



Youth Economic Empowerment Project (YEPP)
"My wealth, My Efforts"

FARMING AS A BUSINESS

Facilitators' Guide

October 2016



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1.0 About Youth Economic Empowerment Project (YEPP)

1.1 Introduction

The Agency For Accelerated Regional Development (AFARD) in partnership with Center for Governance and Economic Development (CEGED) secured a 3-year funding (2016-19) from the European Union in Uganda for Youth Economic Empowerment Project (YEPP) that aims at promoting sustainable and gainful youth employment through a holistic and multi-sectoral approach that targets improving youth employability, public-private sector engagements, and youth voice and space in local governance. The overall goal of YEPP is, *“to contribute to youth inclusive economic growth and poverty reduction in West Nile region of Uganda through sustainable and gainful employment opportunities”* and its specific objectives are to:

- (i) Improve the employability of 2,500 rural youth organized in 125 youth-led VSLAs (900 youth/45 groups in Nebbi; 800 youth/40 groups in Arua; and 800 youth/40 groups in Zombo districts.
- (ii) Promote access to gainful employment opportunities for 2,500 rural youth through agribusiness, microenterprises, micro-franchise, and formal jobs;
- (iii) Strengthen the political capabilities of 2,500 youth to effectively dialogue with local government, private sector, and civil society actors; and
- (iv) Build the capacity of the local CSOs implementing the action for better accountability, learning, and visibility.

1.2 Strategic Approach

To attain the envisaged results, YEPP will use:

- The VSLA model as the entry and growth points for youth to identify like-minded partners, develop savings culture, access business credit, and pursue annual personal development plans.
- Holistic and peer-to-peer training and mentoring approach that will mix soft skills (life, financial, entrepreneurship, and leadership skills) with hard (e.g. vocational and agribusiness) skills.
- Marketplace principles as opposed to charity-driven mindset of interventions. YEPP will finance up to 75% of required start-up kit cost and support agricultural product clusters of “one commodity per youth group” with both production and market linkages development.
- Youth voice and accountability approach to strengthen multi-stakeholder dialogue.
- Mainstreaming of gender and HIV/AIDS to ensure that more female youth (65%) benefit; and HIV/AIDS awareness is increased.
- Information and Communication Technology (ICT) e.g. through mobile money Platform and linkage banking.
- Knowledge management: Learning through monitoring/reviews and evaluation, knowledge and experience sharing, dialogue and documentation of processes and best practices will be key; and
- Partnerships and collaboration with BTVETs, private sector enterprises, and other NGOs to enhance complementarity. This will also help to harness science and business for development.

1.3 Theory of Change

For YEOP to effectively contribute to youth inclusive economic growth and poverty reduction through sustainable and gainful employment opportunities, the project will be anchored on youth-led Village Savings and Loan Associations (VSLAs) as a youth transformation platform. A total of 125 youth-led VSLAs (with 2,500 members i.e., 20 members each) will be formed. All these youth as a start will be trained in VSLA methodology together with trainings in entrepreneurship, financial literacy, life/leadership, and advocacy skills.

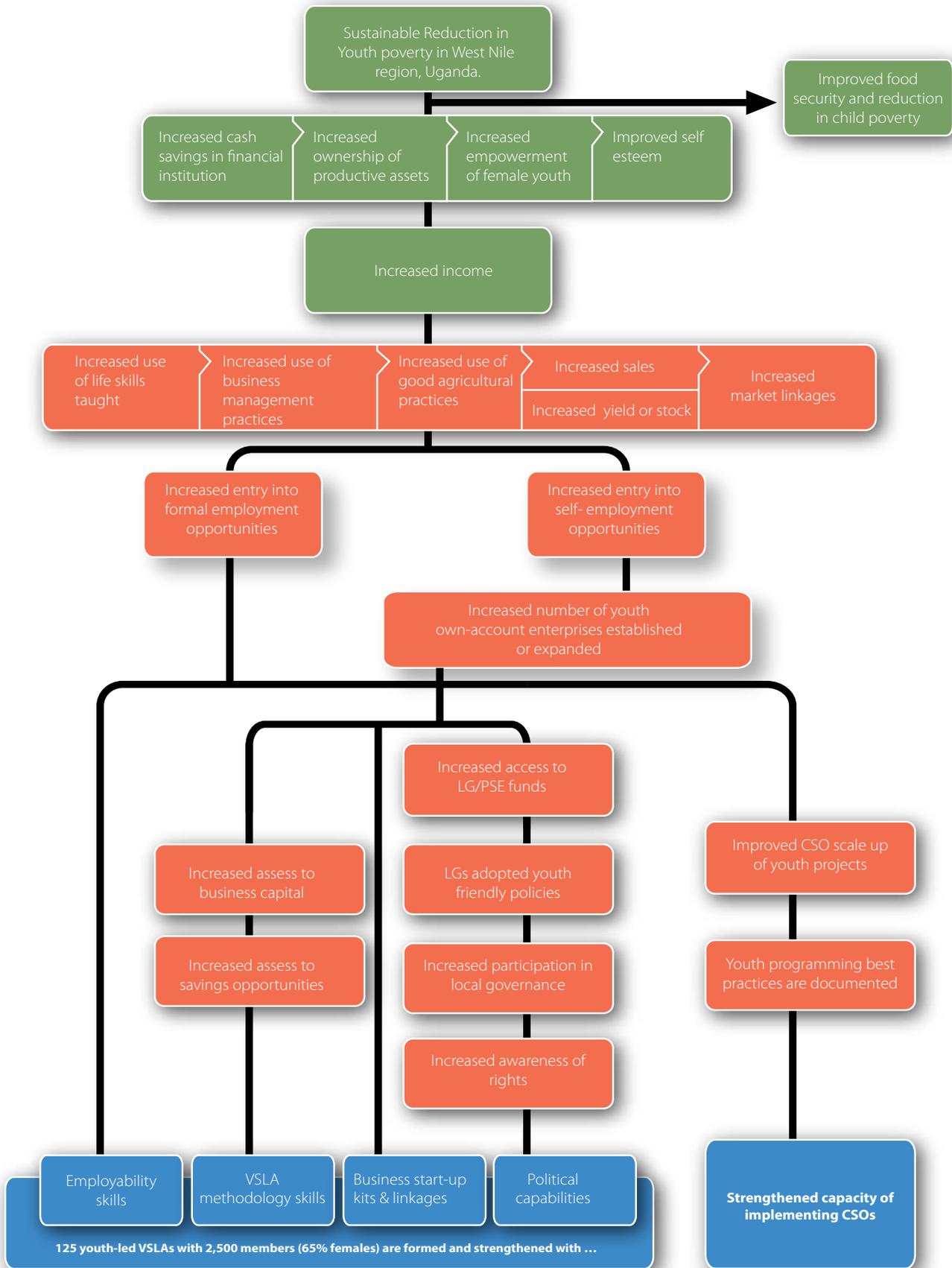
In addition, to ensure that these skills facilitate access to sustainable and gainful employment opportunities, YEOP will support various formal employment and business for self-employment pathways as are shown below:

1,625 youth with support of 250 Young Model Farmers (YMF) will be trained and supported into agribusiness related self-employment

625 youth will be trained in BTVET institutions in locally relevant and profitable skills using non-formal and DIT certified vocational skills training approach. In this way, 125 youth will join formal employment and 500 youth will join self-employment through own-account microenterprises;

250 youth will be supported into micro-franchise business model as self-employed micro-franchisee.

YEEP Adapted Results Chain



2.0 About the manual

2.1 Introduction

The design of YEEP is anchored on a market-led approach. It strives to change two old practices of: (a) Farmers producing and looking for buyers by ensuring that youth produce for a ready market; and (b) Farmers produce any agricultural commodity without due economic diligence especially of poverty reduction potential. To achieve this:

1. The Project Steering Committee critically analyzed the regionally viable enterprises for promotion and identified reliable buyers;
2. Youth should be organized to effectively participate in collective farming i.e., each youth group should produce the same commodity, at the same time, in the right quality, and bulk its commodity so as to attract traders in highly competitive markets able to guarantee them commercially viable and profitable agribusinesses.

2.2 Purpose of the Farming as a Business Guide

This guide is aimed at overall setting a systematic approach for the targeted youth and their facilitators to follow in adopting and promoting this transformation into farming as a business so that the process of igniting and enduring change is organized. The Project Officers and youth-led VSLA members need to have the right attitude, knowledge, and skills to:

- a) Select the right agro-enterprise for their poverty reduction after agro-enterprise analysis.
- b) Plan their enterprise production and marketing in a market-oriented manner.
- c) Use good agricultural practices required to increase their production and productivity.
- d) Collectively and competitively market their produce in better markets.
- e) Review their performance and plan every season with goal-driven and profit orientation.

2.3 Knowledge and skills needed to facilitate enterprise selection

It is imperative that the Facilitator has ample knowledge and skills in:

1. The various enterprises prioritized by YEEP (agronomic and livestock management)
2. How to conduct participatory enterprise selection.
3. How to evaluate enterprise viability before actual selection exercise especially by “gross margin” and “poverty reduction potential” analysis methods.

2.4 Organization of the manual

To ensure coherence in the training as well as incremental adoption of good agricultural and business practices, the manual is divided into 6 main parts, namely:

Part 1: Farming as a Business (FAAB) Explained: This part covers the need for youth to appreciate why FAAB? It also delves into success factors, challenges, leadership, and the importance of goal setting to agripreneurs. The session is also linked to the Life skills Guide component of Personal Development Plan (PDP) that every targeted youth is mandated to set for the next 2-3 years of YEEP intervention.

Part 2: Enterprise Selection: This section covers how youth can identify and prioritize the right agribusiness that has the profit margin able to lift them out of poverty. Given that YEEP seeks to support youth to move out of extreme poverty, it has already preselected high impact enterprises from which the youth will select. However, the skills acquired can be used to select any agroenterprise.

Part 3: Production and Marketing Planning: This session covers how to participatorily conduct basic agribusiness planning. In a step-by-step manner the section takes the youth through a simplified approach to estimating costs and benefits as well as organizing production and marketing activities.

Part 4: Good Agricultural Practices: This section focuses on the promotion of good agricultural practices needed to increase productivity (yield per unit of production). It delves, in detail on the recommended practices for increased production. Emphasis is placed on soil, water and environmental conservation.

Part 5: Collective marketing: This session dwell on how youth can bulk and market their products profitably. It guides on market survey and buyer selection, contracting, simplified bulking, and payment of members. Given the close link with Entrepreneurship and Life Skills Trainers' Guide, participants are drawn back to use the core records therein.

Part 6: Performance Review and Planning: In this session, youth are introduced to critical agribusiness performance indicators that they need to continue tracking to be sure that their selected agribusinesses are worthwhile. The different leaderships in the groups are tasked to provide quantitative data from which members can overtime plot trends of their production and benefits. Equally, room is provided for group members to participatorily discuss how they are performing and to identify challenges and suggest solutions. By so doing it is envisaged that youth-led VSLA members will gain trust, cohesion, accountability and members will have voice in the management of their affairs.

Worth noting here is that the YEEP model is built on Collective Farming whereby a group of farmers farm the same commodity using collective actions to access inputs, technical skills, and better markets.

This process entails that Individual farmers/youth agripreneurs organize themselves into a groups and agree to:

- Farm the same agroenterprise/commodity;
- Farm the selected commodity individually according to their capacities and economic goals;
- Follow the same farming seasons, good agronomic/husbandry practices including post-harvest management;
- Sell their commodity together in the same market using same agreed upon buyer and price.
- Either bulk their produce together on the day of selling or store to sell later.

Note that collective farming:

- Must START as early as at enterprise selection stage through to when the produce is offered to the buyer.
- Farmer groups MUST not engage in buying and selling of the same produce. It should specialize in only selling the product on behalf of farmers.
- The participation of and expectations from members should be agreed upon in advance.

Part 1: Farming as a Business (FAAB) Explained

Methods:

1. Story telling.
2. Question and answer
3. Brainstorming

Objectives: At the end of the session, participants are able to:

- Differentiate between subsistence farming and farming as a business
- List at least 5 reasons that have made subsistence farming lock them into poverty
- List at least 5 benefits and challenges of farming as a business
- State the roles of the key actors in FAAB

Sub- topics:

1. What is subsistence farming?
2. What is farming as a business?
3. Why is subsistence farming associated with poverty?
4. The benefits and challenges of farming as a business
5. Key drivers of farming as a business
6. Roles of key actors in FAAB

Duration:

60 Minutes

Introduction

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. Listen carefully to the story of Ms. Helen and Ms. Mariam.

Story 1:

Ms. Helen is 30 years old and is married with three children. She is a subsistence farmer who annually grows beans, groundnuts, maize, soya beans, and cassava and also rears some five chickens. This job she has been doing for the last 15 years yet her quality of life has not improved at all. Her children hardly go to school because of lack of scholastic materials. She only relies on local herbs when any of her family member is sick. Their clothing and housing unit are no good at all. Ms. Helen has no savings to help her in case of any trouble.

Yet, Ms. Mariam a widow with 6 children lives a better life. She uses farming as a business approach and focuses on growing coffee and banana with beans as an intercrop and keeping only 3 pigs every year. Ms. Mariam earns income every market day from banana and has three peak income seasons from coffee (in June and December) and piglets (in August). As a result, she has a permanent house, decent clothing, and cash savings both in the local SACCO and VSLA where she is a member. All her children study in private schools and when any member of her family is sick they use modern medicine.

Group work: Divide learners into 3 groups and each group answer the following questions:

From the story above, ask learners:

Group 1: What is the difference between Ms. Helen engaged in subsistence farming and Ms. Mariam using farming as a business (in practice and quality of life)?

Group 2: What are the benefits and challenges of farming as a business?

Group 3: If you were to join Ms. Mariam in farming as a business, what would you be keen on?

Emphasize the following:

1.1 Major types of farming practices

- Subsistence farming: Is a low-input, low-risk and low return farming practice where farmers:
 - 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; and
 - Work in isolation of each other relying on individual farmer priority.

NB: In subsistence farming income is always too low to afford a decent living because

Low yield = limited food + low income = limited assets + low savings = persistent poverty (poor quality of life: Clothing, Housing; Status; Ability to use modern medical facilities; Ability to send/retain children in school)

- Commercial farming is the opposite of subsistence farming. It is high-inputs, high-risk, and high return farming practice where farmers are profit-oriented. They focus on:
 - Large-scale production (large land sizes of one crop enterprise, for instance)
 - Advance technologies and innovations than human labour (e.g, tractors); and
 - Market forces of demand and supply to achieve high profits.
- Farming as a business is a hybrid practice/approach that uses the “profit thinking of commercial farming” as the driving force for the small-scale subsistence farmers. It is an approach that “triggers farmers’ mindset 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 aggregation of outputs that are attractive to the market. Typically it is about agribusiness.
 - Business refers to the economic activity of producing or selling of goods or services for profit.
 - Profit (P) occurs when the income (I) generated is greater than expenses (E) incurred ($P = I > E$)
 - No profit occurs when incomes equals expenses ($P \neq I = E$).
 - Loss (L) occurs when income is less than expenses ($L = I < E$). When this state persists, it is advisable that you close down the business as soon as possible.

