Minutes	<ol style="list-style-type: none"> 1. Illustrate to the learners transplanting, mulching and gap filling in tomatoes as in the notes 	<ol style="list-style-type: none"> 1. Take note actively
VIII	15 Minutes	<ol style="list-style-type: none"> 1. Ask learners why weeds should be controlled. Ask them the common weeds of tomatoes (in local languages) 2. Summarize using the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively

Oral work

Class brain storms on the factors to consider in selecting a good nursery site

Activity

Demo groups prepare their nursery sites

Nursery Bed Preparation, sowing and watering

A nursery is a small plot measuring 1 (one) meter width of any length where seeds are sown. After the seeds have germinated, the seedlings are managed to certain height then transplanted to the seed bed (garden).

Once the site has been identified:-

- 1) In a bushy site, carry out bush clearance by slashing followed by first digging
- 2) Carry out second digging at least in two weeks from the time of first digging and remove stones and tree roots

- 3) Do harrowing to break the soil to fine filth
- 4) Set the nursery 1m or 1.2m wide by any length across slope for sloppy sites or in flat areas consider direction of the sun
- 5) In areas with a lot of water, raise the nursery bed 10 – 15cm above the ground
- 6) In dry weather make sunken bed to minimize wastage of water
- 7) Sterilize the soil by burning dry grass to kill nematodes and seeds of weeds which may be in the soil.
- 8) After one day, incorporate organic manure and level the bed or raise it 10 – 15cm in the rain season and make a sunken bed in the dry season.
- 9) Make furrows 10 – 15cm apart and 1cm deep across the beds
- 10) Sow in drills 5cm apart at 0.5cm depth and cover lightly. Seed rate is 1.5 – 2.0kgs/acre. This seed is sown on a bed of 1m width and 2m length. A shorter bed will congest the seedlings and they will not develop well and then cover with a thin layer of soil.

Activity

Demo groups participate in management of own tomato nursery sites

Management of tomato nursery

- 1) Immediately mulch to avoid hardening of the soil and soil erosion with dry vegetation and spread of soil borne diseases such as early blight
- 2) Shade the beds moderately with the shades slanting east immediately after the germination of seeds
- 3) Water twice a day in the morning and evenings only
- 4) Seeds germinate 6 - 8 days after sowing.
- 5) It is recommended that weeding should be done as soon as the seeds germinate. Remove the weeds whenever they appear. This is necessary because weeds compete with vegetables for nutrient, light and water. Use your fingers to uproot the weeds. You can also use a small kitchen knife to weed between the lines of seedlings.
- 6) Provide some fence to prevent stray animals
- 7) Check the nursery bed every day and raise the shade immediately they emerge from the soil to avoid them from bending
- 8) Soften the soil in the nursery for better establishment of the plant
- 9) Harden off the nursery by reducing the amount of the shade and frequency of watering
- 10) Spray the seedlings with mancozeb /agrozeb or diathane M45 to control damping off or early blight in the nursery

Pests and disease control in the tomato nursery

Check for any pest and disease attack. One of the most common diseases of tomatoes in the nursery is damping off which causes the stem to rot at the crown leading to seedling death and early blight which shows signs of dark spots on older leaves. To avoid this, one week after germination, spray with a fungicide e.g mancozeb or Dithane M45 is recommended. On the day of spraying, ensure you water first and then spray after watering so that the chemical is not washed off the seedlings during watering. If there are signs of rain, do not spray. Spraying should be done at least 3 hours before or after any rain.

For any pest infestation spray with a recommended pesticide like duducyper, cypermethrine etc.

Note:

This training should be done by the demo groups on small pieces of land, measuring 3m wide and 5 m long. The participants should physically do the work with the facilitator giving guidance.

Key message

Nine (9) skills to learn should include:

- 1) Indicators of good soils for a nursery bed
- 2) Deep cultivation of the field (1st digging)
- 3) Second cultivation, cleaning and beating up to produce a fine tilth
- 4) Laying 1 meter width of land for the bed
- 5) Soil sterilization
- 6) Sowing (sow half a meter of the bed)
- 7) Shade construction
- 8) Watering
- 9) Nursery bed fencing

Tomato Field Management

Introduction

Introduce the session by telling the participants that in this session, we are going to learn about tomato field management

Activity

Demo groups participate in transplanting tomato seedlings in their demo plots

Transplanting

This refers to the practice of removing seedlings from a nursery bed for planting in the seed bed (garden).

- 1) When properly managed in the nursery bed, seedlings are ready for transplanting 3-4 weeks after germination.
- 2) Water the bed heavily on the day of pulling to ease lifting of seedlings and reduce injury to them. (morning and evening)
- 3) Add manure in the planting holes in less fertile soils
- 4) Spacing: 45cm x 45cm or 60cm x 60cm or 60cm x 45cm or 75cm x 45cm or 75cm x 60cm depending on the variety plant (1 plant per hole). Use as recommended. It is advisable to choose a wider spacing for varieties with wider vegetative cover (hybrids) and vice versa.
- 5) Use vigorous seedlings for faster growth.
- 6) Add water to the planting hole before planting.
- 7) Provide a temporary shade immediately after transplanting to protect the plant against heat and remove at least after 3 to 4 days.
- 8) Plant tomato seedlings in the evening to avoid the day long heat stress



Alemi Scopers one of the beneficiaries in his tomatoes garden

Activity

Demo groups carry field management practices at correct time using correct technologies i.e., use of right tools/equipment, material, agrochemicals, knowledge and skills

Field management

This involves wide range of routine activities carried out for the effective management of tomato field after transplanting. These include;

Weeding

Ask learners why weeds should be controlled. Ask them the common weeds of tomatoes (in local languages)

- 1) The crop stand should be kept free of weeds at all times, because weeds compete for nutrients and are also vectors for disease.
- 2) Hand weeding is recommended both for the greenhouse and outdoor tomatoes.
- 3) To avoid the spread of diseases from plant to plant, do not use knives.
- 4) It is recommended to weed tomatoes at most two times, then mulch immediately after the second weeding

Gap filling

This is done within one week after transplanting. The purpose of gap filling is to maintain the plant population in the field.

Pruning

- 1) Pinch out the suckers using your thumb and forefinger. This is called pruning.
- 2) A weekly scouting is done for side shoots before they develop into big shoots.
- 3) Remove side shoots, laterals, old leaves, diseased leaves & branches and overshadowed lower leaves by hand.
- 4) After formation of the first fruit cluster of mature green tomatoes remove all the lower older leaves to allow for ventilation and disperse food to the fruits.
- 5) Flowers should be pruned to 5-6 per cluster for medium- large sized fruits.

Staking

- 1) Support the plants using poles and wires. This is called staking. It is usually done early – three weeks after transplanting – to minimize plant damage.
- 2) Tie a string lightly on the tomato and then gently twine the string around the plant to avoid snapping the stem.

Mulching;



Is the act of covering the soil surface with dry vegetative material. This prevents the tomatoes from getting into contact with the soil as most of the tomato diseases are soil born. It also plays other roles like suppress weeds, retain soil moisture in the soil, reduce soil erosion and facilitates water infiltration. It is done immediately after the second weeding.

Pest and disease control

Tomato is a crop that suffers a lot of pest and disease attack. It is recommended that control starts even before the pests or disease symptoms are seen.

Key messages

- “Seven (7) skills to learn should include:
1. Lifting the seedlings (watering the seedlings before lifting) – use seedlings raised during the nursery operations practical exercise
 2. Transportation of seedlings from the nursery to the garden.
 3. Right size of seedlings
 4. Depth of transplanting
 5. Digging the correct size of planting holes
 6. Correct spacing
 7. Materials for mulching (avoid those with seeds) and the mulching process itself”

Tomato Pests and Disease

Introduction

Tomato is a crop that suffers a lot of pest and disease attack. This session will highlight the common diseases, pests and the control mechanism.

Objectives

By the end of the session, learner should be able to: -

- i. Identify and control common tomato pests and diseases.
- ii. Know about harvesting of tomatoes at the right stage, minimize post-harvest losses
- iii. Prepare for marketing,

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.) etc.)

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners and ask one to give an opening prayer 2. State the session objectives	1. One says an opening prayer 2. Active listening
II	10 Minutes	1. Discuss with the learners the general pest and disease management practices and use the notes for guidance	1. Give their responses 2. Take note actively
III	20 Minutes	1. Through Q/A, ask the learners to mention some of the common tomato pests and control that they know in local language 2. Summarize as in the notes	1. Give responses 2. Take note actively
IV	25 Minutes	1. Through Q/A, ask the learners some of the common tomato diseases, their symptoms and control that they know in local language 2. Show to the learners, specimens of diseased tomato plants/fruits. 3. Summarize by showing pictorial illustrations in the notes	1. Give responses 2. Take note actively
V	20 Minutes	1. Discuss with the learners the signs of maturity and harvesting of tomatoes 2. Summarize using the notes	1. Give responses 2. Take note actively
VI	20 Minutes	1. Discuss with the learners the procedure of handling tomatoes after harvesting 2. Summarize using the notes	1. Give responses 2. Take note actively
VII	20 Minutes	1. Share the quality considerations and marketing of tomatoes	1. Give responses 2. Take note actively

Activity

- The class should brainstorm on the general pest and disease management practices in tomato growing
- Engage the demo groups in the actual identification and control of the pests and diseases by using pictorial illustrations and specimens in class (e.g. Diseased tomato plants/ fruits) and in the field respectively.

General pest and disease management practices

- 1) Crop rotation – break the pest lifecycle
- 2) Early planting – your crop escapes by the time pest/disease incidences rise, you are harvesting
- 3) Use resistant varieties – they resist damage
- 4) Weed control – weeds affect crop vigor which is related to damage. Weaker crops are more damaged
- 5) Scouting – To spot pests/diseases early and control them in time
- 6) Mulching and staking – reduces contact of soil and the plant parts. Most

tomato diseases are soil borne. Staking also improves crop coverage during spraying

- 7) Correct identification of pest or disease so as to use the right control strategy

Identification of common tomato pests and their control

Aphids, thrips, whiteflies, Cutworms, bollworms, leaf miners, Spider mites and nematodes.

1. Red Spidermite



The red spider mite is more common and serious in hot, dry weather but their numbers are reduced after rain. They feed on the lower sides of the leaves and spread over the whole plant when populations increase. Initial symptoms are chlorotic stipples on the upper side of leaves. Leaves may later turn yellow, become bronze and dry out. Severe infestation is characterized by fine webbing.

Control

- Spraying with insecticide. Insecticide application should be based on careful population monitoring of spider mite before and after spraying. They are able to develop resistance to one pesticide after the other
- Proper sanitation is also important (keep cultivated fields clean from weeds and other foreign material that can serve as host of the killer pest).

2. Cutworms are the caterpillars of certain moths. They are serious pests of tomato seedlings. They cut stems of newly transplanted or emerged plants at the base. Cutworm damage is more critical after thinning or transplanting.

3. American bollworm

Because of its wide distribution and very wide-reach taste in food plants, preferring flower buds, flowers and developing fruits, the American bollworm is one of the most injurious pests of tomatoes. The adult female lay eggs singly on upper leaf surface. The newly hatched caterpillar feed on foliage first and then descend and feed on the tomato fruit and may result in yield loss of up to 70%.

The use of Cypermethrin, Dudenocyper, Endosulfan, Methomyl, and insecticide gives effective control against bollworm



Bollworm eating a tomato fruit

4. Aphids



Although tomato is attacked by several kinds of aphids, the green peach aphid (*Myzus persicae*) is the most prevalent. Severe infestations under dry conditions may result in premature die-back of plants.

Control

- Crop rotation is essential.
- Proper sanitation is important (keep cultivated fields clean from weeds and other foreign material that can serve as host for the killer pest)
- Always destroy infected plant and throw them away from the field

5. Nematodes



Tomato plant roots infested by root knot nematodes

Tomato is attacked by various nematodes although the root-knot nematode is the most prevalent. Attack by nematodes is more likely in sandy soils and during warm conditions. They attack roots causing galls to develop and reduce the size and efficiency of the root system. Stunting of plants, reduced fruit set and yield, and quality result from infestation. Plants also show drought symptom and may sometimes wilt and die even when moisture is adequate.

Control

- Practice crop rotation
- Proper sanitation is important (keep cultivated field's clean from weeds and other foreign material that can serve as host for the killer pest).
- Always destroy infected plants and throw away from the field.

Identification of common tomato diseases and their control

a) Late Blight (fungal)



- The disease is very common particularly during the rainy season but also when there is excess moisture or humidity
- This disease can spread very fast wiping away plants within a short time and it also affects fruits.

Effects of the disease

- There are irregular greenish or water soaked lesions on the leaves, stems and fruits.
- Leaves develop bluish-grey patches, turn brown, wither but stay attached to the plant.
- Fruits develop watery spots which develop on upper half of fruit.
- There is rapid death of the entire plant.

b) Bacterial wilt



Bacterial wilt is one of the major diseases of tomato. The pathogen can also cause the bacterial wilt in several major crops such as eggplant, pepper and potato

Symptoms



- Non-yellowing
- Wilting of the youngest leaves at the ends of the branches during the hottest part of the day.
- During its early stages, only one or half a leaflet may wilt and plants may appear to recover at night, when the temperatures are cooler.
- The entire plant may wilt quickly and desiccate although dried leaves remain green leading to general wilting and yellowing of foliage and eventually the plant dies as shown in the picture.

c) Bacterial Canker



- Symptoms may be noted on leaves, stems, and inside fruits.
- Areas of leaves above the second or third cluster may show dull green and water soaked areas.
- Wilting progresses until the plant dies.
- Symptoms may be as seen in the picture

d) Blossom end rot

- This is a physiological disorder due to inadequate supply of water and calcium to the plant that leads to rotting of the blossom before it ripens.
- This is severe during drought or dry spell.

Control

- By Irrigation
- Mulching
- Adding manure

e) Tomato Mosaic

This is a disease spread by those who smoke. It causes mottling of the leaves of the plant.

Control

- Crop rotation
- Use of resistant variety
- Remove and burn diseased plants
- Avoid entering tomato field after handling tobacco.

Tomato Harvesting, Post-Harvest Handling and Marketing

Introduction

This session will enable the learners to handle economically ensuring quality improvement during tomato harvest and post-harvest handling plus marketing.

Signs of maturity and harvesting of tomatoes



- Tomatoes take 90 days to mature including days in the nursery bed.
 - The fruits turn from light green to yellowish-reddish color
 - Usually the very first cluster bears the first ready fruits.
 - Pick fruits at intervals as they ripen, depending on your market demand.
-
- The very first harvest is usually less compared to the later harvests.
 - Hand pick and place fruits in buckets /trays when the weather is cool
 - Harvesting continues for up to 2 months

Post-harvest handling of tomatoes

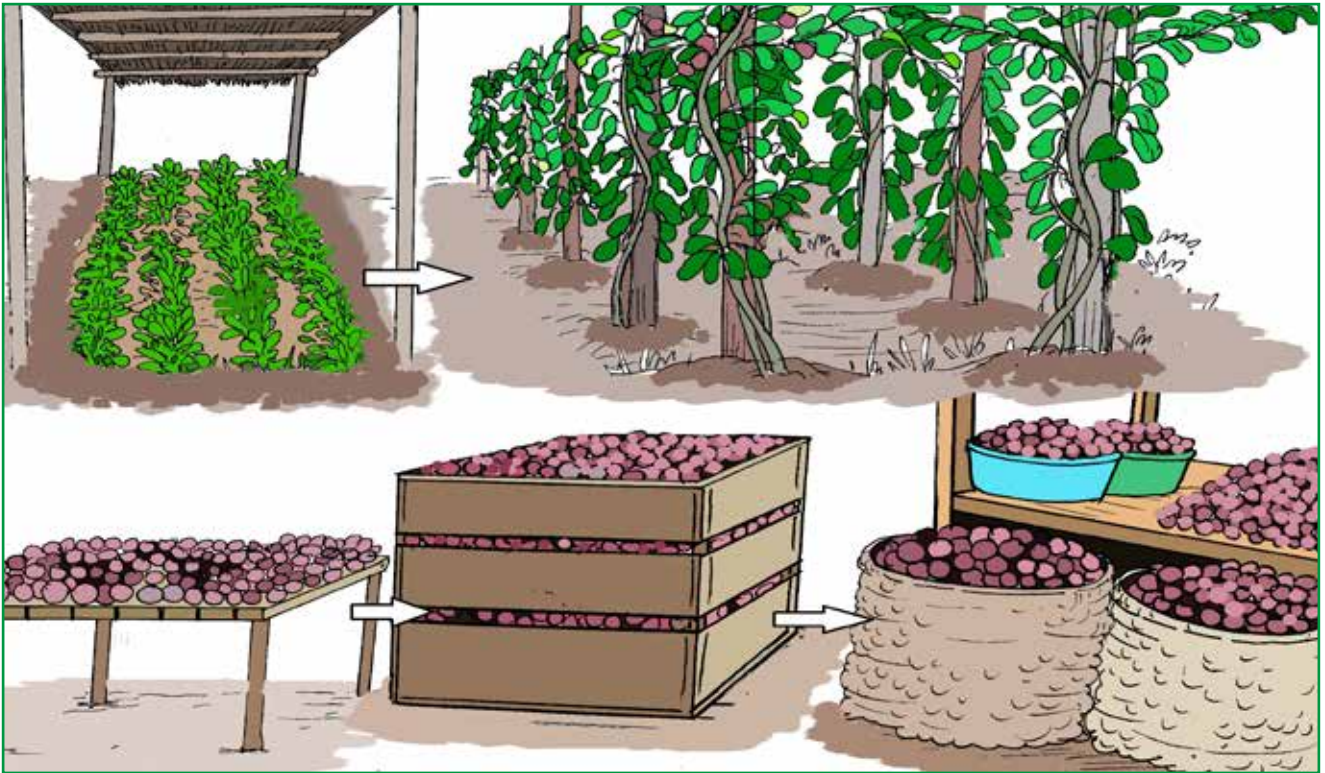
- Sort clean fruits separately from the damaged ones
- Sort according to size, stage of ripening

- After harvesting ripe tomatoes, the fruits should be cleaned and stored in a cool place if not sold immediately.
- When transporting to the market, design wooden boxes to avoid being crushed.
- Sell immediately after picking the fruits.
- Keep away from domestic birds.
- Do not leave already harvested tomatoes in the sunshine to avoid bursting of fruits.



Quality considerations and marketing of tomatoes

- The fruits are accepted in the local market, supermarkets, and other institutions because of their quality.
- When targeting specific markets, grade before selling by sorting according to sizes, colour or weight.
- Potential markets are within the community where they are grown, urban centers in the region Arua town, Lira, Gulu, DR Congo, Moyo, Koboko, Adjumani and as volumes increase,
- Always have contacts of customers and share information with them e.g. expected quantity to sell, quality, time of harvest, variety planted, price and packaging



10.3 PASSION FRUIT PRODUCTION AND MARKETING



Introduction

Introduce the session by telling the learners that in this session we are going to have an introduction to passion fruit growing

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Mention the importance of passion fruit growing
- ii. Know the weekly activity plan for passion fruit growing
- iii. Select and prepare suitable land for passion fruit growing
- iv. Describe the attributes of a good passion fruit nursery site and different steps in passion fruit nursery management.

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	<ol style="list-style-type: none"> 1. Welcome the learners 2. State the session objectives 	<ol style="list-style-type: none"> 1. Active listening
II	10 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to mention why passion fruits are grown. Record their responses on a flip chart. 2. Emphasize the importance as in the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
III	15 Minutes	<ol style="list-style-type: none"> 1. Discuss with the learners 10 different activities that are carried out in passion fruit production. 2. Summarize using the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
IV	20 Minutes	<ol style="list-style-type: none"> 1. From experience sharing, ask learners to share their experiences on the type of land they have ever grown passion fruits on. The instructor takes the learners to a nearby suitable site 2. Note down their responses 3. Emphasize the land type suitable for passion fruit growing (land selection criteria) from the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
V	10 Minutes	<ol style="list-style-type: none"> 1. Discuss with the learners the procedure of preparing land for passion fruit growing. 2. Use the notes to summarize. 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
VI	10 Minutes	<ol style="list-style-type: none"> 1. Through brainstorming ask the learners to mention the factors to consider for good nursery site selection 2. Using the notes, highlight on the qualities as in the notes. 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
VII	25 Minutes	<ol style="list-style-type: none"> 1. Ask the learners to outline the steps involved in the preparation of passion fruit nursery bed, sowing and watering 2. Give a general summary on the steps as in the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively
VIII	25 Minutes	<ol style="list-style-type: none"> 1. Share the importance of weeding in the nursery bed 2. Through brainstorming, ask the learners the ways of managing a passion fruit nursery bed 3. Summarize by emphasizing the ways of managing passion fruit nursery bed as in the notes 	<ol style="list-style-type: none"> 1. Give responses 2. Take note actively

Step	Duration	Instructor's Activities	Learner's Activities
IX	Out door	<ol style="list-style-type: none"> 1. This training should be done on a small piece of land, not more than 1.5 m wide and 2.5 m long. The learners should physically do the work with the instructor giving guidance. It is advisable that at each stage, explanations are given why things are done the way they are done. 2. Emphasize the nine skills that the learners should learn 	<ol style="list-style-type: none"> 1. Undertake practical work

Importance of passion fruit growing

The following should be emphasized.

- As a beverage – they form an important ingredient of various juices and dishes
- For money - they are high income crops and easy to sell
- They require small acreage (small piece of land)
- They take a relatively short time to mature (165 days)
- Perennial crop therefore farmer can get steady income for three years or more.

Passion fruit growing weekly activity plan

Week	Growth Stage	Critical Activities	Recommendations
12 weeks before transplanting	Nursery bed preparation Germination 12-14 days	<ul style="list-style-type: none"> • Prepare the nursery bed • Sowing. • Watering • Raise the shade • Pricking out and Pot filling • Pest and disease management (Hardening) • Pitting (digging holes for planting - 2 weeks before) 	<ul style="list-style-type: none"> • Soil sterilization • Water twice (morning and evening) slant the shade West-East to a height of 15 – 30 cm and width of 1m immediately after germination • Pest & disease control • Reduce watering • Remove the shade
1 week	The seedling is ready when it is 10 to 30 cm	Transplant	<ul style="list-style-type: none"> • Use clean material for carrying the seedlings • Transplant in the evening • Use spacing of 3m x3m
2-3 weeks		<ul style="list-style-type: none"> • Gap fill • 1st weeding 	<ul style="list-style-type: none"> • Keep the field free of weeds all the time • Use vigorous seedlings for faster growth
4-5 weeks	The fourth and fifth leaves emerge	Monitoring for pests (cutting worms, moles & crickets)	Spray with locally made plant derivatives for pest control
6-12 weeks	Vegetative growth	Monitoring for pests and diseases (mole crickets, downy mildew, onion thrips)	<ul style="list-style-type: none"> • Spray with organic concoctions/Pyrethroid and dimethoate derivatives • Fungicides (mancozeb, dithane M45) • Phytosanitation

Week	Growth Stage	Critical Activities	Recommendations
13-16 weeks	1st Flowering and Fruit setting. This can start earlier and it continues on a seasonal basis.	<ul style="list-style-type: none"> Pruning starts Monitoring for pests and diseases 	<ul style="list-style-type: none"> Phytosanitation Reduce movement in the field.
17-27 weeks	Fruit Growth	Monitoring for pests and diseases	<ul style="list-style-type: none"> Spray with dithane M45 or mancozeb Phytosanitation Minimum movements in the garden Prepare harvesting materials
28-30 weeks	Ripening starts	Harvesting starts	<ul style="list-style-type: none"> Minimize movements in the garden Guard against theft.