1.2 Major types of agribusiness

Agribusiness is a farming practice that is bigger than just tilling the land or keeping animals. It looks at farming from a “value chain” lens. 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.

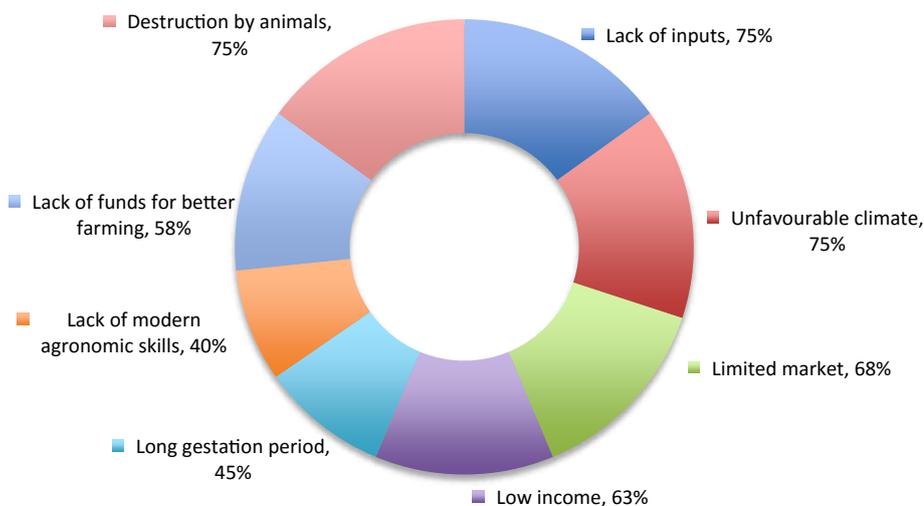
1.3 Benefits of farming as a business



1.4 Challenges to farming as a business

A recent action research that was conducted by SNV, AFARD and CEGED found out that youth are demotivated to join agricultural employment by the factors shown in the figure below.

Figure 2: Factors that demotivate youth uptake of agriculture employment



1.5 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	<ul style="list-style-type: none"> • The product that is highly demanded in the market • The actors (input dealers, buyers, and other supporters)
The Right standards	<ul style="list-style-type: none"> • The units of measurement used (e.g., acres of land [4,000m²]; weights used in the market e.g., Kgs, Liters, etc.) • The quality preferred in the market (e.g., low moisture content; no rotting; spotless tomato; etc.)
Profit maximization	<ul style="list-style-type: none"> • The reduction of cost of production • Increasing yield per unit of production (e.g., use of improved technologies – seeds, fertilizers, etc.) • Higher prices by accessing better paying market
Risk management	<ul style="list-style-type: none"> • Mitigating all factors that cause business loss e.g., correct timing of planting, harvesting, and selling; insurance; etc.

1.6 Key Actors and their Roles in FAAB

Given that YEEP seeks to build self-sustaining youth groups, FAAB will be promoted within the existing youth-led VSLAs. As such, the primary actors will be drawn from within the group membership. They will be equipped with the right skills and will be technically supported by the Project Officers on a declining responsibility basis.

The main actors for FAAB will be:

a) The Executive Committee:

As already established structure, this organ within the group will also provide the marketing committee functions. To note seriously is that given the vital role of marketing, the roles of Marketing Committee that MUST have both males and females, requires people with the following characteristics:

1. Able to read and write so are to keep records
2. Ready to work longer for the benefit of the group
3. Have high negotiation skills
4. Trusted and fraud free
5. Able to motivate youths to participate

b) Young Model Farmers (YMFs):

The market demands quality products in the right volume. That many youth lack agricultural vocational skills, there will be need for hands-on training conducted by their peers. Therefore, two YMFs (1 male and 1 female) will be elected from among the group members to ensure increased agricultural productivity through the provision of relevant, timely, and quality production extension advice to group members. Evidence of this work will accrue from;

- (i) Adoption of good agronomic and agribusiness practices;
- (ii) High volume of quality produce per unit area and
- (iii) Improved business growth, increased income, asset accumulation, and better life.

Thus, the primary roles of YMFs will be to provide hands-on training and mentorship for improved agricultural productivity as well to coordinate the VSLA with project management and the executive committees.

Selection process/criteria for YMFs

The adoption of farmer-to-farmer (peer-learning) extension approach as a sustainable way of ensuring self-reliance requires motivated change agents in the beneficiary groups who can be supported to gain added competencies – content, methodology, and organization – so that they are able to train and mentor better adoption of good agronomic and agribusiness practices (GAAP). Thus, the identification of these change agents will be based on their track records of demonstrated performance in the selected enterprise especially with regard to the ability to innovate, diffuse, and impact knowledge. More so, a Product Cluster Approach requires youth to take advantage of their numbers to aggregate their product (bulking) in order to secure premium markets (collective marketing) with the aim of ensuring that foremost they produce what buyers want in manners that benefits them as farmers.

Selection Process

Given the critical roles and responsibilities YMFs will play in YEOP, their careful selection will be inevitable. In this case, the Youth VSLA together with the Project Officer and Community leaders will be involved in who should be selected as a YMF.

It should be noted that the YFM selection exercise MUST be conducted on the same day the VSLA selects their enterprise.

1. The CBF will mobilize the VSLA members for the Enterprise and YMF selection day. Invitation will be extended to the PO, parents and community leaders too.
2. On that day, the CBT will introduce the objective of the meeting (Selection of Enterprise and YMFs) and brief the gathering on the roles and responsibilities as well as the qualities of a YMF.
3. Once the VSLA has selected their core business agro-enterprise, then YMF selection process will commence. This will be done to ensure that the YMFs are well aligned to the enterprise to be promoted.
4. VSLA members will be given the opportunity to propose candidates to the field staff based on the stated criteria. Three to Six members will be proposed.
5. The proposed members will be requested to either accept or reject the nomination. For every rejected nomination, another name will be proposed.
6. All those who were nominated and accepted such nominations will be requested to step aside from the meeting to allow deliberation by the members present in the meeting.
7. Both the VSLA members and the invited community members will hold discussions on each candidate.
8. After an exhaustive discussion, the VSLA members will be handed over the opportunity and rights to democratically vote their preferred YMFs (1 male and 1 female).
9. After the voting, the candidates will be called back and the results will be declared.

Qualities of a YMF

A good YMF should have the following qualities – S/he has:

- Basic understanding of the local production context;
- Exemplary past performance in farming as a business especially in the chosen enterprise;
- Ability to communicate effectively to other farmers;
- Evidence of hard work such as farm size, good market identification;
- Enthusiasm to learn new knowledge and technologies;
- The vested trust of members and integrity in the community and among peers;

- Permanent residence ship in the VSLA village;
- Basic literacy and numeracy skills in English and the common local language;
- Willingness and time to share knowledge, skills and innovations with others;
- Track records of honesty in handling records and public funds.
- Good leadership skills and attributes.
- Willingness to volunteer and serve his/her group without pay (given that this is not an employment).
- Ability to mobilize group members for a pro-active change.
- Must be a group member

Factors monitored to assess ymf performance

1. Personal application of GAAP and business expansion trends
2. Technology adoption rates among his/her group members
3. Group performance status i.e., enterprise production and productivity rates

Clarifying stakeholders' roles and responsibilities

The agribusiness development under YEEP will involve at least 5 critical stakeholders, namely: 1) The youth groups; 2) The Executive-cum-Marketing Committee; 3) Buyers; 4) Project staff and 5) Young Model Farmers (YMFs). These different actors will execute the following roles and responsibilities:

1. Youth groups

- Approves their Executive Committee to play Marketing Committee roles
- Select the enterprise they want to promote
- Plans and produce the commodity using recommended practices
- Procures inputs together to ensure consistency
- Ensure members adhere to good quality standards for the produce
- Selects the best buyer using market information report
- Bulks members produce for sale
- Ensures all members are paid for their produce

2. Executive-cum-Marketing Committee

- Together with YMFs prepares seasonal marketing plan
- Together with YMFs monitors and estimates production
- Collects market information (buyers and prices)
- Informs members about quality standards for different markets
- Negotiates transactions with buyers on behalf of the group (prices and payment terms)
- Receives payments from buyers
- Effects payments to members
- Provides reports to all members on market trends/sales
- Keep proper updated records – buyers, bulking, sales, etc.

3. The Buyers:

- Provides information about quantity and quality needed
- Negotiates buying price and signs a contract with the group
- Sets buying dates
- Collects produce from bulking centers
- Pays for produce as agreed

4. Project Staffs

(The Project Manager and Project Officers)

- Sensitize the farmer groups about collective farming and marketing
- Assist the farmer groups to elect marketing committees
- Train the marketing committees and farmer groups
- Disseminate information about potential buyers to the marketing committees
- Disseminate price information to the marketing committees (as a supplement to the radio dissemination)
- Advise the marketing committees and follow-up on the marketing activities
- Plan and oversee implementation of marketing activities
- Compile and analyze production data from the farmer groups
- Identify potential buyers and processors and collect information about what they demand
- Organize collection and dissemination of price information
- Coordinate marketing activities with other stakeholders
- Report about production and marketing plans and results

5. Young Model Farmers (YMFs)

- **Together with executive-cum- marketing committees prepare seasonal marketing plans**
- **Together with executive-cum-marketing committees monitor and estimate production**
- **Provide hands on training and mentorship for improved agricultural productivity**
- **Coordinate the VSLA with project management and executive committees**

1.7 Goal Setting

Refer to Part 2 (Session 3) of the Entrepreneurship and Life Skills Trainers' Guide. In case the youth have already completed that session, recap with them:

- What are your economic goals – financial targets?
- What role will agribusiness play in the achievement of your goal?

Reflection/Session Evaluation

What have you learnt today that will help you improve on your mindset toward agriculture?

Part 2. Enterprise Selection

Methods

Lecture, question and answer, group work and take home work

Objectives

At the end of the session, participants are able to:

- Identify a profitable agribusiness
- Prioritize and select their top most agribusinesses

Sub topics:

1. How to identify agribusiness opportunities
2. How to prioritize profitable agribusiness

Duration

90 minutes

Introduction

Introduce the session to learners that today we will learn how to select and prioritize a profitable agroenterprise so that as a group we are able to know, from today onwards, what agroenterprise YEEP will support us in.

To start the process, recap what the key learning and actions were from session 1: Introduction to Farming as a business.

Points to Emphasize

1. Only business farmers who are also called agripreneurs conduct farming as a business. Recap using the Entrepreneurship and Life Skills Manual, on what the qualities of an entrepreneur are.
2. Because farming as a business is concerned with profits for poverty reduction, only high impact enterprises are preferred to be supported by YEEP
3. YEEP will support each youth VSLA with only ONE enterprise in the entire 3-year period.
4. Selecting such high profit and high impact enterprise requires attention because:
 - Factors of production are scarce and costly they must be utilized sparingly and wisely
 - Competition in the private sector is stiff and losers will remain in poverty forever
 - Every enterprise has entry barriers e.g., specialized skills, soil, weather, market regulations, etc.
 - Your investment choice determines your stay in or exit from poverty. Wrong decisions come at a cost!

2.1 How to select a profitable enterprise

- Ask learners engaged in farming as a business to share with members how they were able to identify and prioritize their agroenterprises.
- List the enterprises that YEEP will promote and explain why they were selected – low cost, high returns, medium risks, common skills, etc.
- Take the learners through the prioritization of ONE of the YEEP preferred enterprises for their engagement.

Inform learners that we will use a 2-method approach to select our priority enterprise. The first part of analysis will be based on socio-environmental analysis of the enterprise (see selection criteria below). The second part does the enterprise financial analysis to demonstrate how viable the selected enterprises are.

A: Socio-environmental analysis method

Given that YEEP has prioritized 4 enterprises only, at this stage the group will be required to select only 2 enterprises that will be further analyzed. To do so, a **preference ranking method** will be used.

- Explain all the 10 Core Factors that YEEP prefers in its enterprise selection.
- Give each participant present 40 seeds/sticks/Stones
- Ask each one of them to put one unit per criteria for the enterprise of her/his choice.
- Count and record the number of stones for each Core factor for each enterprise.
- Add the total score for each enterprise.
- Declare to the members their top 2 enterprises that received high score for the next analysis.
- Note that this form MUST be submitted to the Project Manager for filing.

YEEP Enterprise Selection Criteria

Core Factors	Pointer	Tomato	Onions	Passion fruits	Local poultry
1. Market potential	The higher the local/regional market demand and price stability the better				
2. Investment cost	The lower the cost of investment/startup capital required the better				
3. Agro-ecological conditions	The more suitable to local environment – soil, rainfall, etc. – to an enterprises is the better				
4. Available resources	The smaller the land size and start-up costs required for high return the better				
5. Inclusivity	The more the enterprise has gender and vulnerable youth inclusion the better				
6. Experience with the enterprise	The more experienced the youth are in the enterprise the better				
7. Gestation period	The shorter time to produce returns (quick return period) the better.				
8. Risks	The lower the risks – weather, diseases, fire, theft, wild animals the better				
9. Scalability	The higher the expected profit for expansion the better				
10. Collectivity	The easier it is to bulk the produce and sell the better				
TOTAL SCORE					

Points of emphasis

Agro-ecological conditions:

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

Local resources:

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

Risks:

- Small land sizes that do not allow enterprise expansion
- Weather changes are erratic to support business
- High perishability may create marketing pressure
- Poor quality of inputs on the market reduces yield
- High price fluctuations makes returns unstable
- Few and small capacity buyers means stock overload

B: Financial analysis method

- Print and carry along a blank template for each of the enterprise financial analysis sheet (as is used in the template below).
- Using the 2 top most enterprises, conduct the enterprise financial analysis using the guide below for conducting profitability analysis and poverty reduction potential analysis.
- Fill in the template after all the figures have been agreed upon. Note the following:
 - Often farmers start by expecting project support so they inflate input cost. Tell the youth that this is about their own expenses because YEOP will only provide learning inputs.
 - Few farmers have full knowledge of inputs required for good agricultural production. DO not rely on the input list of farmers alone. As a technical person, include what could have been missed out after explaining why such inputs are needed.
 - Many times farmers do not do market survey. Rely on credible sources of information e.g., those producing the commodity; local government officials; local input suppliers; etc.
 - Prices and yields vary from one place to another. Secure the “potential yield data” so that the youth can know the gap between any current yield and what they can harvest once they adopt good agricultural practices.
 - This template MUST also be submitted to the Project Manager for filing.
- Finally, the enterprise financial analysis should be able to make clear:
 - All the required production inputs;
 - Estimate the required production cost in order for the youth to:
 - Know how cheap or expensive the enterprise is
 - Identify what resources they have or can borrow
 - Identify what activities they can do themselves
 - Decide what inputs they may acquire with time e.g., many will list gumboots, spray pumps, etc. This will help them to know the “basic start-up inputs and cost.”
 - Estimate the sales returns/revenue in order that the youth start discussing:
 - Which market/buyer is better to sell to
 - What price can make them realize better profits while maintaining competitiveness
 - Why conducting regular market survey is important
 - When it is profitable to sell their produce (to hoard or not)

- Current market suitability in terms of breakeven price versus prevailing and average market price. Often many youth want to compete with retail traders just because the market price is higher than what the traders offer them. This is because they do not understand marketing costs and risks.
- The relationship between an agroenterprise and poverty reduction. YEEP is striving to see the youth out of extreme poverty.