Land Selection and Preparation

Introduction

Introduce the session to the learners that today we are going to learn about proper land selection and preparation for good passion fruit production.

Activity

Use demo groups to prepare their own sites for passion fruit growing

Land selection for passion fruit growing

- Passion fruits grow on many soil types.
- Land that is suitable for passion fruit growing has sandy loam soils with good fertility. Fertility can be seen from the vegetation growing in the area. (**Ask the learners to mention the characteristics of vegetation indicating good soil fertility**).
- The land should not be prone to flooding and it should have a gentle slope to facilitate drainage and minimize the incidence of collar rot.

Land preparation for passion fruit growing

- The land must be dug and allowed to rest for at least one month. During this period, there is also decomposition of the trash/rubbish to manure for improved soil fertility
- Deep ploughing by use of hand hoes or tractors is recommended to remove most of the weed roots and soften the soil for easy movement of water and air in the soil.
- Planting holes, 30cm deep and 30cm wide in diameter should be dug 2 weeks before transplanting.
- When digging the planting hole, the top fertile soil should be put aside separate from the red bottom soil. The top soil is then put back in the planting hole. Well

decomposed manure, where available, can be mixed with the top soil and put in the planting holes two weeks before planting.

- Recommended spacing for passion fruit is 3 m by 2 m.
- Apply mulch to conserve soil and water and reduce evaporation.
- If you are planning to plant in the second rains, open your land (1st digging) at the end of the 1st rains. This will enable you to have the land ready for planting by the time the second rains start

Nursery Establishment

Introduction

Introduce the session by telling the learners that in this session, we are going to learn about nursery operations in passion fruit production.

Oral work

Class should brainstorm on factors to consider in selecting nursery site.

Factors to consider for a good nursery site

- A flat, fertile and well drained piece of land
- Close to a reliable water source
- Located in less weed infested area
- In areas with a lot of water, raise the nursery bed 10-15cm above the ground
- The soil should be dug deeply
- Not neighboring tomatoes, pumpkins or water melon
- Fenced to protect seedlings against animals

Activity

Demo groups establish and manage their own nursery sites for passion fruit growing.

Nursery bed establishment.

The instructor should guide the learners to discuss the following steps by asking them to mention the steps. Ensure all the steps below are explained. The steps are:

- Sterilize the soil by burning the top of the bed using dried vegetation. Chemicals can also be used but they are expensive
- Allow the bed to rest for at least four hours
- Mix manure with the soil
- Sow in drills 15cm apart at 2 cm deep and cover lightly. Seed rate is 40g for seedlings to plant an acre. This seed is sown on a bed of 1 m width and 10 m length and later the seedlings are put into paper pots.

Management of passion fruit nursery

- After planting seeds, a nursery must be covered using dry grass and watered at least twice a day
- Shade the beds moderately with the shades slanting East
- Water twice a day in the morning and evenings only
- Seeds germinate 12 - 14 days after sowing
- After germination, the grass should be raised to a height of 10cm as the seedlings continue growing.
- You can raise your seedling in the nursery bed up to the time of planting but this method may not be the best when transporting the seedlings.

Potting and pricking out of the seedlings

- 1) Fill the potting materials with loam fertile soil mixed with well decomposed manure. One-part manure and 4 parts fertile soil (usually top soil) will give a good mixture (as shown in the picture below).



- 2) It is advisable to raise the seedlings in pots. The process of transferring seedlings to the potting bags is called pricking out.
- 3) Prick out the seedlings when they have 2 pairs of leaves or two weeks after germination.
- 4) To remove seedlings from nursery bed, it is first watered and the young seedlings are lifted from the bottom of the root using a sharp stick.
- 5) The seedlings are then transferred to the pots (1 seedling per pot) and watering continues.
- 6) When vines are 10-30 cm tall (about 5-6 weeks after potting) they are ready for transplanting
- 7) Start reducing the watering frequency after germination.

Weeding, pests and disease control in the passion fruit nursery

Before watering, it is important to gently pull any weeds that are growing in the nursery bed. Such weeds compete with the seedlings for nutrients and water in the soil.

A fungicide (mancozeb or Dithane M45) should be sprayed when the seedlings are 5cm tall to avoid any fungal attack. Mix one tea spoon to 5 litres of water. Five days before transplanting, apply cypermethrin on the seedlings to protect them from pests. On the day of spraying, ensure you do not water the plants unless they are still small. In case you spray and there is still a need to water, water first and then spray after watering so that the chemical is not washed off the seedlings during watering. If there are signs of rain, do not spray. Spraying should be done at least 3 hours before or after any rain.

Activity

This training should be done on a small piece of land, not more than 1.5 m wide and 2.5 m long. The learners should physically do the work with the instructor giving guidance. It is advisable that at each stage, explanations are given why things are done the way they are done.

Key message

Eleven (11) skills to learn should include:

- 1) Indicators of good soils for a nursery bed
- 2) Deep cultivation of the field (1st digging)
- 3) Second cultivation, cleaning and beating up to produce a fine tilth
- 4) Laying 1-meter width of land for the bed
- 5) Soil sterilization
- 6) Sowing
- 7) Pot filling
- 8) Pricking out
- 9) Shade construction
- 10) Watering
- 11) Nursery bed fencing

Transplanting and gap filling

- Passion fruits should be transplanted when there is plenty of rain to provide adequate water.
- Pour some water in the planting hole where the soil moisture seems to be inadequate.

- With the spacing of 3m by 2m, 660 seedlings of passion fruits can be planted in an acre of land.
- Transplant well hardened seedlings to increase the chances of survival in the field.

Passion Fruit Field Management

Introduction

Introduce the session by telling the learners that in this session, we are going to learn about passion fruit field management

Learning Objectives

By the end of the session, the learner should be able to: -

- Know transplanting, weeding, mulching, pruning and trellising of passion fruits.
- Discuss the common passion fruit pests and diseases and their control
- Know harvesting passion fruits at the right stage
- Minimize postharvest losses
- Know the quality considerations and marketing of passion fruits

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.)

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners 2. State the session objectives	1. Active listening
II	15 Minutes	1. Discuss with the learners transplanting, mulching in passion fruits as in the notes 2. Summarize using the notes	1. Give responses 2. Take note actively
III	15 Minutes	1. Discuss with learners why weeds should be controlled. Ask them the common weeds of passion fruits (in local languages) 2. Summarize using the notes	1. Give responses 2. Take note actively
IV	15 Minutes	1. Discuss with the learners the general pest and disease management practices as in the notes 2. Summarize using the notes	1. Give responses 2. Take note actively

Step	Duration	Instructor's Activities	Learner's Activities
V	15 Minutes	<ol style="list-style-type: none"> Through Q/A, ask the learners some of the common passion fruit pests and control that they know in local language The instructor shows to learners' specimen and pictorial illustration. Summarize as in the notes 	<ol style="list-style-type: none"> Give responses Take note actively
VI	15 Minutes	<ol style="list-style-type: none"> Through Q/A, ask the learners some of the common passion fruit diseases, their signs and control that they know in local language Summarize as in the notes 	<ol style="list-style-type: none"> Give responses Take note actively
VII	15 Minutes	<ol style="list-style-type: none"> Discuss with the learners the signs of maturity and harvesting of passion fruits Summarize using the notes 	<ol style="list-style-type: none"> Give responses Take note actively
VIII	15 Minutes	<ol style="list-style-type: none"> Discuss the procedure of handling passion fruits after harvesting Compare with the notes 	<ol style="list-style-type: none"> Give responses Take note actively
IX	10 Minutes	<ol style="list-style-type: none"> Share the quality considerations and marketing of passion fruits 	<ol style="list-style-type: none"> Give responses Take note actively
X	Field Work	<ol style="list-style-type: none"> Establish demonstration garden at the FAL centers (show an evidence of a demonstration garden). Technical support to be offered by agricultural specialists among the TOTs 	<ol style="list-style-type: none"> Undertake the practical field work

Field management

This involves wide range of routine activities carried out for the effective management of passion fruit field after transplanting. These include: -

Weeding

Ask learners why weeds should be controlled. Ask them the common weeds of passion fruit (in local languages)

- The crop stand should be kept free of weeds at all times, because weeds compete for nutrients and are also vectors for disease.
- Hand weeding is recommended both for the greenhouse and outdoor passion fruit.

Gap filling

This is done within one week after transplanting. The purpose of gap filling is to maintain the plant population in the field.

Staking

- Support the plants using poles and wires. This is called staking. It is usually done early – three weeks after transplanting – to minimize plant damage.

- Tie a string lightly on the passion fruit and then gently twine the string around the plant to avoid snapping the stem.

Mulching

Is the act of covering the soil surface with dry vegetative material. This prevents the passion fruits from getting into contact with the soil as most of the passion fruit diseases are soil born. It also plays other roles like suppress weeds, retain soil moisture in the soil, reduce soil erosion and facilitates water infiltration. It is done immediately after the second weeding.

Pruning is the cutting off of some vines and it is done for the following reasons: -

- To aid in pest and disease control as it allows for scouting and easy spraying.
- Pruning is done to eliminate weak and diseased vines, and all laterals that are 0-30 cm above the ground to initiate flowering.
- During times of fruiting, pruning exposes the fruits to sunlight to promote maturation.

Enhance new growth as old vines are cut back so the plant can direct nutrients to younger flowers and fruits.

Note: Pruning can be done using a sharp knife. The knife used for pruning should be disinfected to avoid transmission of diseases.

Trellising is where passion fruit vines are raised from the ground and trained to grow upwards to avoid infection from soil borne diseases.

Activity

This training should be done on a small piece of land, not more than 10m wide and 10m long. The learners should physically do the work with the instructor giving instructions. It is advisable that at each stage, explanations are given why things are done the way they are done.

Six (6) skills to learn should include:

1. Lining up
2. Lifting the seedlings (watering the seedlings before lifting) – use seedlings raised during the nursery operations practical exercise. NB. The training has to be properly timed to have seedlings ready for this practical training; otherwise, a few seedlings might have to be bought for demonstration purposes.
3. Right size of seedlings
4. Depth of transplanting
5. Digging the correct size of planting holes
6. Correct spacing

Pests and Disease Management

Introduction

The passion fruit is attacked by a number of pests and diseases just like many other horticultural crops. It is therefore recommended that the following general practices of pest and disease management be used

Oral work

Activity

Class brain storm on general pest and disease management practices in passion fruit growing

General pest and disease management practices

The passion fruit is attacked by a number of pests and diseases just like many other horticultural crops. It is therefore recommended that the following general practices of pest and disease management be used.

- 1) Timely planting – your crop takes advantage of all the rains and is strong and vigorous as it grows
- 2) Use resistant varieties – they resist damage
- 3) Weed control – weeds affect crop vigor which is related to damage. Weaker crops are more damaged
- 4) Scouting – To spot pests/diseases early and control them in time
- 5) Correct identification of pest or disease so as to use the right control strategy

Activity

Procedure

Engage the demo groups in the actual identification and control of the pests and diseases by using pictorial illustrations and specimens in class (e.g. Diseased passion fruit plants/ fruits) and in the field respectively.

Identification of Common passion fruit pests and their control

1. Root knot nematodes



It is one of the most serious pests that affect passion fruits.

Signs

- Formation of galls or knots on roots
- Yellowing of leaves,
- Stunting and eventual wilting of the affected plants

Control

- Crop rotation to break the pest cycle
- Planting resistant passion fruit varieties.
- Remove and destroy the affected plants.
- Use nematocides where cases are common at planting

2. Aphids



Aphids suck sap from the passion fruits and transmit woodiness virus disease.

Signs

- Cluster of aphids on the underside of the leaves.

Control

- Spray with an appropriate insecticide E.g. Ambush.

3. Fruit flies

Puncture immature fruits causing them to rot.

Control



- Spray with cypermethrin
- Use pheromone traps to kill fruit flies

4. Mites

Suck the plant sap and juices and causes curling of leaves.