Profitability Analysis

This is a method used to test whether or not an agroenterprise is profitable to invest in. The simple decision is arrived at when the income earned is greater than the cost incurred.

The simple method of conducting a profitability analysis is described below. It should be noted that if the learners do not know the details of inputs and costs of inputs the Project Officer should consult with local actors – parents, traders, suppliers, government officials of the locality.

A: Estimating Production and marketing cost

- 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, and bags, transport, etc.
- Quantify all inputs that are listed in the right amount needed.
- Establish the unit cost (price) of each input
- Estimate the total costs of production for the enterprise by multiplying the total quantity of inputs by the cost price of each input.

B: Estimating sales revenue

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

C: Estimating gross margin

- Subtract the total costs from sales revenue.

Decision: A profitable agroenterprise has a positive gross margin. The amount must also be reasonable. For instance, an enterprise that yields UGX 100,000 is less attractive compared to one with a return worth UGX 5M.

Poverty reduction potential Analysis

This is a method used to test whether or not an agroenterprise will ably lift a farmer out of extreme poverty. The inclusion of this method is because farmers have been engaged in many profitable enterprises but without being able to exit extreme poverty. The subjectivity of “reasonable amount of profit” makes it difficult to judge between 2 enterprises. In YEEP we use this method to ensure that only high impact enterprises that are able to yield surplus income above what a family needs to live at the international poverty line are promoted.

This analysis is conducted as follows:

1. Estimate the average number of people who are dependent on the youth/farmer;
2. Compute their annual cost of living at \$1.90 international poverty line

Average number of people in the target household	X	365 days in a year	X	\$1.90 poverty line	X	UGX 3,400 current exchange rate per dollar	=	Annual household poverty line income
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3. Estimate the annual income from the agroenterprise

Gross margin	X	Number of seasons of production in a year	=	Annual enterprise income
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4. Deduct the cost of living from the annual income and any surplus income means that the enterprise will enable the youth and his/her household to live above the \$1.90 poverty line.

Annual enterprise income	-	Annual household poverty line income	=	Surplus/Deficit
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Decision:

For an enterprise with a surplus income, select for YEEP support

Final Enterprise Selection Decision

Once the analysis is complete, fill in the form below indicating the priority enterprise for the group

Indicators	Tomato	Onions	Passion fruits	Local poultry
Rate of return or Profitability				
Ability to reduce extreme poverty (\$1.90)				

Group YEEP Enterprise Prioritization Form

District:	Sub county	Parish	Village	Date
Name of Group	Members Present			Priority Enterprise Selected
	Males	Females	Total	
Name and signature of Project Officer		Name & Signature of YMF		Name & Signature of Chairman

Core Factors	Pointer	Tomato	Onions	Passion fruits	Local poultry
		Scores			
Market potential	The higher the local/regional market demand and price stability the better				
Investment cost	The lower the cost of investment/startup capital required the better				
Agro-ecological conditions	The more suitable to local environment – soil, rainfall, etc. – to an enterprises is the better				
Available resources	The smaller the land size and start-up costs required for high return the better				
Inclusivity	The more the enterprise has gender and vulnerable youth inclusion the better				
Experience with the enterprise	The more experienced the youth are in the enterprise the better				
Gestation period	The shorter time to produce returns (quick return period) the better.				
Risks	The lower the risks – weather, diseases, fire, theft, wild animals the better				
Scalability	The higher the expected profit for expansion the better				
Collectivity	The easier it is to bulk the produce and sell the better				
TOTAL SCORE					
		Financial values			
Rate of return or Profitability	The higher the profit margin the better				
Ability to reduce extreme poverty (\$1.90)	This is our goal and the key gap many projects focusing on positive margins have had. Net profit must be >UGX 9.8 million per year for it to lift a youth household of 4 people above the \$1,90 poverty line				

Analysis Template: Onions

Plant population	1 acre of land = 40 meters X 100 meters = 4,000 m ² Spacing = 30 cm X 15 cm Therefore: 40m X 100cm = 4,000cm/15cm = 226 plants in a row 100m X 100cm = 10,000cm/30cm = 333 rows 333 rows X 226 plants = 88,578 plants in 1 acre
Yield	Each plant yields 1 bulb 200 bulbs = 1 basin 6 basins = 1 bag 1 acre = 73 bags
Sales returns	Sales price/bag = UGX 180,000 Sales = Yield X sales price = 73 bags X UGX 180,000 = UGX 13,140,000
Production cycle	Nursery period [= 2 months] + garden period [3 months] = 5 months Annual seasonal production = 2 seasons

Production cost	Quantity	Unit cost	Total
Seeds (250g)	5	50,000	250,000
Nursery bed management	2	120,000	240,000
Land preparation	2	80,000	160,000
Planting	10	10,000	100,000
Weed control	10	8,000	80,000
Pest control	2	100,000	200,000
Harvesting	10	5,000	50,000
Transportation to store	50	2,000	100,000
Subtotal for production			1,180,000
Packaging materials in bags	50	2,000	60,000
Labor for packaging	50	500	25,000
Market search/information	5	30,000	150,000
Transport to market	50	50,000	250,000
Subtotal for marketing			485,000
Total Investment cost			1,665,000
Break-even price (costs/yield)			22,808
Profit (sales – costs)			11,475,000
Monthly income (Profit/production cycle)			2,295,000
Estimated annual income (Profit X production seasons)			22,950,000
Amount required at \$1.90/person per year (=Number of people [4] X \$1.90 X 356 days X UGX 3,400 [current exchange rate])			9,431,600
Poverty reduction potential			YES: Yields surplus income

Tomato

Plant population	1 acre of land = 40 meters X 100 meters = 4,000 m ² Spacing = 60 centimeters X 45 centimeters Therefore: 40 meters = 40cm X 100cm = 4,000cm / 45cm = 88 plants in a row 100 meters = 100cm X 100cm = 10,000cm / 65 cm = 166 plants within a row 88 plants rows X 166 plants = 14,608 plants in 1 acre
Yield	Each plant yields in 3 months at 10 fruits each = 1 Kgs 14,608 plants X 10 fruits = 14,608 Kgs
Sales returns	Sales price/Kg = UGX 1,000 Sales = Yield X sales price = 14,608 Kgs X UGX 1,000 = UGX 14,608,000
Production cycle	Gestation period = 1 months + Yield period = 4 months Annual production seasons = 2 seasons

Production cost	Quantity	Unit cost	Total
Seeds (50g)	2	20,000	40,000
Pesticides, fungicides and fertilizer	1	600,000	600,000
Land preparation	2	180,000	360,000
Transplanting	1	120,000	120,000
Weeding	2	120,000	240,000
Labor for pruning	10	5,000	50,000
Labor pegging	10	5,000	50,000
Labour for harvesting	30	5,000	150,000
Transport to store per box	24	2,000	48,000
Sub total for production			1,658,000
Marketing cost			
Packaging material in boxes	24	10,000	240,000
Market search /information	2	30,000	60,000
Transport to market	24	3,000	72,000
Sub total for marketing			372,000
Total Investment cost			2,030,000
Break-even price (costs/yield)			139
Profit (sales – costs)			12,578,000
Monthly income (Profit/production cycle)			3,144,500
Estimated annual income (Profit X production seasons)			
Amount required at \$1.90/person per year (=Number of people [4] X \$1.90 X 356 days X UGX 3,400 [current exchange rate])			9,431,600
Poverty reduction potential			YES: Yields surplus income

Passion Fruits

Plant population	1 acre of land = 40 meters X 100 meters = 4,000 m ² Spacing = 2 meters X 3 meters Therefore: 40 meters/2 meters = 20 plants in a row 100 meters/3 meters = 33 rows 33 rows X 20 plants = 660 plants in 1 acre
Yield	Each plant yields in 7 months 17.5 Kgs 660 plants X 17.5 Kgs = 11,550 Kgs
Sales returns	Sales price/Kg = UGX 4,000 Sales = Yield X sales price = 11,500 Kgs X UGX 4,000 = UGX 46,200,000
Production cycle	Gestation period = 7 months; Yield period = 7 months = 14 months Annual seasonal production = 1 season

Production costs	Quantity	Unit cost	Total
Seedlings	660	1,000	660,000
Pesticides, fungicides and fertilizer	1	500,000	500,000
Pegs for trellis	1,000	1,000	1,000,000
Strats for supporting trellis	800	500	400,000
Land preparation (first ploughing)	1	100,000	100,000
Sisal strings	80	1,000	80,000
Oxen hire for land opening	1	60,000	60,000
Labor for trellis	10	4,000	40,000
Labor for digging holes	660	500	330,000
Labor for transplanting	10	5000	50,000
Labor for thinning/weeding	100	5,000	500,000
Labor /materials for watering	1	105,000	105,000
Labor for pruning	10	10,000	100,000
Labor for spraying	14	5,000	70,000
Labor for harvesting	35	5,000	175,000
Transport to store per bag	100	2,000	200,000
Subtotal for production			4,370,000
Marketing			
Packaging materials in bags	100	1,000	100,000
Labor for packaging	100	500	50,000
Market search /information	7	30,000	210,000
Transport to market	100	3,000	300,000
Subtotal for marketing			660,000
Total investment cost			5,030,000
Break-even price (costs/yield)			437
Profit (sales – costs)			41,170,000
Monthly income (Profit/production cycle)			2,940,714
Estimated annual income (Profit X production season)			41,170,000
Amount required at \$1.90/person per year (=Number of people [4] X \$1.90 X 356 days X UGX 3,400 [current exchange rate])			9,431,600
Poverty reduction potential			YES: Yields surplus income

Local Poultry Under Programmed Hatching

Start-up population	5 birds (1 cock : 4 hens)
Yield	Every 2 months for laying (Each bird laying and hatching at least 10 eggs/chicks) Cycle 1 = 4 birds X 10 chicks each = 40 birds Cycle 2 = 30 birds X 10 chicks each = 300 birds Cycle 3 = 50 birds X 10 chicks each = 500 birds Total = 840 birds
Sales returns	Sales price/bird = UGX 20,000 Sales = Yield X sales price = 840 birds X UGX 20,000 = UGX 16,800,000
Production cycle	Gestation period = 4 running months Annual seasonal production = 3 harvests

Production costs	Quantity	Unit cost	Total
Start-up stock	5	15,000	75,000
Housing	1	100,000	100,000
Vaccines	6	12,000	72,000
Transport of vaccines	6	20,000	120,000
Feeding (Supplementary)	925	8,000	7,400,000
Water trough	10	60,000	600,000
Feed through	50	10,000	500,000
Treatment	10	10,000	100,000
Labor for feeding	12	30,000	360,000
Subtotal for production			9,327,000
Marketing			
Market search /information	7	30,000	210,000
Transport to market	840	1,000	840,000
Subtotal for marketing			1,050,000
Total investment cost			10,377,000
Break-even price (costs/yield)			12,354
Profit (sales – costs)			6,423,000
Estimated annual income (Profit X production season)			6,423,000
Amount required at \$1.90/person per year (=Number of people [4] X \$1.90 X 356 days X UGX 3,400 [current exchange rate])			9,431,600
Poverty reduction potential			No in year 1 but YES from year 2 onwards

Part 3. Production and Marketing Planning

Methods

Lecture, question and answer, group work and take home work

Objectives

At the end of the session, participants are able to:

List all the inputs they need for production

Calculate their production and marketing costs from a given unit of production

State how much net income they will likely earn at the end of the season

Sub topics:

How to plan an agribusiness

Duration

60 minutes

Introduction

Recap with learners what they learned from the last session.

Introduce the session that today we will learn how to plan the agribusiness of the agroenterprise the group selected.

The Young Model Farmers (YMF) together with the Marketing Committee should lead this process. The role of the Project Officer is only to backstop the process.

Procedure:

- a) Invite all group members to a short meeting during which you:
 - Brief them on the need to plan for the upcoming season.
 - Request every member to think through her/his Economic Goal and how the agribusiness will help achieve that goal.
 - For married members, encourage them to plan together with their spouses so as to benefit from labour pooling, shared voice and ownership, etc.
 - Then set a date when the planning meeting will be held.
- b) To make work easier, calculate the following prior to the scheduled meeting but referring to the enterprise selection analysis sheet used during the enterprise selection meeting:
 - How much it will cost to produce a unit of the product. For instance, how much would $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1 or 2 acres of passion fruit, onion, and tomato production cost?
 - How much a member can earn from the above units in terms of yields and the prevailing market price?
- c) On the day of the planning meeting (use the template below to fill in the information):
 - Ask each member to indicate how much acres/birds s/he planned to plant/rear
 - Using computations above, fill in the various columns with standard units (e.g., kilograms, basins, bags, etc.)
 - Ensure that people change their targets because the net income may present many members with the need to increase or decrease their acre/bird targets.
 - Do the computation participatorily so that all members are fully engaged.
- d) Once the overall computation is finished, sum the various totals to indicate what projected production, investment, and returns will be in the season (all other things being constant). At this point it is important to emphasize to members that they should stick to their targets.

- e) After the completion of (d) above, it will be time to plan for the detailed activities that will be undertaken to achieve the set targets. This will include:
- Listing the all the recommended production practices or activities (see manual on good husbandry practices).
 - Setting the timeline within which every member should accomplish each activity. Doing so will require knowing the enterprise calendar as well as appreciating the need to harvest and sell together at the same time if they should realize the benefits of aggregation.
 - Assigning monitoring responsibilities among the members to ensure that all member fields are visited and assessed for compliance with agreed upon activities and timelines besides adherence to recommended husbandry practices.
- f) Once all these are done, then the group leaders should fill the Form below and ensure that it is duly signed by all the required persons. This form **MUST** be filled in 4 copies – 1 copy each for the group executive committee, Young Model Farmer, Project Officer, and Project Manager.
- g) Upon receiving and signing this form, the Project Officer will enter the data into an Agroenterprise Business Plan database that will be forwarded to the Project Manager.
- h) The Project Manager will aggregate all the data into: (i) Enterprise specific seasonal business case; (ii) Plot on map the Enterprise volume and outreach; and (iii) A regional enterprise business case for sharing with local governments, private sector actors, and other stakeholders.

Production and Marketing Seasonal Plan for Period (e.g., Feb- July.....)

Name of Youth Group:		Contact Details	Enterprise: Variety:
District:	Sub county:	Parish:	Village:

No.	Name of Member (a)	Planned Acres/ Birds (b)	Yield expected (units) (c)	Estimated yield loss + food (d)	Estimated yield to be sold (e=(c-d))	Estimated sales price per unit (UGX) (f)	Estimated Income (UGX) (g=e*f)	Estimated production cost (UGX) (h)	Estimated net Income (UGX) (i=g-h)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
GROUP GARDEN									
TOTAL									

Planned Seasonal Activities

Activity	Period																Responsible
	Month 1				Month 2				Month 3				Month 4				
	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15	W 16	
Nursery management																	
Clashing																	
Ploughing																	
Procurement of inputs																	
Planting																	
Weeding																	
Spraying																	
Harvesting																	
Marketing of produce																	
Review of achievements																	

For Youth Group:

 Group Chairperson: Date, name, signature & stamp

 Group YMF: Date, name and signature

For Implementing Partner:

 Project Officer: Date, name, and signature

 Project Manager: Date, name, signature & stamp

Part 4: Good Agricultural Practices

Methods:
Lecture, Brainstorming
Question and answer
Group work

Objectives:

By the end of the session, participants are able to:

- List the crop/livestock physiology
- Explain the farming calendar of the enterprise
- Identify key pest and diseases as well as their management practices
- Identify the recommended post-harvest management practices

Sub-topics

1. Generally accepted good agronomic practices
2. Pest and disease management practices
3. Post harvest management

Duration:

Varied depending on the enterprise

Points to Consider

It should be noted here that:

First, this part of the manual is divided into four parts in accordance with YEEP prioritized enterprises: Onion, Tomato, Passion fruit, and poultry production.

Second, under each enterprise, a detailed training will be conducted by the YMF at the group-learning sites. These trainings are designed to fit the enterprise calendar that is aligned to each commodity physiology. These trainings will be planned together with the members and executed when youth can use them on their individual farms immediately.

Third, each training session, that will be conducted for each group according to their enterprise will be followed with a reflection and recap during the next session. This will be done to build not just effective flow of sessions but also to ensure that each session is closely linked to the required practices.

4.1 ONION PRODUCTION AND MARKETING



Session 4.11. Introduction to onion production	Method: Lecture, Brainstorming, Question and answer, Group work
Objectives At the end of the session, participants are able to mention the importance of onion growing, understand the weekly activity plan, select and prepare land for onion growing.	
Sub topics 1. Importance of onion growing 2. Weekly activity plan for onion production 3. Land selection and preparation for onion growing	Time: 60 Minutes

Introduction

Introduce the session by telling the participants that in this session we are going to have an introduction to onion growing.

Importance of onion growing

Ask the participants 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 (165 days)
- They require small initial capital.

Onion growing weekly activity plan

Group work

Divide the participants into 4 groups. Ask each group to discuss and come up with 10 different activities that they expect to carry out in onion production. Let them record these activities on a flip chart. The activities should be recorded in the order they occur in the season.

After each group presenting, brain storm on the correct timing for each activity so as to come up with a table as below.

Onion growing weekly activity plan

WEEK	GROWTH STAGE	CRITICAL ACTIVITIES	RECOMMENDATIONS
8 weeks before transplanting	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 1 m by ½ m immediately after germination • Reduce watering gradually • Remove the shade
1	Pencil thick	<ul style="list-style-type: none"> • Transplant 	<ul style="list-style-type: none"> • Use clean material for carrying the seedlings • Transplant in the evening
2		<ul style="list-style-type: none"> • 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 (mole crickets) 	<ul style="list-style-type: none"> • Remove the weeds from the ridges and bury them in the furrows
4	Vegetative growth	<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 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	<ul style="list-style-type: none"> • 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 • Earthing-up for exposed tubers continues
10	Physiological maturity signs appear(10% maturity)	<ul style="list-style-type: none"> • Field monitoring for exposed bulbs. 	<ul style="list-style-type: none"> • Guard against intruders (thieves) • Earthing-up for exposed tubers continues • Reduce movement in the field • Phytosanitation • Organize the items used during harvesting and drying
11	Physiological maturity signs intensify (50% maturity)	<ul style="list-style-type: none"> • Field monitoring for theft 	<ul style="list-style-type: none"> • Bend the leaves to fasten maturity
12	Maturity continues (70%)	<ul style="list-style-type: none"> • Start selective harvest incase bending wasn't done 	<ul style="list-style-type: none"> • Guard against theft
13	Maturity continues (70%)	<ul style="list-style-type: none"> • Start selective harvest incase bending wasn't done 	<ul style="list-style-type: none"> • Guard against theft
14	Harvesting	<ul style="list-style-type: none"> • Go for the harvesting 	<ul style="list-style-type: none"> • Lifting the bulbs • Take care to avoid bulb injury
15	Post-harvest handling	<ul style="list-style-type: none"> • Drying/ Curing • storage 	<ul style="list-style-type: none"> • Cure under shade • Well ventilated stores

Session 4.12. Land selection and preparation	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants are able to select and prepare suitable land for onion growing.	
Sub topics 1. Land selection for onion production 2. Preparation of land for onion growing	Time: 60 Minutes

Introduction

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

Ask the participants how they would conclude that the land is suitable for onion production

Land selection for onion growing

- 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. *(Ask the participants to mention the characteristics of vegetation indicating good soil fertility).*
- Soils with small gravels are suitable for onion production.
- 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 onions.
- The land should not have been used for production of onions or ginger in the last 6 months. This will help minimize pests and disease build up.

Land preparation for onion 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, but also make it easy for bulb formation and expansion.
- Second tillage is then done to produce a fine bed. This will improve crop establishment and growth.
- 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.

Session 4.13. Nursery operations	Method: Lecture, Brainstorming, Question and answer, Practical exercise
Objectives At the end of the session, participants understand the attributes of a good onion nursery site and different steps in onion nursery management.	
Sub topics 1. Qualities of a good nursery site 2. Nursery bed preparation, sowing and watering 3. Pest and disease management 4. Hardening	Time: 120 minutes

Introduction

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

Qualities of a good nursery bed

- A flat, fertile and well drained piece of land
- Close to water source
- Located in less weed infested area
- In areas with a lot of water, raise the nursery bed 10-15 cm above the ground
- The soil should be dug deeply
- Not neighboring onion or ginger gardens

Nursery bed preparation, sowing and watering

The steps are:

1. Sterilize the soil by burning the top of the bed for 20 minutes using dried vegetation. Chemicals can also be used but they are expensive
2. Allow the bed to rest for between 5-7 days
3. Mix manure with the soil
4. 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 1 m width and 20 m length. A shorter bed will over congest the seedlings and they will not develop well.
5. Shade the beds moderately with the shades slanting east
6. Water twice a day in the morning and evenings only
7. Seeds germinate 7- 10 days after sowing.
8. Start reducing the watering frequency after germination.
9. Stop watering completely one week before transplanting

Weeding, pests and disease control in the onion 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. One of the most common diseases of onions in the nursery is damping off, which causes the stem to rot at the crown, leading to seedling death. To avoid this, one week after germination, a spray with mancozeb or Dithane M45 is recommended. Mix 1 tea spoon 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. If there are signs of rain, do not spray. Spraying should be done at least 3 hours before or after any rain.

Practical Exercise

This training should be done on a small piece of land, not more than 1.5 m wide and 2.5 m long. The participants should physically do the work with the facilitator giving guidance. It is advisable that at each stage, explanations are given why things are done the way they are done. 9 skills to learn should include:

- a) Indicators of good soils for a nursery bed
- b) Deep cultivation of the field (1st digging)
- c) Second cultivation, cleaning and beating up to produce a fine tilth
- d) Laying 1 metre width of land for the bed
- e) Soil sterilization
- f) Sowing (sow half a metre of the bed)
- g) Shade construction
- h) Watering
- i) Nursery bed fencing

Session 4.14. Onion field management	Method: Lecture, Brainstorming, Question and answer, Practical exercise
Objectives At the end of the session, participants understand transplanting, weeding and soiling up of onions.	
Sub topics 1. Transplanting and gap filling 2. Weeding and soiling up in onions	Time: 120 Minutes

Transplanting and gap filling

- When properly managed in the nursery bed, seedlings are ready for transplanting 6- 8 weeks after germination. The seedlings will be pencil thickness at the base of the stem.
- The seedlings should have not been watered in the nursery for at least 7 days to strengthen them.
- Water the bed heavily on the day of pulling to ease lifting of seedlings and reduce injury to them.
- Prick out the seedlings and transplant into the main garden in the evening in order to avoid long day heat stress.
- Spacing: 30cm x 15cm (1 plant per hole)
- Gap fill within 1 week of transplanting for even growth.
- Add water to the planting hole before planting for better establishment.

Weeding and soiling up

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

- The crop stand should be kept free of weeds at all time, because weeds compete for nutrients and are also vectors for disease.
- Hand weeding is recommended as the hoe could lead to damage to the tender plants
- Immediately after each weeding, the soil around the crop is softened and heaped around the crown (soiling up). This facilitates bulb formation and expansion.
- It is also recommended that even when there are no weeds, as long as it rains, soiling up should be done.
- 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

Practical exercise

This training should be done on a small piece of land, not more than 3 m wide and 5 m long. The participants should physically do the work with the facilitator giving instructions. It is advisable that at each stage, explanations are given why things are done the way they are done. 8 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

Session 4.15. Onion pests and disease management	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants understand the common onion pests and diseases and their control.	
Sub topics 1. General pest and disease management practices 2. Pest and disease management	Time: 75 Minutes

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

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.

Control

Crop rotation, timely planting, spray with spinosad (an organic pesticide) or cypermethrin.

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.

Control

Field hygiene by timely weeding especially immediately after transplanting.

Common onion diseases and their control

Downy mildew

Lesions form near tips of old leaves (elongated yellowish patches)

Leaves die back and this extends to younger leaves

Control:

Crop rotation, use clean propagules, sprays every seven days with a fungicide when signs of infection appear.

Purple blotch

Small white spots form on the foliage expanding rapidly under moist conditions.

Control

Crop rotation, use clean propagules, sprays every seven days with a fungicide when signs of infection appear.

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.

Control

Timely planting, Improved field hygiene and sanitation

Session 4.16. Harvesting and post-harvest handling

Method:

Lecture, Brainstorming,
Question and answer

Objectives

At the end of the session, participants are able to harvest onions at the right stage, minimize post-harvest losses and prepare for marketing,

Sub topics

1. Signs of maturity and harvesting of onions
2. Post-harvest handling of onions
3. Quality considerations and marketing of onions

Time: 90 Minutes

Signs of maturity and harvesting of onions

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

Post-harvest handling of onions

- Dry in open sided bands or under tree shade on a raised platform that allows air circulation form the bottom of the heap.
- Drying under hot sun leads to scorch burns on the bulbs.
- Delayed drying after harvest can cause rotting
- Store until required for sale or use.
- Store in good houses, well ventilated for further curing.
- Tie bunches by the leaves and hang in an onion store well ventilated cool and dry

Quality considerations and marketing of onions

- Onions 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 and weight.
- Onions 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, and as volumes increase, Arua town, Lira, Gulu, DR Congo, Moyo, Koboko, Adjumani
- 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.

4.2: TOMATO PRODUCTION AND MARKETING



Session 4.21. Introduction to tomato production

Method:

Lecture, Brainstorming, Question and answer, Group work

Objectives

At the end of the session, participants are able to mention the importance of tomato growing, understand the weekly activity plan for, select and prepare land for tomato growing.

Sub topics

1. Importance of tomato growing
2. Weekly activity plan for tomato production
3. Land selection and preparation for tomato growing

Time: 60 Minutes

Introduction

Introduce the session by telling the participants that in this session we are going to have an introduction to tomato growing.

Importance of tomato growing

Ask the participants to mention why tomatoes 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 short time to mature (90 days)
- They require small initial capital.

Tomato growing weekly activity plan

Group work

Divide the participants into 4 groups. Ask each group to discuss and come up with 10 different activities that they expect to carry out in tomato production. Let them record these activities on a flip chart. The activities should be recorded in the order they occur in the season.

After each group presenting, brain storm on the correct timing for each activity so as to come up with a table as below.

Tomato growing weekly activity plan

WEEK	GROWTH STAGE	CRITICAL ACTIVITIES	RECOMMENDATIONS
8 weeks before transplanting	Nursery bed preparation Germination after 5 - 8 days	<ul style="list-style-type: none"> • Prepare the nursery bed • Monitoring • Sowing (4 – 5 weeks before intended transplanting date) • Watering • Raise the shade • Thinning • Pest and disease management (Hardening) 	<ul style="list-style-type: none"> • Soil sterilization • Fence the nursery bed after sowing • Water twice (morning and evening) • Slant the shade west-east to a height of 1m by 1/2m immediately after germination • Reduce watering gradually • Remove the shade
1	Pencil thick	<ul style="list-style-type: none"> • Transplant and mulch immediately after transplanting. Take care not to mulch with materials having viable seeds. These will become weeds 	<ul style="list-style-type: none"> • Use clean material for carrying the seedlings • Transplant in the evening
2		<ul style="list-style-type: none"> • 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 (cutworms and crickets) 	<ul style="list-style-type: none"> • Remove the weeds from the field, taking care not to injure the plants
4	Vegetative growth	<ul style="list-style-type: none"> • Monitoring for pests and diseases (cutworms, aphids, bacterial wilt) • Staking starts 	<ul style="list-style-type: none"> • Spray with organic concoctions/ Pyrethroid and dimethoate derivatives • Fungicides (mancozeb, dithane M45) • Phytosanitation
5	Flowering starts and production of suckers (<i>Explain what suckers are</i>).	<ul style="list-style-type: none"> • Monitoring for pests and diseases (aphids, thrips, late blight, bacterial wilt) • Pruning should start 	<ul style="list-style-type: none"> • Phytosanitation • Reduce movement in the field

6	Flowering	<ul style="list-style-type: none"> • Monitoring for pests and diseases (Bacterial wilt, Late blight) • More pruning - with care to avoid flower damage) 	<ul style="list-style-type: none"> • Spray with organic concoctions/ Pyrethroid and dimethoate derivatives • Phytosanitation • Avoid movements in the garden
7	Fruit formation starts	<ul style="list-style-type: none"> • Second weeding starts • During second weeding, • Monitoring for pests and diseases (Late blight, 	<ul style="list-style-type: none"> • Move carefully in the garden • Fungicides (mancozeb, dithane M45)
8	Fruits increase in size	<ul style="list-style-type: none"> • Field monitoring to check for diseases/pests (Boll worms, fruit canker) 	<ul style="list-style-type: none"> • Limit movements in the field, and where necessary, move carefully in the garden
9	Physiological maturity signs appear(10% maturity)	<ul style="list-style-type: none"> • Field monitoring for diseases/pests 	<ul style="list-style-type: none"> • Guard against intruders (thieves) • Reduce movement in the field • Phytosanitation • Organize the items used during drying
11	Start of harvesting	<ul style="list-style-type: none"> • Field monitoring for theft 	<ul style="list-style-type: none"> • Guard against intruders (thieves)

Session 4.22. Land selection and preparation	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants are able to select and prepare suitable land for tomato growing.	
Sub topics 1. Land selection for tomato production 2. Preparation of land for tomato growing	Time: 60 Minutes

Introduction

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

Ask the participants how they would conclude that the land is suitable for tomato production

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 participants 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, pumpkins or water melon in the last 6 months. This will help minimize pests and disease build up.