Control

- Spraying with cypermethrin

Identification of Common passion fruit diseases and their control

1. **Fusarium wilt**

This is a soil borne disease that attacks the plant from root to leaves. It affects the rooting system, causing wilting and withering.

Control



Fusarium wilt can be controlled with the use of any copper based fungicide, or uprooting the attacked plants

2. **Brown spot**

Occurs in humid conditions and is caused by fungi called *Alternaria passiflorae*.

Signs

- i. Brown spots on leaves, stems and fruits.
- ii. Ringing occurs on back of the stem, and prohibits the exchange of nutrients from the roots to the leaves, and vice versa.
- iii. Fruits fall pre-maturely, leaves wither and in severe attack, the plant rots and dries up

Prevention

Farm hygiene and treatment by spraying with a copper based fungicide like Dithane M45, Ridomil, Milraz.



3. **Woodiness virus**

Woodiness is a viral disease transmitted by Aphids, mostly in dry seasons.

Signs

The virus causes abnormal thickening of fruits



Hardening of fruit tissues resulting to less juice. Growth is retarded, with small leaves

Control

Remove the affected plant immediately from the plantation

Harvesting and Post-Harvest Handling

Introduction

Harvesting passion fruits to realize their economic value is an important skill this session will impart.

Signs of maturity and harvesting of passion fruits

- ✓ Harvesting typically starts 70 days after fruit setting.
- ✓ Mature fruits turn purple when ripe and fall themselves, or are dislodged by wind.
- ✓ They should be collected daily to avoid spoilage from soil organisms.
- ✓ As soon as fruits start turning purple they can be picked from the vines 2 or 3 times a week.
- ✓ A fruit picked at this stage will be clean compared to that which fell on the ground and can have a shelf life of up to 4 weeks if kept in a cool place.
- ✓ Avoid picking immature fruits from the vines as they can wrinkle leading to poor quality.

Post-harvest handling of passion fruits

- Collect fallen fruits daily to avoid spoilage on the ground by microorganisms.
- For transport and for export, fruit should be picked at the first signs of turning purple. Passion fruit, at this stage, can have a shelf life of 4 - 6 weeks if stored and refrigerated properly.
- Fruits should be stored in cool, shaded facilities in polyethylene sacs to ensure that moisture is not lost and fruits do not shrivel. It is important that conditions are dry so that mold does not grow on the fruits.

Quality considerations and marketing of passion fruits

- Passion fruits are accepted in the local market, groceries, hotels, fruit processors, exporters and other institutions because of their quality.
- When targeting specific markets, grade before selling by sorting out according

to sizes, colour or weight.

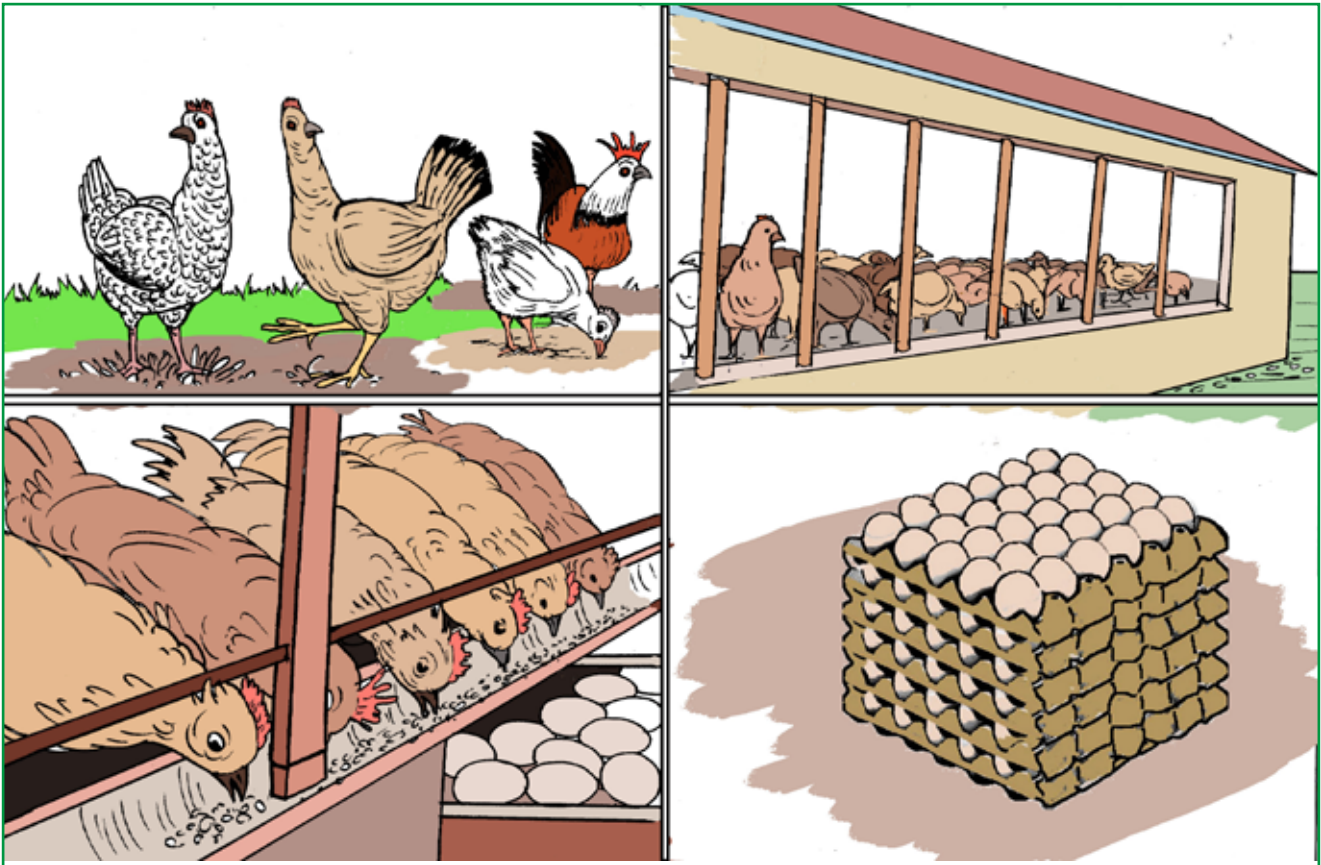
- Passion fruits can be delivered to markets in bags, baskets or any other packaging that is specified by the customers.



- Potential markets are within the community where they are grown, urban centres in the region, Arua town, Lira, Gulu, DR Congo, Moyo, Koboko, Adjumani and as volumes increase
- Always have contacts of customers and share information with them e.g. expected quantity to sell, quality, time of harvest, variety planted, price and packaging
- Marketing should be done after establishment of the demand and price at a given market and individual farmers are encouraged to bring together their produce so as to have better bargaining power.

Action Plan

- 1) Establish demonstration garden at the FAL centres (show an evidence of a demonstration garden).
- 2) Technical support to be offered by agricultural specialists among the TOTs
- 3) Link up the beneficiaries with lead farmers in the community for mentorship, hands-on learning.
- 4) Groups and individuals to replicate lessons learnt and establish their own gardens and enterprises.



10.4 OVERVIEW OF POULTRY PRODUCTION

Overview

This session focuses on introducing the youth to poultry production and management. Taking the commercial and backyard flocks together, there are an estimated 44.7 million chickens in Uganda, or a little more than one per person. Demand for poultry products is growing as a consequence of urbanization and income growth. While commercial and semi-commercial poultry production is increasing, the vast majority of chickens are still owned by small farmers, usually with women primarily responsible for their care. They serve to provide both a food source for farmers and a supplementary source of income (USAID 2017). Of the 44.7 million chickens in Uganda, 86 percent are in village flocks; these are mostly indigenous varieties that are low-maintenance scavengers living in close proximity to their owners in small rural communities. Village flocks range from 5 to 20 birds per household, with an overall national average of 12 (USAID, 2017). The dominant



chicken breed in Uganda is the indigenous chicken (87.7%) followed by the exotic layers (6.6%). The national chicken flock of indigenous chicken for Uganda was estimated to be 32.8 million as of 2008, representing 87.7% of the total chicken flock in Uganda (UBOS, 2008).

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Know the meaning of poultry production
- ii. Explain the characteristics of poultry industry in Uganda
- iii. Explain the management of local chicken
- iv. Describe the breeds of local chicken
- v. Describe the breeds of exotic chicken
- vi. Name the poultry rearing system
- vii. Explain the poultry housing

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.) etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners 2. State the session objectives	1. Active listening
II	15 Minutes	1. Discuss with the learners what poultry means 2. Use the notes for guidance.	1. Give response 2. Take note actively
III	20 Minutes	1. Discuss with the learners the management of local chicken. 2. Use the notes to summarize	1. Give response 2. Take note actively
IV	20 Minutes	1. Describe the local chicken breeds. 2. Use the notes to summarize	1. Give response 2. Take note actively
V	20 Minutes	1. Discuss the exotic chicken breeds. 2. Use the notes to summarize	1. Give response 2. Take note actively
VI	20 Minutes	1. Explain the poultry rearing systems.	1. Give response 2. Take note actively
VII	20 Minutes	1. Use the notes to explain the poultry housing	1. Take not actively

Session Notes

Overview

Poultry contributes to improved human nutrition and food security by being leading source of high quality protein in form of eggs and meat. It also acts as a source of wealth by supplementing revenue from other livestock enterprise and crops. Poultry is highly valued in many social cultural functions like dowry and festivals hence it is socially accepted and has high demand across the country. They include the following; Chickens, Turkeys, Ducks, Geese, Pigeons, Guinea fowl, Ostriches, Peacocks, and Quills.

Points to consider before investing in a commercial poultry enterprise

- Available market facility for poultry products
- Availability of veterinary and extension services
- Availability of inputs like feeds, drugs etc.

Why is it important to improve the management of local birds?

- Local chicken contributes to over 80% of the poultry products (eggs/meat) in the region.
- They are an important source of cash.
- They are resistant to diseases, optimize production on scavenging, good mothering ability and adapt well to weather conditions.
- Due to the above advantages, it is necessary to put in place strategies that will optimize their potential production.

Constraints to the poultry industry

- Birds have a lot of diseases
- Lack of transport and storage facilities
- Poor extension services to advise farmers on poultry management
- Lack of organized market for poultry products such as meat, eggs etc. in Uganda, hence this causes periodic shortages or surpluses of the above products in certain parts of the country.
- Lack of capital
- Needs skills and knowledge

Positive aspects of local chicken (advantages)	Negative aspects of local chicken
<ul style="list-style-type: none"> • Cheap source of meat- readily available for most rural people • Easily adaptable in all agro-ecological zones • Do not cost much to keep • Tolerant to most diseases • Produces good tasty meat and eggs. 	<ul style="list-style-type: none"> • Lay few eggs • They are generally small in size • Take long time to mature.

How can the management of the local chicken be improved?

- There is need to provide them with feeds and clean water
- Establishment of poultry housing. It is important to have separate unit for the chicks and the big chicken to increase their chance of survival
- Improvement on the management of disease, predators and parasites control. It is very important to carry out periodic vaccination and administration of other drugs for common diseases like new castle disease, fowl pox, coccidiosis etc. This reduces the mortality of both the chicks and old birds.
- Breeding; it is very important to practice cross breeding to increase the size of eggs, the weight of the birds.
- Due to poor hatchability of the local birds it is important to introduce artificial incubation.
- By also making a perimeter fence to avoid them from scavenging.

Chicken Breeds

Introduction

This session will look at the various breeds of chicken, system of chicken rearing and poultry housing.

Activity

Divide the learners into groups and the groups to outline common local breeds kept in their region.

Describe the local chicken breeds that exist in this region.

- Featherless around the neck (Logologo)
- Rough feathered
- The feathered legged
- Tailless
- Crown headed

Name the exotic poultry breeds available in this region?