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
- 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.
- Second tillage is then done to produce a fine bed. This will improve crop establishment and growth.
- 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.

Session 4.23. Nursery operations

Method:

Lecture, Brainstorming, Question and answer, Practical exercise

Objectives:

At the end of the session, participants understand the attributes of a good tomato nursery site and different steps in tomato nursery management.

Sub topics:

1. Qualities of a good nursery site
2. Nursery bed preparation, sowing and watering
3. Pest and disease management
4. Hardening

Time: 120 minutes



Introduction

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

Qualities of a good nursery bed

- A flat, fertile and well drained piece of land
- Close to 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 neighbouring other tomato gardens, or gardens planted with irish potatoes, egg plants or pepper.

Nursery bed preparation, sowing and watering

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

1. Sterilize the soil by burning the top of the bed for 20 minutes using dried vegetation. Chemicals can also be used but they are expensive
2. Allow the bed to rest for between 5-7 days
3. Mix manure with the soil
4. Sow in drills 5cm apart at 0.5cm deep and cover lightly. Seed rate is 1.2- 1.4kgs/acre. This seed is sown on a bed of 1 m width and 20 m length. A shorter bed will over congest the seedlings and they will not develop well.

5. Shade the beds moderately with the shades slanting east
6. Water twice a day in the morning and evenings only
7. Seeds germinate 5-8 days after sowing.
8. Start reducing the watering frequency after germination.
9. Stop watering completely one week before transplanting

Weeding, pests and disease control in the tomato 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. 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. To avoid this, one week after germination, a spray with mancozeb or Dithane M45 is recommended. Mix 1 tea spoon 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. If there are signs of rain, do not spray. Spraying should be done at least 3 hours before or after any rain.

Practical Exercise

Introduce this exercise by explaining to the participants that in this session, we are going to practically carry out nursery operations from site selection, nursery bed preparation, sowing, shading and fencing.

This training should be done on a small piece of land, not more than 1.5 m wide and 2.5 m long. The participants should physically do the work with the facilitator giving instructions. It is advisable that at each stage, explanations are given why things are done the way they are done. 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 metre width of land for the bed
5. Soil sterilization
6. Sowing (sow half a metre of the bed)
7. Shade construction
8. Watering
9. Nursery bed fencing

Session 4.24. Tomato field management

Method:

Lecture, Brainstorming, Question and answer, Practical exercise

Objectives:

At the end of the session, participants understand transplanting, weeding, mulching, pruning and staking of tomatoes.

Sub topics:

1. Transplanting and gap filling
2. Weeding and pruning
3. Tomato mulching and staking

Time: 120 Minutes

Transplanting, mulching and gap filling

- When properly managed in the nursery bed, seedlings are ready for transplanting 4- 5 weeks after germination.
- The seedlings should have not been watered in the nursery for at least 7 days to strengthen them.
- Water the bed heavily on the day of pulling to ease lifting of seedlings and reduce injury to them.
- Prick out the seedlings and transplant into the main garden in the evening in order to avoid long day heat stress.
- Spacing: 45cm x 30cm or 60x60cm depending on the variety (1 plant per hole)
- Use vigorous seedlings for faster growth.
- Add water to the planting hole before planting.
- Mulching should be done to conserve water in the soil; it should be done immediately after transplantation of the seedling.
- The mulch will also help to protect the fruits from being soiled in case of rain.
- Gap fill within 1 week of transplanting for even growth.

Weeding, pruning and staking

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

- The crop stand should be kept free of weeds at all time, because weeds compete for nutrients and are also vectors for disease.
- Hand weeding is recommended both for the greenhouse and outdoor tomatoes.
- To avoid the spread of diseases from plant to plant, do not use knives..
- 'Pinch out' the suckers instead using your thumb and forefinger as shown in the picture. This is called pinning.
- A weekly scouting is done for side shoots before they develop into big shoots.
- Remove side shoots, laterals, old leaves, diseased leaves & branches and overshadowed lower leaves by hand.
- 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.
- Flowers should be pruned to 5-6 per cluster for medium- large sized fruits.
- 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 tomato and then gently twine the string around the plant to avoid snapping the stem as shown in the picture



Practical exercise

Introduce this exercise to the participants by telling them that in this session, we are going to practically carry out transplanting and mulching of tomatoes.

This training should be done on a small piece of land, not more than 3 m wide and 5 m long. The participants should physically do the work with the facilitator giving instructions. It is advisable that at each stage, explanations are given why things are done the way they are done. 8 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 the 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

Session 4.25. Tomato pests and disease management	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants understand the common tomato pests and diseases and their control.	
Sub topics 1. General pest and disease management practices 2. Pest and disease management	Time: 75 Minutes

General pest and disease management practices

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. In principle, the following practices will greatly reduce pest and disease incidences in the field and you are encouraged to practice them.

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

Common tomato pests and their control

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

Control

Crop rotation, field hygiene, use of organic pesticides.

Common tomato diseases and their control

Late Blight

- 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



Session 4.26. Tomato harvesting, post-harvest handling and marketing	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants are able to harvest tomatoes at the right stage, minimize post-harvest losses and prepare for marketing,	
Sub topics 1. Signs of maturity and harvesting of tomatoes 2. Post-harvest handling of tomatoes 3. Quality considerations and marketing of tomatoes	Time: 90 Minutes

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

- After harvesting ripe tomatoes, the fruits should be washed 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 centres in the region, and as volumes increase, Arua town, Lira, Gulu, DR Congo, Moyo, Koboko, Adjumani
- 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

4.3: PASSION FRUIT PRODUCTION AND MARKETING



Session 4.31. Introduction to passion fruit production

Method:

Lecture, Brainstorming, Question and answer

Objectives

At the end of the session, participants are able to mention the importance of passion fruit growing, understand the weekly activity plan for passion fruit growing, select and prepare land for passion fruit growing.

Sub topics

1. Importance of passion fruit growing
2. Weekly activity plan for passion fruit production
3. Land selection and preparation for passion fruit growing

Time: 60 Minutes

Introduction

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

Importance of passion fruit growing

Ask the participants to mention why passion fruits are grown. Record their responses on a flip chart. 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

Divide the participants into 4 groups. Ask each group to discuss and come up with 10 different activities that they expect to carry out in passion fruit production. Let them record these activities on a flip chart. The activities should be recorded in the order they occur in the season.

After each group presenting, brain storm on the correct timing for each activity so as to come up with a table as below.

Passion fruit growing weekly activity plan

WEEK	GROWTH STAGE	CRITICAL ACTIVITIES	RECOMMENDATIONS
12 weeks before transplanting	Nursery bed preparation Germination 12-14days	<ul style="list-style-type: none"> • Prepare the nursery bed • Sowing • Pot filling • Watering • Raise the shade • Pricking out • 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 1m by 1/2m immediately after germination • Pest & disease control • reduce watering • remove the shade
1	Pencil thick	<ul style="list-style-type: none"> • Transplant 	<ul style="list-style-type: none"> • Use clean material for carrying the seedlings • Transplant in the evening
3		<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	The fourth and fifth leaves emerge	<ul style="list-style-type: none"> • Monitoring for pests (cutworms, mole crickets) 	<ul style="list-style-type: none"> • Spray with locally made plant derivatives for pest control
6 - 12	Vegetative growth	<ul style="list-style-type: none"> • Monitoring for pests and diseases • Weeding • Trellising 	<ul style="list-style-type: none"> • Spray with fungicides (mancozeb, dithane M 45) • Phytosanitation
13 - 16	1 st 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	Fruit growth	<ul style="list-style-type: none"> • 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	Ripening starts	<ul style="list-style-type: none"> • Harvesting starts 	<ul style="list-style-type: none"> • Minimize movements in the garden • Guard against theft

Session 4.32. Land selection and preparation	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants are able to select and prepare suitable land for passion fruit growing.	
Sub topics 1. Land selection for passion fruit production 2. Preparation of land for passion fruit growing	Time: 60 Minutes

Introduction

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

Ask the participants how they would conclude that the land is suitable for passion fruit production

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 participants 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.

Session 4.33. Nursery operations

Method:

Lecture, Brainstorming, Question and answer, Practical exercise

Objectives

At the end of the session, participants understand the attributes of a good passion fruit nursery site and different steps in passion fruit nursery management.

Sub topics

1. Qualities of a good nursery site
2. Nursery bed preparation, sowing and watering
3. Pot filling
4. Pricking out
5. Pest and disease management
6. Hardening

Time: 120 minutes

Introduction

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

Qualities of a good nursery bed

- 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 neighbouring tomatoes, pumpkins or water melon
- Fenced to protect seedlings against animals

Nursery bed preparation, sowing and watering

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

1. Sterilize the soil by burning the top of the bed for 20 minutes using dried vegetation. Chemicals can also be used but they are expensive
2. Allow the bed to rest for between 5-7 days
3. Mix manure with the soil
4. 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.
5. After planting seeds, a nursery must be covered using dry grass and watered at least twice a day
6. Shade the beds moderately with the shades slanting east
7. Water twice a day in the morning and evenings only
8. Seeds germinate 12- 14 days after sowing.
9. After germination, the grass should be raised to a height of 1cm as the seedlings continue growing.
10. 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.
11. It is advisable to raise the seedlings in pots
12. Fill the potting materials with loam fertile soil mixed with well decomposed manure. 1 part manure and 4 parts fertile soil (usually top soil) will give a good mixture.

13. The seedlings can be transferred from the nursery bed to potting materials two weeks after germination.
14. 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.
15. The seedlings are then transferred to the pots (1 seedling per pot) and watering continues.
16. When vines are 10-60 cm tall (about 5-6 weeks after potting) they are ready for transplanting
17. Start reducing the watering frequency after germination.
18. Stop watering completely one week before transplanting

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 1 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.

Practical Exercise

This training should be done on a small piece of land, not more than 1.5 m wide and 2.5 m long. The participants should physically do the work with the facilitator giving guidance. It is advisable that at each stage, explanations are given why things are done the way they are done. 10 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 metre width of land for the bed
5. Soil sterilization
6. Sowing (sow half a metre of the bed)
7. Pot filling
8. Shade construction
9. Watering
10. Nursery bed fencing

Session 4.34. Passion fruit field management	Method: Lecture, Brainstorming, Question and answer, Practical exercise
Objectives At the end of the session, participants understand transplanting, weeding, pruning and trellising of passion fruits.	
Subtopics 1. Transplanting and gap filling 2. Weeding, pruning and trellising 3. Mulching	Time: 120 Minutes

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 rain seems to be inadequate.
- With the spacing of 3m by 2m, 660 seedlings of passion fruits can be planted in an acre of land.
- The seedlings should have not been watered in the nursery for at least 7 days to strengthen

Weeding, pruning and trellising

Ask participants why weeds should be controlled. Ask them the common weeds in their localities (in local languages). Also ask them what they understand by and the importance of (a) Pruning (b) trellising.

- The crop stand should be kept free of weeds at all time, because weeds compete for nutrients and are also vectors for disease.
- The first weeding should be done within two weeks after transplanting.
- Shallow weeding should be done using hoes.
- Weeds should be allowed to decompose in the garden to form manure.

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.

Practical exercise

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

Session 4.35. Pests and disease management	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants understand the common passion fruit pests and diseases and their control.	
Sub topics 1. General pest and disease management practices 2. Pest and disease management	Time: 75 Minutes

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

Common passion fruit pests and their control

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.

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.

Fruit flies

Puncture immature fruits causing them to rot.

Control

Spray with cypermethrin

Mites

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

Control

Spraying with cypermethrin



Common passion fruit diseases and their control

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



Brown spot

Occurs in humid conditions and is caused by a 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 dies up



Prevention

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

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.

Session 4.36. Harvesting and post-harvest handling	Method: Lecture, Brainstorming, Question and answer
Objectives At the end of the session, participants are able to harvest passion fruits at the right stage, minimize post-harvest losses and prepare for marketing,	
Sub topics 1. Signs of maturity and harvesting of passion fruits 2. Post-harvest handling of passion fruits 3. Quality considerations and marketing of passion fruits	Time: 90 Minutes

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, and as volumes increase, Arua town, Lira, Gulu, DR Congo, Moyo, Koboko, Adjumani
- 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.

4.4 Poultry productivity improvement through programmed hatching in West Nile, Uganda

4.41 Introduction

Poultry rearing has been and is still a traditional activity for vast people in Uganda. Despite the socio-economic and agricultural role it plays in Uganda, the poultry industry is still underdeveloped compared to western countries. Chicken are among the major domesticated birds (poultry) that are of value to man. Over 80% of chicken reared in Uganda are indigenous chicken. Local chickens are the main poultry species reared among others like turkeys, ducks, guinea fowls, geese and pigeons. The birds are mainly kept on free range system. Local chickens have an important role in increasing household food security, income as well as increasing gender equity.

Previous attempts by individual farmers, government programmes and NGOs to introduce exotic breeds of chicken have had major setbacks due to high mortalities, high cost and poor quality feeds and low market for birds such as broilers. Broilers were perceived to have soft meat which the population did not appreciate hence the only market was a few hotels (where it's deep fried) in the region. Layers can be promoted because the demand for eggs within the region and neighbouring countries exceeds the current production; however they also prefer local chicken eggs. Local chicken production is economically viable since the prices are very attractive, with local cocks costing between shs. 20,000-25,000 per bird as compared to a broiler at shs. 8,000-10,000/=.

Local chickens are hardy and can be kept with minimum labour and other production inputs. Therefore households that stabilize their flock sizes and improve husbandry practices can support their family needs from local chickens whose market is ready at most times in West Nile. This is not without the following challenges: low adult body weight, low egg production, high death rates (due to diseases, predators and accidents) and slow growth rates. In order to improve local chicken production, emphasis should be on improving their production characteristics.