Pure Breeds

- Rhode Island
- White leghorn
- Light sussex

Hybrids

- Brown eggers
- Black shavers

Rearing Systems and Housing

Name the Poultry keeping (rearing) systems in local communities

1. Extensive system e.g. free range- this is the system that is commonly used for managing the local birds

- There is no proper care for the birds.
- The birds are left to scavenge for food.
- The stocking rate is 125birds/ha

2. Intensive system e.g. deep litter, battery system or cage system



Deep litter

- A house is constructed using any material and the floor is covered with at least 6 inches of litter.
- The birds are kept indoors throughout for a given period.
- The stocking rate is 4 birds/m² for layers and for broilers 11 birds/ m².

Battery system

Battery cages are a housing system used for various animal production methods, but primarily for egg-laying hens. The name arises from the arrangement of rows and columns of identical cages connected together, in a unit, as in an artillery battery.

Cage system-



The cage system of rearing birds has been considered as a super intensive system providing floor area of 450-525 sq.cm. (0.6-0.75 sq. feet) per bird. In cage the birds are kept in one, two or three per cage, arranged in single or double or triple rows.

The small box like structures attached together fitting most times one or two birds each made using iron.

3. Semi intensive system e.g. a house with a run fold unit (run system)

- The chicken house can either be slatted or deep litter but a run is provided around the house.
- The birds' movement is restricted to a given area.
- The stocking rate is 5 birds /m² for layers, house only.

Poultry Housing

- To protect the birds against predators like fox, eagle, etc.
- Protect from bad weather
- Housing enhance easy management of diseases and parasites in poultry production
- Increase production through saving energy (walking)
- Manure collection for making farm yard manure
- Improve management and efficiency e.g. feeding, watering and population.
- It also enhances clean and increased egg production
- It is possible to control breeding
- Immediate detection and removal of sick birds
- The type of housing depends on the rearing system to be adopted.

Qualities of a good poultry house:

- The house should have good protection against rains.
- The roof should be at least 6 feet from the ground.
- The walls should have good ventilation and light.

- The floor should be level or trampled solid for ease of cleaning.
- The floor should be covered with 6 inches' good litter.
- A good stocking rate
- Provide necessary equipment.



Equipment and Management

Introduction

This session will focus on the equipment used in poultry production.

Learning Objectives

By the end of the session, the learner should be able to: -

- Name and describe the use of some of the common poultry equipment
- Explain brooding of chicken
- Explain selection
- Explain the survival of chicken
- Know the cock-hen management
- Explain the management of feeds

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.)

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners 2. State the session objectives	1. Active listening
II	30 Minutes	1. Name and describe the various poultry equipment and their qualities 2. Use the notes to summarize	1. Give response 2. Take note actively
III	25 Minutes	1. Using the notes, explain the brooding process	1. Take note actively
IV	10 Minutes	1. Use the notes to explain selection.	1. Take note actively
V	10 Minutes	1. Use the notes to explain the survival of chicken	1. Take note actively
VI	10 Minutes	1. Use the notes to explain the management of the cock-hen relations.	1. Take note actively
V	30 Minutes	1. Use the notes to explain the poultry feeds (what, why, how, when).	2. Take note actively

Poultry Equipment

Among the equipment and facilities in poultry production used in chicken farms, chicken cages, equipment for feeding chickens, drinking water and manure removal equipment are also involved, and there are also chicken supplies equipment: hatching, brooding, egg collection, chicken manure heat.

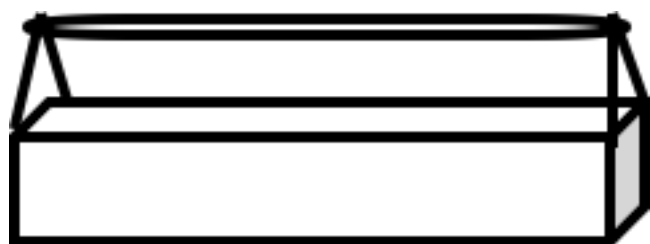
Feeders

Describe and draw different types of feeders (chick to layer stage)

A dry mash feed trough (A rectangular wooden trough)

Qualities of a good feeder

- Should allow extra feed
- Should not allow feed contamination
- Should minimize feed wastage
- Should not cause injury to birds
- Should be durable/last for a longer period of time
- It should be easy to clean
- Should not allow for perching
- Should not tip over



Making a chick drinker.

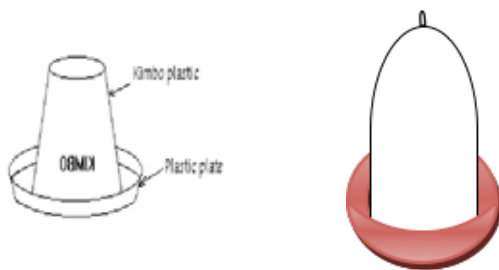
Procedure:

Tools required

(i) 3" ordinary nail

Materials required:

- A plastic plate
- A plastic container such as empty Kimbo tin. Measure 2cm from the rim of the plastic container and make a hole.
- Fill container with water, cover with plate, and invert. It is ready for use.



Tools required

(i) a knife

Materials required:

- Plastic 5 liter jerrican

Procedure:

- Using a sharp knife cut the jerrican by the sides as shown below.
- Fill container with water, it is ready for use.



Nests

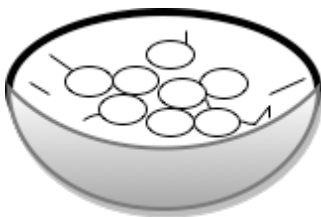
List important points of a good nest:



- Accessible to the birds
- Spacious
- Dry (material)
- Strong enough to support the bird
- The nest should be fairly dark
- Not allow for perching

Describe and draw the different types of nests that you know?

1. Individual nests



One bird lays in a nest at a go. The nests may be in rows or in stairs

Individual nests: 25cm wide x 30cm long x 35cm high

2. Local Nests – basin, sufuria, hole, a ring as shallow

Describe and / or draw other poultry equipment.

a) Perches/Roosters: Structures on which birds roost (rest) on in the poultry house.

- By nature, chicken like sleeping high in trees. Therefore, provide your birds with sleeping sticks or roosts.
- Perches prevent birds from soiling feeders, nests, and drinkers during the night.
- Good perches should be placed about 1 m high.
- Good perches should be round to allow good grip.

b) Litter: Materials spread on the floor of the poultry house.

Good litter should be able to absorb moisture e.g. wood shavings, hay, sawdust, rice husks etc.

- Should make the floor easy to clean.
- Should at least be 6 inch thick.
- Wet patches should be removed immediately.

c) Disinfection Equipment: A foot bath at the entrance of the poultry house / gate for prevention of infection.

d) Brooding Equipment: Brooding refers to the period of rearing of one day old chicks up to eight weeks where the chicks are provided warmth, feeds, water and protection naturally or artificially.

Natural brooding; in this method the hen stays with 10-15 chicks and provides the necessary warmth, food and water for the chicks.

Artificial brooding; in which water, food and heat are provided.

Before buying the young hybrid chicks, an appropriate brooding area needs to be prepared:

Day old chicks need to be kept warm at all times. As they grow and the feathers start to develop they tolerate cold better. At the same time, they need to access feed, light and clean water at all times as they feed within short intervals.

Brooder Preparation

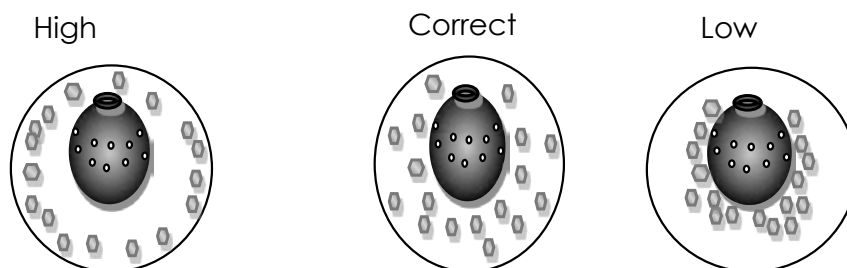
- Prepare/disinfect the brooder house and equipment thoroughly 2 weeks before the arrival of chicks
- The floor should be covered with litter of about 3-4 cm thickness. Litter materials used include sawdust, groundnut shells and coffee husks.
- Use hard boards to make a brooding ring of 60 cm height
- Cover the litter with newspaper to prevent chicks from eating the litter. Within the first few days the chicks may not have learnt to feed from troughs, though some feed from trough, thus some feed can be placed on the papers.

- Start with a density of 50 chicks per square meter
- Source of heat for warming the chicks and light should be provided in the brooder. In case charcoal stove is used, care must be taken not to burn the chicks.
- A hover/cover should be provided above the brooder, to reduce heat wastage
- Make space for feed and water feeding equipment inside the brooder ring
- Provide dim lighting to discourage toe pecking and blindness.

Management of chicks in the brooder.

The following are some management practices which should be carried out in the time they brooder up to the time the chicks leave.

- Count the chicks to ascertain their number.
- Isolate the weak and the sick ones.
- Provide them with fresh sugar solution on the day of arrival and no feed should be given on that day.
- Clean and disinfect the brooder occasionally to control diseases and parasites.
- Start source of heat overnight to adjust the temperature in a brooder before the chicks arrive.
- Maintain the appropriate range of temperature in the brooder.
- Maintain proper ventilation by adjusting the openings or windows
- Provide fresh, adequate and appropriate feed and water.
- Make sure the brooder room is vermin proof.
- Make sure the feeds are available
- Stock drugs in advance
- Provide adequate and appropriate waterers (water troughs) and feed troughs.
- Control diseases using appropriate methods, for example through vaccination or use of prophylactic drugs
- Keep proper records



- Temperature above the floor should be kept at 32° C for the first week, and then lowered by 4° C for each week up to the 4th week.
- Observe the reaction of chicks to the heat:

- At **correct** (normal) brooding temperatures, chicks are evenly spread within the brooder ring
- At **low** temperature they crowd around the heat source
- At **high** temperature the chicks will move away from the heat source

Selection and Management of Flock

Introduction

This session looks at the selection and management of chicken

Selection

This involves:

- Selection of productive hens.
- Selection of cocks.
- Selection of hatching eggs.

How do we ensure survival and good growth of chicks?

- Proper housing
- Vaccination
- Appropriate feeding
- Pest control
- Availability of clean water.

What is the recommended cock to hen ratio?

1 cock: 10 – 15 hens (For light breeds)

1: 10 (Medium)

1: 8 (Heavy)

How often do we change the cock?

- When the off-springs have reached maturing stage (ready for breeding)
- If the cock does not run after the hens
- If it no longer produces strong healthy chicks
- If the cock is not healthy
- Change after 2 years.

Feeds and Feeding

Reasons for feeding.

- More meat.
- More eggs.
- Disease control.

Components of chicken feed.

- Energy giving feeds; Birds need energy to walk, scavenge, run, produce, grow etc.
- Proteins. Birds need proteins to grow and produce feathers and eggs.
- Vitamins; Birds need vitamins to protect themselves against diseases.
- Minerals; these are needed for bone and eggshell development.

Energy giving	Vitamins	Minerals	Proteins	Animal source
Maize bran, Sorghum, Finger millet, Rice, Sweet potatoes (cooked), Wheat, Kitchen left over, Bananas and Cassava	Green palatable vegetable, Yeast, Liver meal, Germinated seeds	Bones, Fish meal, blood meal, egg shells, Oyster shells, Calcium phosphate	Sunflower seed cake, Cotton seed cake, Green gram, Soya bean cake, Pulses seeds, By product of oil milling	Blood meal, fish meal, insect e.g. ants and worms

What is the procedure followed when mixing your feeds?

Procedure:

- Mixing of feeds is determined by the type / age of the chicken
- The nutrients they contain
- Identifications of ingredients i.e. energy food, protein and vitamin mineral salts
- Determine your limits
- Procure the materials
- Determine the ratio
- You put the materials in the form required i.e. boiling of Soya, roasting, crushing etc.
- Mix as per the determined ratio i.e. maize + Soya beans

What limitations do you have in mixing poultry feeds?