Production characteristics of local chicken

- Small flock size (usually less than 30 birds per household)
- Eggs per clutch may vary from 6 to 20 eggs
- The hens are broody and after hatching, they take care of the chicks
- Egg weight may vary from 37 to 45 grams per egg
- Hatchability of the eggs can be as low as 40%
- Chick survival is quite low, the chick mortality ranges from 50-90%
- In mature birds, the mortality rate may be 1-50%
- Age at sexual maturity marked by laying of the first egg is 6-7 months whereas in commercial layers it is 4-5 months
- The average length of laying cycle may be 15 to 20 days and incubation period is 21 days
- Chick rearing period may be 2½-3 months
- After weaning, an open period will be about 3 weeks before starting to lay again
- The whole cycle from laying of first egg to another laying is about 140 days

Uses of poultry

Poultry have very many uses among which are the following:-

- Source of food; eggs and meat for humans.
- Source of income through sale of the birds and their products. A properly managed farm attracts visitors and learners who pay a fee to learn good management methods.
- Employment for the farmer and workers on the farm.
- Gifts and dowry payments
- Chickens are used to perform traditional functions such as cleansing and offerings or sacrifices
- Cocks are used widely in estimating time
- Chicken also supply feeds to other livestock, for example, chicken manure, bones, offals, blood and feathers are important ingredients in animal and fish feeds.
- Other uses include;
- Chicken manure is used widely in soil fertility improvement and in fertilisation of fish ponds.
- Chicken feathers are used in making various items such as pillows, jackets and various ornamentals.
- Chicken kill various dangerous animals including caterpillars and snakes.
- Chicken are also used in entertainment, for example, cock fights are an emerging entertainment in many parts of the world.

Advantages of rearing poultry

Local poultry keeping has many advantages over other enterprises and these include;

- The market is readily available throughout the year.
- Starting capital is relatively small when compared to other enterprises on commercial scale.
- Poultry rearing requires little land because of their small size. Individuals in areas where land is limited such as in urban areas can also keep poultry at commercial scale.
- Chicken are acceptable to people from various cultural backgrounds and there are not many common taboos associated with eating them.
- Poultry are easy to handle and need minimal physical energy inputs such that even children, persons with disabilities (pwws), women and hiv/aids victims can successfully look after them.
- Disposal is very easy because of their small sizes and little unit prices. This makes them suitable for solving emergency problems.
- The cost of veterinary inputs is small when compared to other livestock enterprises.

How to improve production characteristics of the local breed

Small flock size: the numbers of birds are low mainly due to low inputs and deaths. To improve this, husbandry methods (housing, feeds/feeding, breeds and health care) should be improved by each household that intends to keep local chicken on commercial scale. There is need to rear different age groups separately, especially chicks should be separated and brooded separately from their mothers to improve their survival.

Few eggs per clutch: this index can be improved in several ways. First is to improve the breed by crossing the local selected hens with improved or parent stock cocks for laying breeds or dual purpose breeds. Secondly, feeding and other management practices should be improved. Thirdly, artificial incubation technologies need to be adopted to support hatching large number of eggs laid since most improved laying birds are not broody. When improved cocks are introduced to replace local cocks, efforts should be made to control inbreeding by adopting regular/periodic cock exchange programs among benefiting groups.

Low egg weights: egg weights can be improved by breed improvement and improved nutrition. Identifying cheap local feed resources will greatly improve the quality of eggs laid and weight of birds for sale. This will also reduce the time taken for birds to reach sexual maturity. Small eggs usually have low hatchabilities because eggs that lose more than 18% of their water do not hatch. Small eggs have low water content and any normal loss of water during incubation will lower hatchability. In commercial layers, the minimum egg weight required for setting in incubator is 52g.

Poor hatchability: several factors affect hatchability including temperature, humidity, egg storage, egg size, fertility of males, nutrition and many others. To improve local chicken numbers, artificial brooding needs to be adopted.

Natural brooding: natural brooding is advantageous in local birds where no artificial incubation technologies are available. Natural brooding reduces the number of eggs laid per hen per year and number of chicks raised. This broody behaviour can be adopted for programmed hatching where a hen is used to hatch several sets of eggs. Broodiness can be eliminated by careful selection and cross breeding with improved breeds.

Low chick survival: chick losses can result from diseases and parasites, accidents, predators and poor environmental conditions. When chicks are left to move around with their mothers, they may be killed by rain, diseases acquired from older birds, predators and several others. This greatly lowers their survival. Also natural brooding wastes productive time of mothers. Adopting artificial brooding for 6-8 weeks before releasing chicks on free range will improve their survival and increase the laying cycles of the mothers. Also adopting disease control measures discussed later in this book will improve chick survival.

Periodic deaths of mature birds: from time to time, flocks are killed by newcastle disease. Introducing regular vaccination routine will improve the resistance of the birds against the disease and improve their survival. Newcastle disease vaccines are affordable and local communities can institute effective control programs for a particular geographical area. Other vaccination regimes and disease control measures are discussed later in this book.

Slow growth rate: this is mainly due to low inputs in production and scavenging nature of the birds. Active identification of local feed resources should be considered to improve growth rates and weights of products from the birds.

Long laying time: the birds take 15-20 days to lay on average 12 eggs. This is explainable by the scavenging method of feeding. Birds skip certain days during laying. One needs to ensure constant supply of feeds to continuous lay, good quality eggs and chicks. After incubation, chick rearing periods should be taken over by the owner to free the hens to return to lay. Priming hens and making them lay around the same week makes chick rearing quite easier and encourages proper management (all in, all out) practices.

All attempts will be made to improve the production indices of local birds in the project period. For the purpose of this manual, emphasis will be laid on basic husbandry practices and programmed hatching of eggs.

4.42 Housing

- Housing is important in monitoring poultry production, disease control, ease daily management and protection against adverse weather and predators.
- The type of housing is dependent on which system of production is to be adopted. In all cases, different house designs should cater for stocking rate, equipment in house, ventilation and building materials to be used.
- Extensive system requires large space for birds to move around to feed and scavenge. Semi intensive system has a house with fence that surrounds a run (open grassed area) where the birds relax at day time. The intensive system is the most applicable where space is limiting and when you want to improve feeding, disease control and management and ultimately profits.
- A good poultry house should provide a conducive environment for optimal production.
- Proper security should be taken care of to protect your birds and installations from predators and thieves.

Space allowance/stocking rate

- Space allowed per bird should be adequate to avoid overcrowding. Usually 5 to 7 birds per metre square are recommended if they are completely housed but up to 13 birds can stay in one metre square in night housing with patches.
- When constructing a house, consider the space required by birds and other fittings (feeders, drinkers, heaters, patches, etc).

Humidity

- The house should be constructed to ensure that the moisture content in air (humidity) inside the house is kept low to avoid diseases.
- Sources of moisture in the house include exhaled air, faecal matter, evaporation from drinkers etc.

Temperature

- The house should conserve heat for chicks while there should be no heat build-up in adult birds units (because feathers are insulators and prevent heat loss from birds).
- Chicks of 1-4 weeks of age require warmth while adult birds should be kept in room temperature (20-25°C).

Effects of high temperature

- Increase water intake that leads to increased frequency of defecation that affects litter quality. Birds in hot houses are seen with open mouths breathing rapidly with extended wings.
- Eggs laid may be of small size and thin shelled as birds lose water and more carbon dioxide.
- Reduction in egg size (as water evaporates from the eggs) and deterioration of egg quality.

How to reduce heat in poultry units

- The walls of the house should be tall enough to keep the house cool.
- Poultry houses should have free air circulation to reduce excessive heat.
- Selection of appropriate roofing material that reduce heat in the house e.g. Thatch grass is a good insulator to heat though it does not last for long and harbours vermins (like rats, snakes) and parasites.
- The area around poultry house should have grasses or short crops to reduce solar/heat radiation from the ground to the house. High canopy trees help to reduce heat in house but tall buildings or too many shrubs around house prevent air movements and harbour predators.

Ventilation

- Ventilation helps in removal of stale air, excess heat and too much moisture from the house.
- Ventilation is achieved through building side walls for poultry houses halfway.

Lighting

- Lighting facilities should be available in the house of intensively managed poultry eg brooders.
- Lighting induces sexual maturity in young females (pullets) and continuous supply of light makes birds eat and grow fast.

The brooder

A brooder is a house for rearing chicks for the first 4-8 weeks of life.

A brooder is a building or a room which has the following features:

- Conserves heat i.E. Should not get cold very fast and should be properly sealed so as not to allow in cold air. It should not also allow too much heat to build up inside.
- Has adequate ventilation i.E. Windows and ventilators can be opened or closed when necessary
- Should be leak proof, that is, should not allow rain water to sip into the house and the rain should not splash into the house from the sides.
- Should have room for expansion as the chicks grow and should prevent vermin and rodents from entering inside.
- Artificially brooding chicks after hatching improves their survival by reducing incidences of death from some diseases, predators and accidents.

Note: young chicks are very vulnerable to cold, dehydration, starvation and diseases, so care should be taken to avoid these.

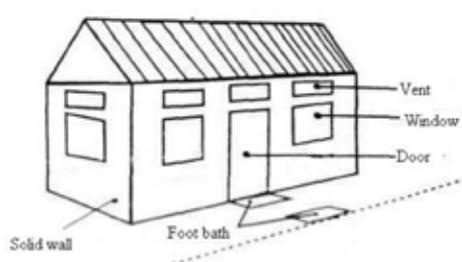


Figure 1: Sketch of brooder house

Sketches of Brooder and Adult chickens house

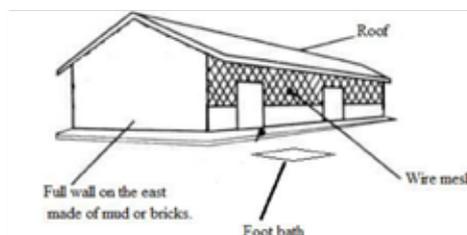


Figure 2: Sketch of a rearing house

The inside layout of a rearing house may be as in Figure 3 below.

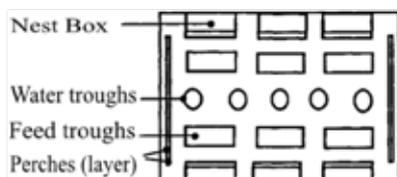


Figure 3: Inside layout of a rearing house

Example of simple poultry house made of locally available materials.



Management of poultry houses

The underlying principle is to keep the house tidy, clean and safe for birds. The management practices include:

- Areas around poultry house should be kept clean.
- Any dead bird found in house should be removed immediately and buried or burnt but not thrown in rubbish pit.
- Keep unnecessary visitors away from poultry units.
- Carry out routine repairs on the house as depreciation sets in with time.
- The poultry houses should be enclosed (fenced) to form a unit.
- Keep litter clean and in a friable state.

Stores (feeds, eggs)

- The feed store should be a room or a house which does not leak and is burglar & vermin proof.
- The walls of this house should be plastered and the finishing made with a slippery layer of cement (or any slippery material) to avoid rodents climbing and parasites hiding in them. The door should also be fitted firmly.
- The store should have slates or raised structures on which feed/egg trays are packed to avoid contact with the floor (figure 4). Sacks of food should be packed in stacks with spaces between them for air circulation.
- You should always avoid the use of rat poison in the store as it can contaminate the feed. Resort to traps or cats.

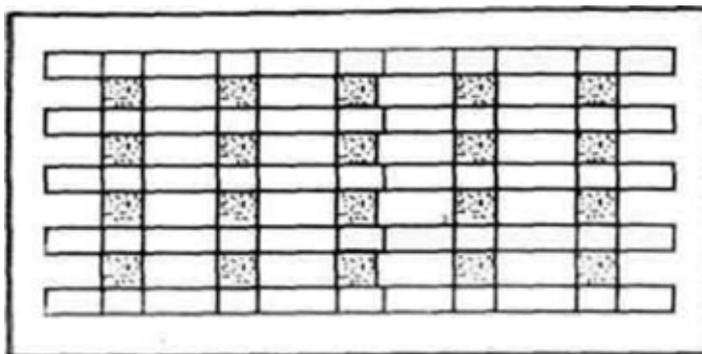


Figure 4: Rack on which feed in sacks can be piled

Sickbay/ isolation room

- A sick bay room on a big farm can be constructed on each rearing house so that you don't mix birds from different houses. This is a disease control measure.
- In the sick bay room, you keep birds which you suspect to be sick, unproductive and injured e.g. By pecking. At times sick ones can be kept in an isolation unit or sick bay from where they can be watched closely and treated or culled in case of a contagious disease.
- Birds which are very sick should be disposed of as they may not regain their production ability to the maximum.

Litter

- Rearing chicken on the floor is the most common in Uganda because it is cheap. Various types of materials are used as litter include coffee husks; wood shavings, rice husks, crushed ground nut hulls, and chopped maize/sorghum stalks (stover) among others.
- The floor is first covered with the litter to a depth of 5-8cm (to avoid burial of chicks) and is gradually increased to 30 cm, by adding more litter every 2-3 weeks.
- The litter should not be mouldy. The litter should be kept dry and friable by replacing wetted part and raking daily.

Feeders and water troughs

- Feeders should be adequate in size for the age group and may be linear or conical. Linear feeders are easy to make from wood (figure 5a).
- Like plastics, wood is difficult to disinfect. Conical feeders can be plastic or metallic.
- You can design your own feeders from iron sheets as in figure 5b. Metallic feeders are easy to clean and disinfect.
- The feeders **SHOULD BE CONSTRUCTED TO MEET THE FOLLOWING REQUIREMENTS:**
 - easy to clean and fill.
 - should not allow feed spillage or wastage.
 - should not allow feed contamination by droppings (faecal matter).
- Linear feeders should have rotating bar on top to prevent birds from perching and defecating on the feed. The bar also limits the space with feed surface and so preventing birds from entering the feeders and causing wastage by scratching.
- Feeding space should be adequate and feeders should be placed regularly in the house to ensure that all birds feed.
- Birds of same age may be seen to be of different sizes due to competition for feeds. Stronger birds will out-compete smaller ones which get stunted.
- When using linear feeders, consider the two sides from which the birds feed, for example, if the feeder is 1m in length, it means space for feeding is 2m (on both sides).
- Drinkers should be easy to clean and be able to keep water clean and cool.
- Drinkers should not be too deep for chicks to access water and should not allow water spillage in the litter. The drinkers for chicks should be shallow to avoid drowning.
- Allow 2cm per chick and 5cm per bird for growers and adults as space requirement for drinking.
- Drinkers should not be easily contaminated and also should not allow excessive evaporation of water.
- You can improvise drinkers locally from jerrycans by cutting two strips to create openings (which can allow the head of a bird to pass to get water) on one of the broad sides and closing the lid, place the jerrycan on the opposite side which is not cut.

Wooden feed troughs are cheap but difficult to disinfect.

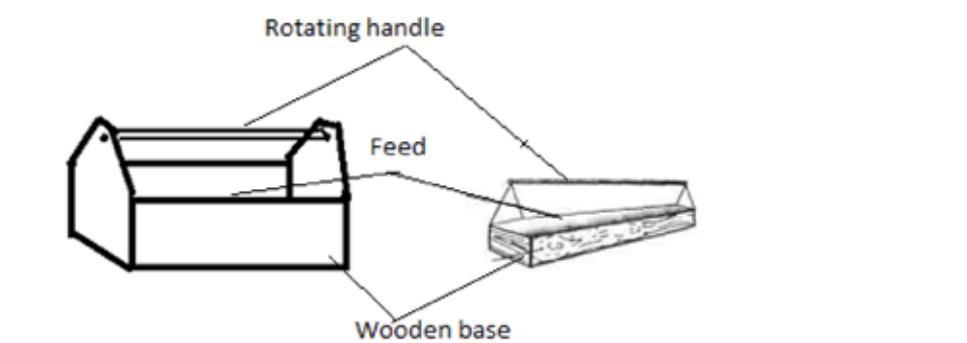


Figure 5A: Tubular feed troughs.