- Availability of raw materials
- Composition of nutrients in various raw materials
- Inadequate skills
- Uncertainty of the quality of the various ingredients
- Lack of appropriate equipment e.g. mixer

Pest and Disease

Introduction

This session will look at pests and diseases in poultry.

Learning Objectives

By the end of the session, the learner should be able to: -

- i. Know how to keep birds free from diseases
- ii. Explain the parasites in birds (pests)
- iii. Explain the diseases affecting birds (signs, prevention, control and treatment)

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.) etc.

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners 2. State the session objectives	1. Active listening
II	30 Minutes	1. Use the notes to discuss how to keep birds free from diseases	1. Participate actively
III	40 Minutes	1. Using Q&A discuss the pests in birds. Use the notes for the discussion	1. Give responses and take note actively
IV	45 Minutes	1. Using the notes, discuss the diseases affecting birds. The signs, prevention, control and treatment.	1. Give responses and take note actively

Activity

How do we keep birds free from disease and pest?

- 1) Always have a footpath, which must be used by anybody entering the house.
- 2) Clean the unit using a disinfectant.
- 3) Regular removal of litter.
- 4) Sealing of cracks on walls and floor.
- 5) Attendants should observe high level of hygiene.
- 6) There should be an interval of at least three weeks before introduction of a new flock around the house.
- 7) Spread rows of ash, to protect it from safari ants.
- 8) Ensure that the incoming birds are disease and pest free.
- 9) Sufficient ventilation.

- 10) Practice the recommended vaccination programme for a given area.
- 11) Disinfect the equipment.
- 12) Ensure balanced feeding

Identify poultry ectoparasites, endoparasites and their control

(a) Ectoparasites – Outside the body

Parasite	Where found	Control
Fleas	Nests and around the eyes	Hygiene , apply dudu dust
Mites	On skin, under wings and rectum	Dudu dust
Lice	Cracks, perches, walls	Dudu dust
Ticks	Skin, around eyes, comb/wattle	Dudu dust

(b) Endoparasite – Inside the body

Parasite	Where found	Control
Tape worm	Intestines	Deworm regularly
Large worm	Intestines	Deworm at least after every 2 months
Caecum worm	Caecum	Deworm at least after every 2 months
Gizzard worm	Gizzard	Control vectors e.g. grass hopper

Identify Common Poultry Diseases and their control measures

1. New Castle disease viral

It is spread through oral and respiration discharges and droppings of infected birds. Can also be spread through equipment, personnel.



Signs

- i. Greenish-yellow diarrhea
- ii. Loss of appetite
- iii. Droopy wings
- iv. Gasping for air,
- v. Coughing,
- vi. Sneezing
- vii. Nervous symptoms (paralyzed neck)
- viii. Misshapen eggs

Treatment

There is no treatment for Newcastle disease

Prevention

- i. Vaccinate the birds. Administer the first dose at day 1, second at two weeks then give booster at least after every 2-3 months
- ii. Avoid introducing new birds from unknown source into your stock.

- iii. Avoid visitors from entering into your farm
- iv. There should be high standard of hygiene in the farm
- v. Report the outbreak to the Veterinary department of your sub county

2. Infectious Bronchitis (ib)

Caused by virus



Signs

Common signs observed include gasping, coughing, sneezing and discharge from the nose and the eyes.

In laying birds egg production decreases up to 50% and have ragged shapes. This effect can last 6-8 weeks or longer.

Treatment

Broad-spectrum antibiotic can help to treat because it is a bacterial disease

In chicks it is very important to increase the room temperature, provide adequate feeds.

Prevention

Vaccination. Vaccines are either separate or combined with that of Newcastle disease.

3. Fowl pox

The disease is caused by virus. Birds of all ages can be affected but it's of more danger to chicks and laying birds. It is spread by contact.



Signs

- Lesions (wounds) on combs, wattles, around the eyes, base of the beak.
- Egg production in laying birds decreases

Prevention and control

Vaccination is recommended. Usually when the birds are 6-8 weeks and 12 weeks of age.

Antibiotics and vitamins help quick recovery. You can also smear Vaseline containing iodine on the wounds.

4. Gumboro (Infectious Bursal Disease)

It is a disease of great importance these days. it is caused by virus

It occurs when the birds are 3-6 weeks of age

It mainly affects the gland called bursa which is one of the organs around the cloaca. It can be spread by contact with contaminated materials and by various parasites.

Signs

Signs can be observed only after three weeks of age. There is sudden onset with the first outbreak.

There is loss of appetite, ruffled feathers and droopy appearance

There is diarrhea that may be white, there is passing of blood and straining during defecation

Number of affected is very high in the flock

Treatment;

There is no treatment. Good management and ensuring adequate temperature can reduce severity of the disease.

Prevention

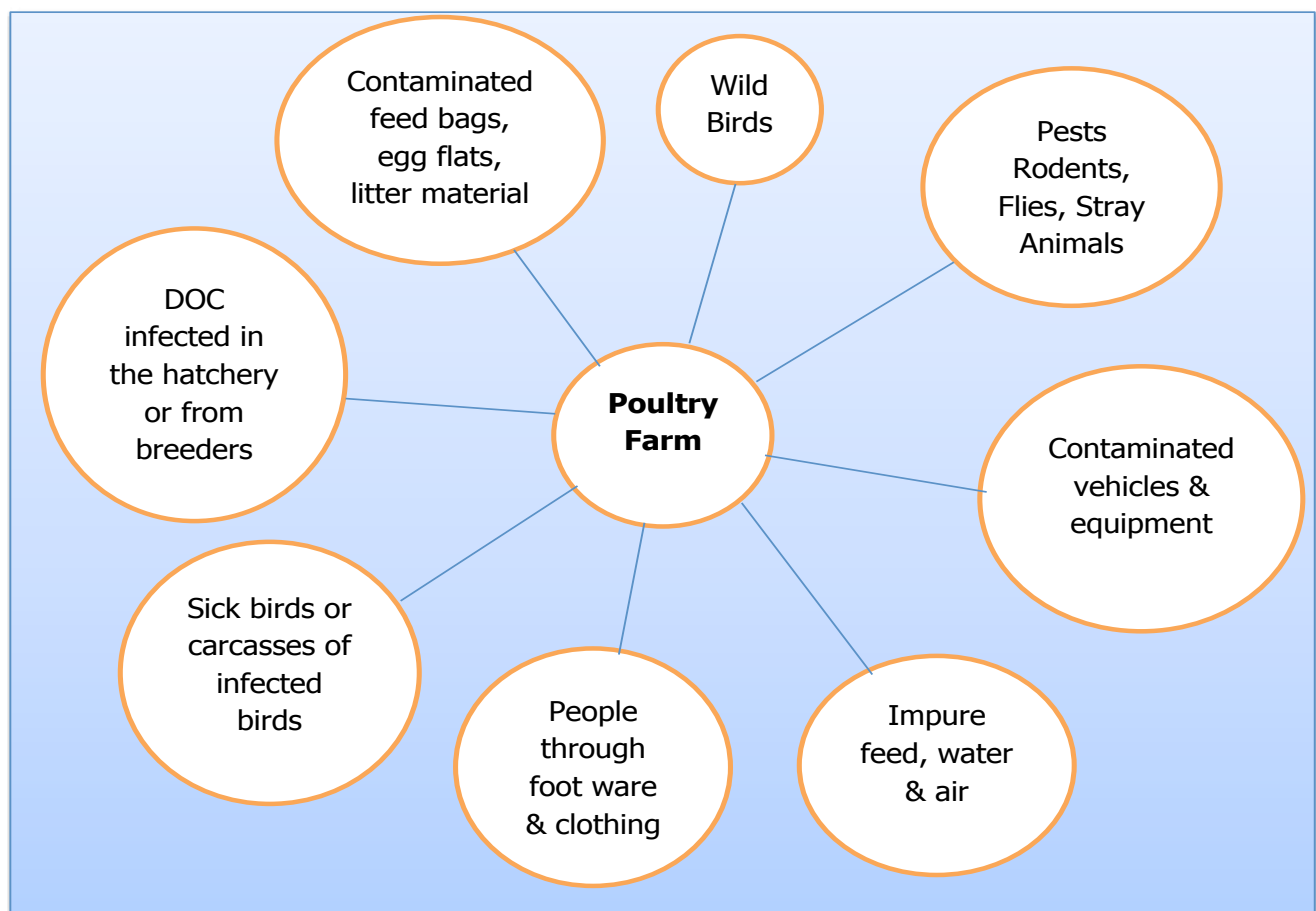
- Vaccinate the birds with Gumboro vaccine
- Paint warts on combs and feet with iodine

Common Poultry Problems

S/N	Vice	Causes	Remedies
1	Hens Eating eggs	<ol style="list-style-type: none">Lack of certain nutrients (iron & calcium)Exposed laying nests (not well darkened) and inadequate nestsFailure to de-beakEggs not being collected frequentlyBirds laying thin shelled/shell less eggsGreedy hens	<ol style="list-style-type: none">Correct the causal factorsGive egg formula to laying birdsAvoid egg breakagesDe-beak the birds especially the greedy ones before they start laying
2	Cannibalism	<ol style="list-style-type: none">Lack of mineralsOvercrowding- inadequate space on floor, feeders, perches, drinkersHigh temperature stressHigh light intensity stressPresence of external parasites- raise itching effectsCloaca prolapse (this prolapse can occur during laying or diarrhea (rarely)	<ol style="list-style-type: none">Don't overcrowd birdsProvide enough eating length and drinking lengthAvoid stressful situations like high temperature, high light intensity.Provide hanging greens/ perches to keep them busy of mischief.

3	Fighting	<ul style="list-style-type: none"> i. Establishment of pecking order ii. Struggle for feed or water iii. When they are stressed like in case of high light intensity or temperature iv. Idleness of birds or hunger 	<ul style="list-style-type: none"> i. Avoid mixing birds of different age groups ii. De-beak iii. Isolate the pecked birds and treat them iv. Cull the badly affected birds v. Provide enough eating and drinking length vi. Avoid stressful situations like high temperature, intensity, and ammonium levels in the house
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How diseases might enter poultry farm



(Adopted from Yoni Segal, FAO Consultant)

Business Plan for egg production from local chicken

According to the UIA 2010, for one engaged in production of eggs from local chick with a target of 162,000 trays of eggs annually and 1,350 off layers annually, the initial capital investment cost for the project is USD 865. The first three months demand a lot of investment yet returns are not realized. This needs a lot of patience.

Chicks are kept in the brooder in which they are vaccinated and well fed on chick mash for 2 months till the grow feathers. They are then shifted to the main shelter in which they are fed for 3 months on growers' mash. Cocks are then introduced to

help fertilize the eggs. Reduce the noise, feed them on greens, ensure that water is enough and the hens will lay eggs.

1. Capital Investment Requirements in USD

Capital Item	Units	Qty	Unit Cost	Amount
Feeders	No.	50	2.5	125
Drinkers	No.	60	1.5	90
Brooder	No.	2	7.5	150
Stands	No.			500
Total				865

2. Production and Operational Costs in USD

Direct Costs						
Cost Items	Units	Unit Cost	Qty/Day	Pdn/Cost/day	Pdn/Cost/Month	Pdn/Cost/Year
Chicks	No.	0.5	0	0	62.5	750
Coffee Husks	Bags	2	0	0	40	480
Feeds	Bags	7.5			195	2,340
Medicine		0	0	0	15	180
Egg Trays	Pcs	0.75	0	0	8	100
Sub-Total					321	3,850

General Costs (Overheads)	Pdn/Cost/Month	Pdn/Cost/Year
Labour	300	3,600
Utilities	100	1,200
Administrative Expenses	100	1,200
Shelter (Rented)	250	3,000
Depreciation (Asset write off) Expenses	36	433
Sub-Total	786	9,433
Total Operating Costs	1,107	13,283

Production is assumed for 365 days per year. Depreciation assumes 2-year life of assets written off at 50% per year for all assets.

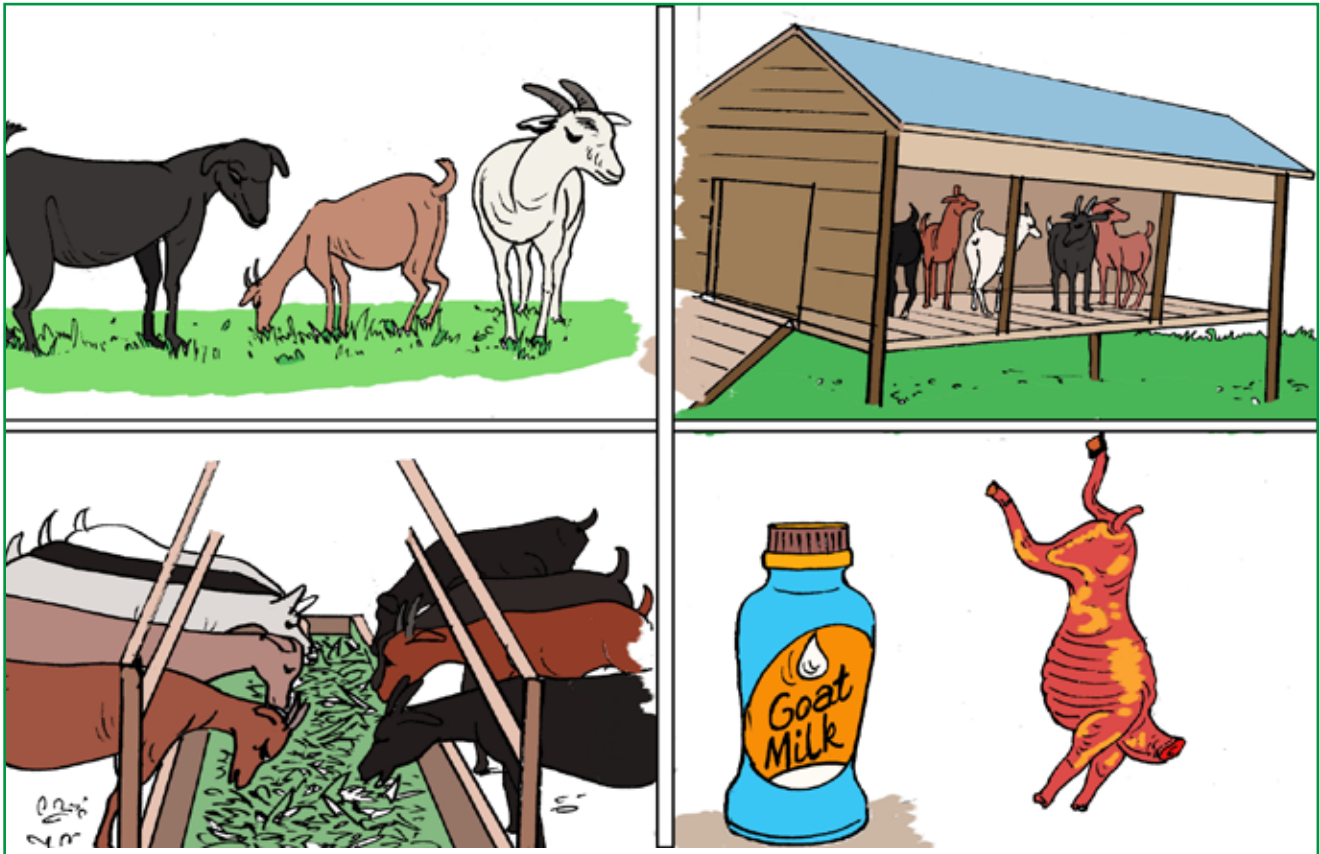
3. Project Product Costs and Price Structure in USD

Item	Period	Output	Unit Cost	Unit Price	Total Cost	Total Rev
Eggs	4 Month	162,000	0.07	0.11	11,500	17820
Off Layers	1 Year	1350	1.37	2	1,850	700
Total		163,350				18,520

4. Profitability Analysis Table in USD

Profitability Item	Per Day	Per Month	Per Year
Revenue	59	1,543	18,520
Less: Production and Operating Cost	43	1,107	13,283
Profit	17	436	5,238

Source: *UIA Business Ideas*



10.5 GOAT REARING

Overview of Goat Rearing

Goats are small ruminants which form an important part of animal farming; food production and income generation in the developing countries. Overall, about four out of every ten of the households in Uganda (39.2%) owned goats as of 2008. The estimated number of households owning goats in Uganda was 2.5 million. In terms of region; Eastern region had the highest estimated number of households owning goats (0.74million). Almost all the goat-owning households (99.5%) owned indigenous goats. Amongst the goat-owning households; a typical household in Uganda owns on average five (5) goats (UBOS 2008). In Koboko, between July 2017 and March 2018, seven thousand sixteen goats (7,016) were slaughtered in the main abattoir. More live goats were sold in the main market. The demand for meat is increasing every day and number of livestock within cannot satisfy this demand. Over 60% of the goats slaughtered are from the neighboring districts of Yumbe, Moyo and Maracha. This means goat production in Koboko is low and business opportunity exists in this sub sector.



Learning Objectives

By the end of the session, the learner should be able to: -

- i. Know the overview on goat rearing including words used
- ii. Discuss the importance of goat rearing
- iii. Explain the breeding of goats
- iv. Know the management system of goats
- v. Explain the parasites and diseases in goats
- vi. Know the characteristics of healthy goats

Materials to use

Marker pens, newsprint, masking tape, manila papers, cards, pieces of papers, flip charts and/or blackboard, chalk, local materials, farm input (seeds/seedlings, watering can, fertilizers, chemicals, planting line (rope), hoe, trowel, dibber, wheel barrow/basin etc.)

Procedure

Step	Duration	Instructor's Activities	Learner's Activities
I	5 Minutes	1. Welcome the learners 2. State the session objectives	1. Active listening
II	10 Minutes	1. Through brainstorming discuss the importance of rearing goats. Use the notes to summarize	1. Give responses 2. Take note actively
III	30 Minutes	1. Using the notes, illustrate the breeding of goats	1. Take note actively
IV	30 Minutes	1. Using the notes, discuss the management of goats.	1. Take note actively
V	30 Minutes	1. Explain the parasites and diseases in goats.	1. Take note actively
VI	15 Minutes	1. Discuss the characteristics of healthy goats.	1. Take note actively

Words to note

- **Buck** refers to a male goat
- **Doe** refers to a female goat
- **Feed** refers to plant material that animals eat
- **Mating** refers to reproduction or sexual activity in animals
- **Mount** refers to the male animal climbing onto the female by raising both fore feet from behind.
- **Gestation** refers to the period during which the goat is pregnant
- **Trait** refers to a specific characteristic

Importance of goats

Goats are of high importance to people because of the many functions they provide:

- Goat meat (**giriye**) is considered to be tastier than beef (cattle meat),
- Their size makes it easier for farmers to sell to solve immediate problems such as school fees.
- They are at the forefront during funerals, gifts not forgetting marriages.
- Goats are used as court fines at lower councils, elders' councils and family level reconciliation.
- The skins are also a valuable product which in itself is a business. This means goat business is a marketable and viable one.

Attractive properties of goats

For small holder farmers, the goat is suitable due to the following factors

- The goat is a small animal compared to cows. This means it is less risky to invest in goats
- It is easier to find feeds for a small animal, the goat.
- Even small children can control them
- It is a quick maturing animal with high fertility
- Animals are readily available always for sale and it is easy to restore the herd
- Goats can maintain themselves well in poor / dry areas, where other ruminants do not succeed.
- Goats are more tolerant to diseases, parasites and harsh weather conditions.



Breeding in goats

The indigenous breeds (Small East African Goat) are more suitable to the local conditions; weather, feeding, parasite tolerance. However, the breed can only weigh up to 15 kg. For business purposes, this needs to be improved through cross breeding.



The Boer goat is a breed originally from South Africa which has a high carcass weight of up to 65kg in mature goats. This is a good trait to improve the indigenous breed.

Systems of breeding

Pure breeding; this is where bucks (he goat) and does (she goat) of a specific breed are mated

to preserve desirable traits or characteristic in that specific breed, e.g. a Boer buck mates a Boer doe.

Cross breeding; in this system, a breed with desirable traits is mated with another breed to obtain off springs with desirable traits from both breeds. E.g. the Boer goat having a high growth rate and carcass weight is mated with a Doe from the Small Goat of East Africa. The offspring becomes of faster growth rate, bigger in size while remaining tolerant to parasites, good feed conversion rate.

Selecting goats for breeding/Mating

Healthy bucks with prominent genitalia (2 testacles) should be selected for mating.

Hornless bucks should not be selected since they tend to be infertile.

Bucks with deformed feet have to be avoided as they face difficulties in mounting Does.

Younger males can be allowed to service up to 30 females while mature ones can serve up to 40 does.

Does are ready at 12 months or at least when they attain $\frac{3}{4}$ (three-quarters) of their mature weight depending on the breed. The doe can however be sexually ready before such a time and so care should be taken not to service.

Does that get served while young may have stunted growth (stop growing) and give birth to weak kids. Goats ready for service show the following signs.

Signs of heat in goats (signs that the goat is ready for mating)

- Wagging of the tail
- Bleating (making noise)
- Moist and red labia (the private part)
- Mounting (climbing) other goats
- Dribbling urine now and then, especially in the presence of bucks.

Gestation and birth

The pregnancy can take up to 21 weeks or 5 months. The goat should be fed well with feed rich in proteins and minerals. This will make the goat strong at birth and a healthy kid will also be born.

At birth usually signs present and so make sure the surroundings are clean and quiet to avoid infections and interference to the birth process respectively.

The following signs show a goat is about to give birth;

- The goat frequently stands and lies down
- She no longer eats and drinks

- She isolates herself, e.g. at the corner of the goat house
- She sniffs at kids at her neighborhood
- The birth canal discharges clear secretion
- The udder becomes more prominent

Nutrition in goats

Goats are naturally browsers; they pick shoots of trees and bushes where there is not enough vegetation for sheep and cattle. Goats can keep themselves in reasonable condition in difficult circumstances because the first part of their stomach system. Their rumen is full of micro-organisms which help them in converting poor quality feed in to usable nutrients.

Essential (important) requirements

Water

Goats obtain water from the fresh/succulent fodder in the natural moisture, this however is not enough especially in the dry season where pasture or straw only has 10-15% water. Less water leads to low feeding which reduces the goat's production in terms of meat, milk, and heat frequency.

Goats require between 3 and 8 liters of fresh water per day which should be provided once a day at a regular time so that they will develop a routine to expect it. The water should be kept clean so that goats will refuse dirty water.

Energy

Goats need energy giving food/carbohydrates to among others; keep active, grow (add on weight), reproduce (feeding the foetus and producing milk), and keeping the body functional and normal.

The energy sources include leafy and stalky feed of cereals; maize, sorghum, millet, molasses, grass species, tubers, roots and bananas.

Proteins

Proteins are required for growth, building body fat and other essential body functions. The goat strangely through its rumen hosts millions of microorganisms which produce proteins after they die and their remains become source of proteins to the animal.

This however should be supplemented with other sources of proteins including the young leaves of vegetables, grasses contain proteins. Legumes; leucaena, sesbania, glyricidia, pigeon pea. Legume crops of soya and groundnuts are very rich in protein and fat. This is also true even for the waste remaining after oil extraction (soy bean meal, cotton seed meal and ground nut meal).

Minerals

Goats cannot live without minerals. Salt, calcium phosphorous, and trace elements like iron, copper and iodine are very important. They not only help to maintain and regulate the body functions but they also strengthen the teeth and bones. They are also important for young kids and pregnant and milking nannies. Lack of minerals leads to poor appetite, dull coat, poor growth and reduced fertility.

An animal will lick all kinds of objects in the search for extra minerals in case of deficiency. Green leaves usually supply the necessary mineral, mineral lick and ordinary iodized salt are good supplementary sources.