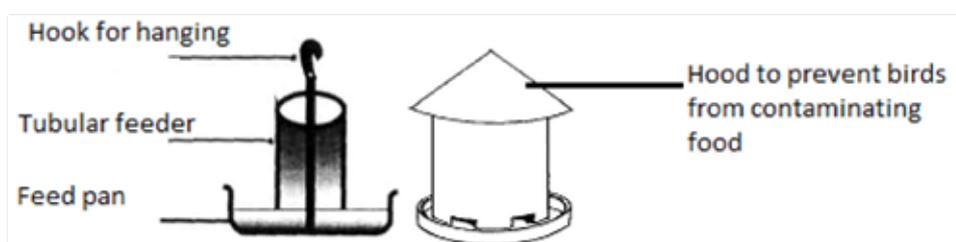


Figure 5B: Tubular metallic feed troughs

Light source

- Light is important in the brooder because:
 - It enables the chicks to see food and water source.
 - It also eliminates possibility of chicks getting frightened by darkness.
- Light in the house can be supplied by electricity, solar or kerosene lamps. Kerosene lamps have the disadvantage of letting off toxic fumes and being prone to fire accidents.

Heat source

Chicks have poorly developed feathers (thermo regulatory system) and therefore need external source of heat. This is known as artificial brooding.

Heat sources in a brooder include:

- Electric bulbs.
- Kerosene.
- Charcoal stove/pots: it is prone to fire accidents and may emit toxic fumes like carbon monoxide. It should never rest directly on the litter. Place it on a metal sheet or concrete slab or bricks. The stove is left to burn outside until it is red hot before being brought in. Ash may be poured over it to reduce the temperature and to let the charcoal burn for a longer time. There are tailor made brooder stoves on the open markets.

Nest box

- Nests can be constructed from wood, boxes, cut jerrycans, basins or shallow excavations.
- The nests may rest on the floor or raised above ground to avoid dampness.
- The floor of the nest should have enough soft litter about 5-8cm deep and air gaps for ventilation. The litter may be old clothes, cotton, dry grass, coffee husks and any other soft dump free material.
- Nest boxes made of wood such as below can be constructed. They measure 30cm length x 30cm width and height of 25cm. Each individual box caters for a bird.



Figure 8: individual nests. One on the left has wide entrance while the entrance of that in the right is reduced.

4.43 Feeds and feeding

- Local birds like any other livestock, need to feed well in order to grow quickly and resist diseases.
- In sickness, well fed birds recover faster than the malnourished ones.
- Poor feeds do not only cause stunted growth and poor production but also cause poor health.
- The major source of food for local chicken is by scavenging
- The birds scavenge around the backyard during day time from environment, eating feed like insects, seeds, grit, earth worms, nuts and grains as they feed on their own
- It is through scavenging where they obtain a balanced diet with vitamins being provided by vegetables and other greens they eat.
- Scavenging is not always enough and therefore a need to supplement the birds.
- Birds are usually supplemented with table scraps, green fodders, grains of cereals and insects from near gardens.
- When supplementing, give balanced ration containing proteins, carbohydrates, fats & oils, fibre, vitamins and minerals.
- Chicken need water every 15 to 20 minutes and therefore, water should be available all the time.
- Feeds can be improved at home by adding soya beans, fish meal, blood meal, mixture of vitamins and minerals and many others.
- Greens may be fed to birds at the age of 1 month as it contains vitamins and other nutrients. Greens are responsible for the yellow colour of the egg yolk, which some customers prefer. These greens include amaranthus (dodo), cabbage, russian comfrey, lablab and other non-poisonous greens/grasses.
- Leaves of plants may be dried and ground to form leaf meals that can be fed to birds and other animals for supplementation.
- Water can be provided locally in good clean containers like basins or cut jerrycans.
- Water is largely demanded by birds and it's absolutely essential that it should be available all times to local birds too.

Feed storage

- When feeds are bought, they should be piled on racks or raised structures from the floor to avoid damp soaking.
- The store should be leak proof and free from vermin like rodents which cause feed wastage and disease spread.
- Store should have enough ventilation.
- Feed should not be stored for more than 3 months as it can go bad (rancidity), become unpalatable and even poisonous (growth of fungus).
- It is recommended that feed should be as fresh as possible and if possible not stay for more than one month.

Note: minerals are also taken in like from the grains and other vegetables which are vital for good hatchability of eggs, hard shell and bone formation. Do not give too much common salt to chicken as it damages their kidneys.

In all systems of poultry management, not only will production be affected markedly if birds have insufficient water to drink, but also in the young chicks and birds of any age in hot weather, it may take only a few hours for death to take place if there is total absence of water.

You can also grow these greens yourself. Birds fed on greens should be dozed against worms monthly. Before greens are fed to birds, they should be washed in a solution containing salt (to kill parasite eggs/larval stages) and rinsed with fresh water.

4.44 Breeding

Breeds of chicken in uganda

There are commonly 3 breeds based on main types of products expected, the layers and broilers. Dual purpose breeds like kuroilers have also been introduced. Of all chickens reared in uganda, over 80% are indigenous chicken. The local chickens as already stated above, without improvement in basic husbandry practices remain low output breeds despite good market for them.

Mating

Mating activity in chickens is usually initiated by males and this done through courting. Cocks are polygamous though some males and females mate more often. A fair mating ratio for good fertility is 1 cock for every 8 to 10 hens. Higher numbers of the hens will overwork the cocks and so fertility of the eggs laid will be low. A cock may mate 10 to 30 times a day depending on availability of females and competition from other males. Too many cocks will also lead to fighting and less time for mating. More matings a day reduces the volume of semen and number of sperm cells.

One single mating can lead to fertile eggs for upto 3 days. Replace old cocks with young ones from different places to avoid inbreeding and also to ensure fertility. Old cocks tend to have less libido and often get tired from athletic females. Do not mate males and females that are closely related. This is inbreeding and lowers the general productivity of birds and resistance against infections. Do not keep cocks in a place for more than six months. Exchange with a neighbour or buy another cock.

Laying

Most local chicken start laying eggs around 7 months of age. This stage of laying the first egg is called puberty or sexual maturity. It is about 4 to 5 months in improved or exotic layers. Hens can lay without the presence of cocks. For mating and fertilisation of eggs to occur, cocks should be introduced among hens about 5 months of age. Eggs laid before mating are not fertilised and cannot hatch.

Most eggs are oval and eggs laid by the same hen tend to be of the same size and shape. Abnormalities in shape are many and may include flat sided, elongated, ball-shaped, wrinkled, shell-less, thin shells or rough shells. Some of the abnormalities are due to genetics, diseases, poor feeding or harsh environmental temperatures and abnormalities in the oviduct. Diseases like newcastle disease, infectious bronchitis cause rough or wrinkled egg shells. Egg size varies from bird to bird. Young birds lay small eggs. If hens are not getting enough water or proteins in feeds, the eggs will be small in size.

Nests

Various materials are used for making nests for the chicken to lay from. These include dry grass, dry banana leaves, cotton, sand, old clothes and other cereal straws. The nest material should be clean and be able to retain warmth. The materials can be put in shallow holes, cut jerrycans, boxes, baskets, broken pots and other related materials. The nest should be free from damp conditions and parasites. The nest should be shallow to allow all eggs to have contact with the body of the hen. The mother provides warmth, moisture to the eggs and turns them regularly. Warmth, moisture and turning are the three main factors necessary for the eggs to hatch.

Nests may be located on or above the ground but in a house where the hens are protected from predators, thieves and bad weather. Hens often leave their nests during incubation in search for food. This act of leaving the eggs reduces with as incubation progresses. This has effect on hatchability in two ways:

- The eggs cool down and this affects chick development
- The eggs may get contaminated by dirty legs and body as the hen scratches for food in wet or muddy places

Therefore, food and water should be put near the nest for the hens to have easy access.



Hen incubating in cut jerrycan covered with sacs. A basin of feeds towards the entrance to the nest

Care of hatching eggs

Hens may lay one egg per day or skip some days. A total of 8 to 30 eggs may be laid. This number varies from hen to hen and season to season. Under scavenging conditions, chickens lay more eggs in the wet season than dry season due to availability of plenty food (green grass, insects or worms). Before incubation starts, eggs should be stored in cool dry place as high temperatures like in dry season affects chick development in the egg. High temperatures make eggs lose water and become small sized. Eggs that have lost a lot of water do not hatch or if they hatch, the chicks are small and weak and often die. High temperatures also initiate embryo development before the actual incubation starts and so these embryos will die if incubation is not started soon. Eggs that stay for more than 7 days before incubation lose their hatchability greatly. After 7 days, hatchability drops by about 4% every day that passes by without incubation. Eggs laid earlier are better identified and sold or eaten as they may fail to hatch.

The effect of environment is more adverse during dry season. High temperatures and low humidity affect hatchability. Eggs exposed to high temperatures and low humidity may lose many of the developing embryos. In dry weather as water evaporates from the eggs, a partial vacuum is created inside the egg which will be filled up by air. As the air moves in, through holes in the egg shell, disease causing organisms are taken in as well, hence contamination and rotting. Covering eggs with polythene bags in cool dry place until the hen is ready to incubate them can minimize water evaporation during storage and improve hatchability.

In wet season, the problem most commonly encountered is rotting of eggs. This may occur:

Inside the mother before the eggs are laid due to disease (bacteria, viruses, mycoplasma) affecting the mother. This can be controlled by keeping the birds healthy through vaccinations, proper feeding to improve their resistance to disease and providing good environment by housing the chickens.

Outside after the eggs are laid through contamination with mud or chicken faeces of the hen's body. This is true when birds scratch wet material in search for food and carry the waste material on their legs and lower abdominal feathers. After contamination of egg surface by the germs, they penetrate the egg through the pores (small holes) and cause the death and rotting of developing chick. Provide food near the nests of incubating hens to avoid egg rotting.

Programmed hatching

Programmed hatching is a fast and cheap way of increasing numbers of chickens on a farm. The essence of the program is the synchronization of hatching by a group of local hens in order to produce large numbers of day old chicks of the same age. The advantages include:

- Many chicks are hatched at the same day and so it is easier to vaccinate and manage the birds.
- Batch formation of the birds is easier, which makes it also easier to feed in groups.
- Farmers are able to plan in advance when to market the birds.
- No incubators are required hence the innovation is appropriate for rural areas.
- Birds may hatch up to seven times a year compared with two or three times with ordinary incubation.
- Chicks are produced at cheaper costs since farmers don't need to transport them from distant towns, as is the case with commercial chicks.

To produce fertile eggs, it is recommended to keep one cock for every eight hens. Each hen is given its own laying nest (which should be numbered). A decoy or a marked boiled egg, is placed in each nest. Every day the eggs laid are removed and the date of removal is marked with a pencil on each egg. The eggs are put on clean egg trays with broad ends facing up and stored in a secure undisturbed place. Usually, after a while, one bird starts incubating by staying overnight on the boiled egg. This bird is not given any fertile eggs but is left to sit on the decoy or marked boiled egg for about ten days or until others start to incubate. After about ten days from when the first bird started sitting on the egg, most other hens will have started sitting on their decoy as well. All incubating hens are then given 10 to 12 fertile eggs each, starting from the ones which were laid last.

When you want the birds to hatch on thursdays, they are given the eggs on wednesday evening, exactly three weeks earlier. The method works because chickens don't count the eggs which they incubate. After removing the hatched chicks on thursday morning, the hens can be given a new batch of fertile eggs to sit on if desired. Sanitation of laying nests is important, as well as food and water for the incubating hens. Also important is external parasite control in incubating birds.

When the chicks are removed from the hens they are placed in a brooding area. Coffee or rice husks or any other good litter material are poured on the ground to form a deep litter. During the first week, the husks are covered with paper to prevent chicks from eating the husks which can block their digestive tract. In order to teach the chicks to feed, the first three days chick feed is spread on the paper. The next three days, feed is provided in new and unused carton eggs trays, and after that feeding troughs are provided. A cheap source of heat for the chicks is provided through charcoal briquettes; charcoal grit is mixed with

sticky soil and moulded in balls which are then left to dry and become hard. The briquettes are lighted and placed in a clay pot which is placed on some stones in the brooding area. When the chicks are small, they need to be kept together and close to the heat source through the construction of a round enclosure in the room; papyrus mats can provide cheap enclosure material.

The programmed hatching approach has the potential of at least tripling original stock numbers in less than a year. Crossing more productive poultry strains with the local chickens on the other hand can improve egg numbers, sizes and body weights of the subsequent offsprings while maintaining the ease of management and disease resistance of the indigenous breed. Crossbreeding with other breeds like kuroilers or improved cocks is encouraged.

Brooding

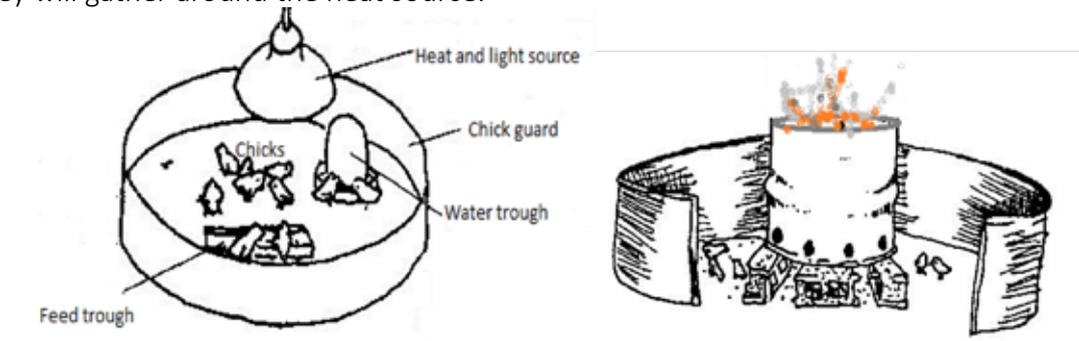
This is the most delicate stage in the life of the chicks because they are very vulnerable to diseases and other stressful conditions, causing heavy losses during this period when not done correctly. If the brooding methods are satisfactory, mortality in chicks should not exceed 5% during the first 8 weeks of life. Farmers should therefore be very careful during brooding.