Vitamins

Vitamin deficiency is not common in livestock since the microbes in the rumen produce the vitamins apart from vitamin A. This can be found in carotene which is in green, yellow or red plant parts. Its deficiency leads to eye disorders, skin ailments, breathing and digestion problems.

Systems of Management

Free range; this is where animals are left to move freely, find their own food with little attention from the owner. It is mainly used in sparsely populated areas where cropping is not common.



Tethering; this is a practice where ropes are used to restrain the animals. The rope is tied carefully around the neck of the goat. They can be tied on trees in the grazing land during the day and returned home in the evening. They need owners' attention frequently.

Rotational grazing; this is also called paddocking system. It is where the grazing land is divided using a fence into small units called paddocks. Animals are grazed according to the carrying capacity and moved from one unit/paddock to another; ensuring grass is not completely destroyed.

Zero grazing; this is a practice where goats are completely housed and fed by the owner or caretaker indoors. They can only be released out for a short while for exercise, treatment or other management practices. This is laborious and requires an established pasture land.

Strip grazing; related to rotational grazing, it is where electricity is used in grazing the animals. A particular grazing area is fenced off using electric wire and regulated amount of power is used to shock animals which come in contact with the wires. It is expensive and used mainly in commercial cattle rearing.

Other management practices (illustrate the management practices)

Castration; this is the removal of the testis of male animals to control breeding among the stock. Only males with desirable traits are allowed to mate while others are castrated and remain infertile.

Ear tagging; this is a practice of applying tags on the ears of the goats mainly for identification purpose.

Spraying; this is where acaricide is carefully applied on to goats to control external parasites, most especially ticks and tsetse flies. Appropriate equipment is normally used such as knap sack sprayers.

Deworming; this is where drugs to get rid of worms are given to the goats to help reduce internal parasites which usually affect the animals.

Ear notching; this is a practice of making 'V' shaped marks on the ears of the goats using a specialized machine. The marks usually help in numbering animals and their off springs.

Housing Goats

Goats houses are structures constructed to accommodate the animals. There can be various designs depending on finances available, climatic conditions and availability of construction materials. Key in the structure is the roof, wall and floor which form the basic structural parts of the house. A goat requires 1.5 square meters of space in the house.

Reasons for housing goats

Climate control; extreme weather conditions of rain, wind and strong heat are unfavorable for goats. Therefore, the goat has to be protected within a house.

Making management easier; when goats are housed, it is easy to monitor heat and mating, pregnancy and kidding, parasites and disease control than when they are not housed.

Safety and security; housed goats are protected from theft and predator such as wild animals, stay dogs which usually kill goats and eat the carcasses.

Collection of manure; it is easier to collect animal droppings for mixed farming when goats are housed. The manure can also be used to improve pastures to feed the goats.

Components of the structure

The first step to consider in housing goats is the location of the house or structure. This should be around the home stead for security reasons. It should be positioned along

the North–South axis for floors that are not solid. This allows sunshine onto the floor to destroy buildup of parasites and diseases.

Roof



The roof of a goats' pen is very important as it regulates temperature and prevents rain or strong sunshine from causing discomfort to goats. Depending on resources available, it can be made of thatch or iron sheets.

Wall

The walls of a goats' pen can vary mainly depending on security within the area, climate conditions and management system in place.



Simple poles can be used to support the roof of the house and this will serve as the wall in secure locations. This can be enhanced by planting a hedge/live fence around. In wet/dump conditions where it is cold, solid walls made of bricks, closely packed wood is ideal to ensure protection from the weather conditions. This is also appropriate in areas which are insecure. However, there should be care to ensure

ventilation of the house for adequate air circulation. One meter (1m) high wall is good enough in warm climates.

Floor

The floor can be made of concrete, soil or wood. Concrete floors and soil floors should be made sloping to ensure drainage of urine and easy cleaning of the house. The wooden floors should be raised with small gaps between the wood pieces to allow droppings and urine down under the floor as shown in the picture. It can be raised to a maximum of 1m.

Health, Parasite and Diseases

Health of animals is very important; it is better to prevent the diseases than curing. This saves a lot of money and unpleasantness if goats are and remain healthy. To prevent parasites and diseases, the following are paramount: -

- Well-constructed house; the house should be located away from the wind and blowing rain since dump conditions make goats susceptible to diseases.
- Cleanliness; It should be easy to clean and kept clean. Dirty, muddy or dump

conditions encourage buildup of parasites and diseases.

- Sufficient feeding and watering; poor feeding causes weakness in animals and can lead to disorders such as bloat.
- Incorrect management of pasture, when goats graze too often on the same pastureland, there is increased contamination by parasites (worms, ticks) this may lead to increased infections among the goats.

Common Parasites and Diseases

Parasites	Causes	Signs and Symptoms	Treatment	Prevention
Liver fluke	The adult fluke lays eggs which hatch in water or wet pasture, giving rise to immature flukes, which cling to the plants growing around marshes and are swallowed when the goats graze there.	Pale mucous membranes, Weight loss. Bottle jaw, (which is a soft swelling under the chin of the animal).	Use a registered dewormer	Where possible, fence off streams and dams to stop the goats going there. Fence off the pastures that are known to give liver fluke problem.
Roundworms	Goats get roundworms when they take in the immature worms while eating grass. These immature worms grow into adult worms in the animal.	Decreased appetite, anaemia and Diarrhea may occur, constipation due to too many worms	Use Albendazole	Have a flexible rotational grazing programme
Pulpy kidney	Caused by a bacterium which is aggravated when there is a sudden change of diet or when the goats are stressed	Unsteady gait and convulsions. Animals found dead without showing any signs. At post mortem Soft pale kidneys. Increased amount of fluid around the heart, which gets thicker and like jelly when sac is opened.	When pulpy kidney is suspected, use antibiotics	Do not change feed suddenly. Strategic vaccination
Heart Water	Caused by blood parasite. The bont tick transmits the parasite.	Sick animals may have temperature of 40°C or higher Strange behavior, for example the goat may turn its head towards its body in a strange manner. Nervous signs such as a high stepping walk, convulsions or kicking very hard.	Treat with a broad spectrum acting antibiotic	Dipping to control ticks is recommended. Keep domestic animals away from wild animals
Coccidiosis	Caused by a type of a single celled organism. This disease happens when there are dirty conditions in the animal pens. Young animals get this disease very easily.	Watery diarrhea, Dehydration, Loss of appetite, Loss of body weight	Separate all sick animals. Treat all sick animals with a remedy for Coccidiosis	Make sure that you keep the animal pens dry, clean and well ventilated. Do not crowd animals into an area that is too small

Parasites	Causes	Signs and Symptoms	Treatment	Prevention
Pneumonia	Caused by some bacteria. Usually occurs if goats are under stress due to exposure e.g. to wind, cold and heavy rain. Animals usually develop the disease after travelling for long distance	Animals may seem tired and walk behind the rest of the flock May stop eating properly High temperature Animals show fast breathing and breathe with difficulty Mucus discharge from the nose	Treat with a long acting antibiotic product	Provide shelter all the time. During long journeys allow goats stop to rest, eat and drink
Abscesses	Caused by bacteria found in the dust or manure Usually develops from injury caused by ticks, thorns or wire	Round swelling which maybe red and painful on touching Usually develops in front of the shoulder, on the head or neck or on the flank on the hind quarter, but can also develop on other areas on the body.	(For hairy goats), shave and cut across over the soft spot Use your finger to squeeze out puss. Clean the wound with boiled salty water Use a suitable wound spray to keep away flies (If this is not possible use some herbs that repel flies) If possible give an antibiotic injection	If the animal has several bad abscesses or often gets abscesses it should be culled Control ticks
Helminths	Poor grazing methods, and management practices lead to contamination of pastures and surroundings	Animals have poor body condition Starring coat (rough hair) Animals develop pot belly	De-worming using recommended de- wormers	De-worming Controlled grazing

Characteristics of healthy and unhealthy goats

Body part or condition	Healthy goat	Unhealthy goat
General body	Active	Dull
Hair	Smooth, colourful	Ruffled hair, loose
Appetite	Good appetite, eats frequently	Loss of appetite
Ears	Alert, standing here and there	Dropping ears, discharge
Eyes	Bright, clear	Dull and pale eyes
Movement	Actively moves and runs	Difficult in movement
Tail	Upright, wagged	Dropping tail

Goat Rearing Business Plan

Capital Investment Costs

Item	Units	Qty	Unit Cost	Amount
Goats		10	100,000	1,000,000=
Building Materials (Shelter & Fence)			250,000	250,000=
Sub-Total				1,250,000=

Operating Costs Per Month

Item	Units	Qty	Unit Cost	Amount
Land Hire (1 month)		1	100,000	100,000=
Treatment			50,000	50,000=
Labour	Casual worker	1	60,000	60,000=
Sub-Total				210,000=

Expected Yields & Profits after Resale (6 Months)

Profitability Item		Cost	Total
Total Revenue	10 goats sold	200,000	2,000,000=
Less: Production & Operation Costs	After 6 Months		1,260,000=
Profit			740,000=

Source: UWEP Compendium of Business Enterprise Models Vol. 1, 2018

ANNEX

BASIC BUSINESS TERMS

- 1) **Business** refers to the economic activity of producing or selling of goods or services for profit.
- 2) **Agriculture:** Growing of crops and rearing of animals for business and home consumption
- 3) **Farming:** The practice of cultivation and keeping of animals
- 4) **Production Costs:** These are the financial and non-financial expenditures used in producing commodity. For example, the costs pertaining to a farming business include seeds, chemicals, transport, processing, packaging and marketing. While costs pertaining to tailoring include a sewing machine, fabric, thread, machine oil, scissors, needles, and labour etc.
- 5) **Horticulture:** Fruits, vegetables and spices grown for subsistence and for market, in this case specifically tomatoes.
- 6) **Floriculture:** Production of flowers for commercial purpose.
- 7) **Labour costs:** The total expenditure paid for family labour and for hired casual labour in the production of a specified commodity. Farms may have a casual labour cost for activities such as sowing, weeding and harvesting. Tailor shops may have no need for outside labour.
- 8) **Yield or Output:** This is the total volume of the product produced in a given time period. In case of a farm business, the yield would be in terms of quantity of crops produced (kilograms) per acre after a season, while in tailoring it would be the number of dresses, shirts, trousers, bed-sheets made and ready for sale, over a specified time period.
- 9) **Producer Price:** ("farm gate price"): This is the price at which the farm-business sells the commodity to an on-farm buyer. The price is usually lower than terminal market prices. For example, clothing purchased at a town tailor may be resold in village at a higher price. Likewise, tomatoes and onions can be bought from the farmers at lower prices and resold in town markets at higher prices.
- 10) **Gross Income:** (Total Income): The sum of money an entrepreneur receives for selling his output commodity before deducting the costs incurred for producing that commodity.
- 11) **Net Profit:** The sum of money left when all costs of production are deducted from the gross income.

- 12) **Return on Labour:** Net profit divided by total number of person-days used to produce the commodity.
- 13) **Person-day:** A unit used to measure casual labour. Is the total amount of uninterrupted time to perform a task (agricultural task).
- 14) **Operational Costs:** The cost of actions or services needed to produce the output commodity. Note that this does not include the costs of inputs. For example, in a farming business, such services paid for would include: labour for land preparation, fertilizers, etc. While in a tailoring business, this would include labour for cutting fabric, sewing, lifting materials, etc.
- 15) **Fixed Capital:** Machinery, tools, etc. that are invested in and paid for by a business in an initial period that will last for some time into the future.
- 16) **Saving:** Money or goods set aside for future use or putting aside some of a business' profit or earnings for investing in the next production cycle (or season in the case of farming).
- 17) **Credit:** Borrowed money before production and paying it back with interest after production is finished and the product sold.

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For agricultural production to increase, farmers should be equipped with skills through modular and hands on training for market-oriented production –NDP 3

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