Preparation of the brooder to receive the chicks

The period in the brooder is from hatching to 6 – 8 weeks for local birds. The following activities should be carried before chicks arrive:

- The necessary repairs should be made to the building. Ensure that the house does not leak; rain water does not enter the windows, do not let in draughts (cold wind) and rodents or predators. It may be necessary to block some windows with papyrus mats, cardboards or old sack to reduce draughts and regulate ventilation. Do not use polythene material as it does not allow air circulation through them.
- Acquire hurricane lamps or gas lamps as sources of light if necessary. The target should be to provide bright light with which you can also read newspapers in the room. Hang the lamps to provide uniform light in the brooder.
- Clean and disinfect the brooder. If it has been used before, remove the old litter. Wash and clean the whole room, the outside concrete runs and equipment inside. The house is left for 2-4 weeks to fallow (idle) before bringing in new batch. This ensures that most disease agents die.
- The floor is covered with litter 3-4 inches in depth. The litter should not be damp and mouldy nor should it be dusty. Newspapers/feed sacks are put over the litter in the early days of chicks' life in the brooder. This ensures that the chicks that have not developed their olfactory sense do not mistake the litter for food and eat it, causing impaction. The newspaper also reduces the chances of navel infection in the first few days of life. The feed is placed in small mounds (not spread) on newspapers, flat cardboards or plates until the chicks become accustomed to the feeders. Do not use polythene paper to cover the litter because it does not absorb water from droppings or spillage from troughs.
- The sharp corners of the brooder should be rounded to prevent the chicks from piling in corners and suffocating. A chick guard, which is a circle of plywood, cardboard, plastic, papyrus mat or wire mesh, can be made around the heat source if the brooder is very large. It limits movement of chicks away from heat source. The chick guard is 3m in diameter and at least 2ft high for every 200 chicks

- The brooder is heated for at least 12-24 hours (3 hours in emergencies) before the chicks are stocked in. Monitor the temperature using the behavior of chicks. When the temperature is high, chicks will run away from heat source and breathe rapidly with open mouth. When temperature is low, they will gather around the heat source.



Chicks guard or ring made of card board. This helps to keep chicks not to stray away.



Design of a local brooder with clay pot heater

4.45 Health care and disease management

There are several causes of loss of birds on farms that lead to the low numbers of chicken in households. They range from diseases and parasites, predators, starvation, environmental conditions and accidents. These are most common among the chicks. All efforts should be made to reduce these causes among birds if we are to improve their survival.

Accidents in chick stage

The following accidents occur during the early days of the chicks' life and may lead to large numbers of mortalities.

- Suffocation: it can be caused by carbon monoxide poisoning, if charcoal and kerosene are used when you have a brooder. It can also occur if the chicks are frightened and pile in one of the corners of the room (brooder).
- Falling of chicks in water is common as they attempt to drink water from bigger containers.
- Trampling: by people (workers) or by fellow chicks during stampede or knocked by vehicles/ bicycles if left to move scavenge.
- Heat or cold stress.
- Impaction with litter, fibres of feed-sack or when dry feed is given with no water.

Note: these can also occur in mature birds but are common among the young birds and should be avoided to minimize on losses.

Though not accidents, some diseases can cause severe deaths in the chicks in brooder. The diseases include: newcastle disease, gumboro, salmonellosis (bacillary white diarrhoea), navel ill (collibacillosis), aspergillosis/mycotoxicosis (mouldy feed) and coccidiosis. These diseases are mainly neglected in local chicken production but must be considered when artificial brooding is practiced.

Predators

- The common predators include; eagles, fox, monitor lizards, snakes, wild dogs/cats, and rats. These commonly attack the chicks.
- This occurs when homesteads are left busy hence attracting the predators
- To keep predators away, homesteads need to be kept clean and free of bushes. Also one can rear chicks for 6-8 weeks in house to let them grow and this increases chick survival.

Ways of introduction of infections into poultry farm/unit.

Infections gain entrance to a flock from various sources, these include:-

1. Humans:

- People who come to visit your farm either for duties, curiosity, ignorance or carelessness.
- Frequently, footwear and clothing are suspected as the biggest carrier of disease.
- When an outbreak occurs at the neighbourhood, there should be no movement of birds between the two places. Farmers should always try to limit the number of people (visitors, traders and casual workers)
- People who should inevitably enter the poultry houses should wear disinfected overcoats and pass through a footbath at the entrance of the house.

2. Recovered birds (carriers)

- Birds that have recovered from a disease but still have the germs (infectious organisms) in their bodies.

- While they appear healthy, the germs continue to multiply in the body and can be released into the environment.
- If a disease happens to persist on the farm, depopulate the whole flock, clean, disinfect and rest the house for some time (at least two months) and then restock.
- Do not mix different age groups of birds (adult birds and chicks).

3. Mixed species of poultry

- Keeping different types of birds together e.G. Keeping chicken with ducks, turkey, pigeons etc.
- One group of bird can transmit diseases to another e.G. Chicken transmit a disease (black head diseases or histomoniasis) of turkeys which kills the turkeys very fast.

4. Sick bay (on large farms)

- Sick birds collected into one room (sick bay) and later returned after recovery to their respective houses may carry back more than the disease for which they were brought in for.
- At least each house (if there are different houses on farm) should have its own sick bay.

5. Poultry markets

- Avoid buying birds for breeding from poultry markets.
- When you take birds to market and they are not bought, you should keep them away from other birds as much as possible to reduce chances of disease spread.

6. Carrier mothers

- Some diseases can be got from mothers. Rear chicks separately from mothers.
- Sell off birds whose chicks always die with disease from similar signs even after good care.

General signs of ill health in birds

These include:

- Fever,
- Listlessness,
- Dullness,
- Drowsiness
- Drooping wings.
- Loss of appetite (anorexia) and body weakness.
- Ruffled feathers
- Mucous discharge from the mouth and nostrils
- Increased respiratory rate, cough, and sneezing, tracheal rales and laboured breathing.
- Sudden death
- Bluish-purple combs and skin due to oxygen deficiency in blood (cyanosis) of combs & wattles prior to death.
- Diarrhoea-watery (whitish, greenish faeces which may contain mucous) and dirty/matted feathers.
- Dehydration & emaciation
- Swollen wattles, sinuses, leg or wing joints, footpads & sternal bursa.
- Neck tilting (torticollis), convulsions and tremors.

Note: when you observe the above signs, it is always advised to notify a veterinarian nearest to you for advice on the next step.

Health care in local chicken

- Birds that are well managed, well fed and vaccinated against the common diseases usually remain healthy and produce well.
- Drugs do not replace good management and will only keep down infections but are no guarantee that disease outbreak will not occur.
- When administering drugs, you should always follow the instructions of the manufacturer or veterinary personnel near you. In an outbreak of diseases, always seek assistance from veterinary personnel as most poultry diseases present with general signs and may require post-mortem for diagnosis.

Common diseases of poultry

New castle disease .

- Spreads mainly through oral and respiratory discharges and droppings of infected birds.
- Other ways of spread can be through clothes, other poultry, equipment, trucks, personnel, pets and rodents.

Signs include:

- Loss of appetite, drooping wings, dullness and birds hide their heads under the wings.
- Greenish – yellow diarrhoea
- Respiratory signs – noisy breathing, sneezing, coughing and gasping.
- Discharge from nostrils and eyes
- Muscular abnormalities like twisted neck (figure 9), stiffness and prostration. .
- Central nervous signs like tremors, compulsive movements and death.
- In laying birds, production almost completely ceases within a few days. Eggs laid are of low quality and may be soft-shelled, roughened, or deformed (figure 9). Production is resumed slowly, or not at all, depending on the stage of lay at the time of infection.



Figure 9: dull bird and one with twisted neck (left) and eggs with abnormal shells (right) in newcastle disease.



Figure 10: poultry mixed in local market. This is where infection to other birds can be got. Do not visit your birds immediately without changing and disinfection when coming from such a place.

Treatment

- Treatment of newcastle disease is of no value.

Prevention

- A vaccination program should be adopted and strictly adhered to e.G. 1st dose at day 1 old, at 2 weeks, then give booster dose after every 2-3 months.
- Avoid introducing new birds into your stock.
- High standard of sanitation should be practiced and avoid introduction of disease on farm.
- Newcastle disease is a reportable disease. All suspected outbreaks of the disease must be reported to animal health authorities immediately.

Marek's disease

- Signs usually do not appear prior to 3 weeks of age and peak between 2 and 7 months.
- Difficult to diagnose as the signs are usually vague but usually involve partial paralysis of the legs (one leg normal and the other paralysed) (figure 11) and at times distension of the crop (food storage sack in the neck) due to nerve paralysis.
- The skin at feather roots (follicles) are also swollen.
- Blindness occurs in some birds.

Treatment and control

- No treatment but the vaccine is available.
- Commercial flocks are usually immunized via injection at 18 days of incubation or at hatching. Revaccination is not necessary and immunity is usually life-long.



Figure 11: birds with limb paralysis in mareks' disease.

Infectious bronchitis (ib)

Caused by a virus and spread rapidly and can affect 100% of birds in a flock with varying severity.

Signs

- Commonly observed signs are; gasping, coughing and sneezing discharge from nose and eyes.
- In chicks, there is weakness, depression, and huddling near heat sources. Mortality in young chicks is usually negligible unless the disease is complicated by another infectious agent like bacteria.
- In laying birds, egg production decreases (up to 50%) and eggs have ragged shapes (figure 12). Effects on production can last 6-8 weeks or longer.

Treatment

- Broad-spectrum antibiotic can help because the disease is usually complicated by bacterial infections.
- For baby chicks with the disease, it may be helpful to increase the room temperature, encourage the birds to eat and correct any apparent management deficiencies.



Figure 12: eggs with abnormal shapes due to infectious bronchitis

Prevention:

- Vaccination. Vaccines are either separate or combined with that for newcastle disease.

FOWL POX

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

Signs

- Warts like nodules/ scabs are common on combs, wattles and also around the eye/base of the beaks (figure 13). Eye lids can be closed by these nodules (cutaneous form).
- Another form attacks the mouth or upper air ways, where white nodules are seen in the mouth, tongue, throat, nostrils and eyes (figure 14). Causes more deaths as the birds cannot eat and/or drink.
- Egg production in laying birds decreases. Death rate with fowl pox is generally low and deaths are mainly due to suffocation and starvation.



Figure 13: scab on the heads of chicken due to fowl pox.



Figure 14: thick adherent scab in the mouth (red arrow) and external nodule (yellow arrow) between the eye and nostril.

Prevention and control

- Vaccination is recommended. Usually at 6 – 8 and 12 weeks of age.
- Antibiotics and vitamins help quick recovery. You can also smear vaseline containing some antiseptic (iodine) on the wounds.

Gumboro (infectious bursal disease)

Disease of great importance these days caused by a virus

Generally occurs in chicks between 3 – 6 weeks of age.

The disease mainly affects the gland called bursa of fabricius which is one of the most important defence organs located around the cloaca. The disease can be spread by contact with contaminated materials and also by means of various parasites that pick up and carry the virus.

Striking features include sudden and high morbidity rate, striking death curve (high deaths in short time) and rapid flock recovery.

Signs:

- Signs observed only after 3 weeks of age. There is a sudden onset, particularly with the first outbreak. There is depression, lack of appetite, ruffled feathers, and a droopy appearance.
- There is diarrhea that may be white but occasionally, there is passing of blood and straining during defecation.
- Vent pecking is common.
- Number of affected birds is very high in the flock. Number of deaths is usually low although it can be substantial (approaching 30%) if husbandry is poor. Deaths in a flock usually peaks and recedes within a week of onset.
- Postmortem is required to establish the actual diagnosis of the disease by the veterinarian.

Treatment

- Treatment is of no value. However, good husbandry and adequate temperature may reduce the severity of the disease.

Prevention

- Protection is achieved by vaccination with a gumboro vaccine and sometimes with a booster dose or as recommended by the manufacturer.

Pullorum disease (bacillary white diarrhoea)

- Common disease of chicks transmitted through eggs from their mother
- After hatching, the disease can be transmitted to other chicks through pecking contaminated equipment, food and breathing.

Signs

- Often associated with white diarrhoea and high death rates in young birds while adults show no signs but can be carriers.
- Chicks have ruffled feathers, appear sleepy, don't eat, gather around heat source and make shrill (high pitched) sounds. Chicks have some breathing problems and are stunted. Birds have swollen leg joints.
- High deaths are experienced in chicks less than 10-days-old and peaks at 2-3 weeks after hatching. . Number of deaths vary greatly but often is very high and can approach 100%. Number of deaths is increased by stress, chilling, or poor husbandry.

Prevention/treatment

- When the disease occurs, improve sanitation, provide optimum room temperature and treat with sulpha drugs and other broad spectrum antibiotics.

Nb: treatment causes the development of carrier states and is not recommended.

Fowl typhoid

It is an egg transmitted disease like pullorum disease.

More frequently transmitted between adults compared to pullorum disease and the disease may persist for a month unlike pullorum disease. Fowl typhoid can also be transmitted through feeds contaminated with droppings, water, equipment and personnel, wild birds, rodents and flies.

Signs

- Similar signs to pullorum disease in young birds up to 4 weeks of age but semi-mature and older birds die as opposed to almost no signs in pullorum disease.
- Birds may have a green diarrhoea, pale and shrunken combs/wattles and high mortality.

Prevention/treatment

- Vaccines are available
- Other prevention and treatments are similar to pullorum disease (both diseases are caused by salmonella bacteria). Heat source is not necessary in adult birds.

Fowl cholera

Mostly affects semi-mature and mature birds.

Cats and rodents can spread the disease while infected birds can spread the disease through contaminating feeds and water and cannibalism of dead birds.

Signs can appear in short time (acute form). In this, there is sudden death but before death, they have greenish-yellow diarrhoea, discharge from mouth, ruffled feathers, reduced appetite, lameness, difficult breathing and decreased egg production. Often find dead birds in the nests and death toll rises quite fast.

In a long standing state (chronic form), there is swelling of joints, foot pads, wattles (figure 15) and areas around the eyes causing them to close. Birds may have head tilting to one side when one ear is affected.

Recovered birds are carriers and hence a source of infection.

Fowl cholera is more likely to occur in birds that are stressed by such things as poor sanitation, parasitism, malnutrition, and other diseases.



Figure 15: birds with swollen wattle in chronic fowl cholera. A section through the swollen wattle reveals dry pussy material

Prevention and treatment

- Vaccines exist but unavailable in Uganda.
- Purchase clean birds since the disease is not transmitted through eggs.
- Control rodents and keep cats out of poultry house or feed stores.
- Sulpha drugs, tetracyclines, penicillin, streptomycin, erythromycin or other broad spectrum antibiotics can be used in acute form of the disease under instructions of a veterinarian.

Infectious coryza

This is a respiratory disease which spreads quite rapidly but with low mortality.

The disease is transmitted by close contact since the bacteria do not survive for long in the outside environment.

Signs

- Discharge from nostrils, swollen face, eyes and wattles.
- Adherence of eyelids, fluid accumulation (oedema) in the face sometimes in the wattles. Later, some of the birds may have swollen areas just in front/below the eye with some cheesy/pussy content (figure 16).
- Respiratory noises and diarrhoea.
- The disease occurs frequently in laying flocks and there is often reduced egg production with affected birds appearing thin with breathing problems.

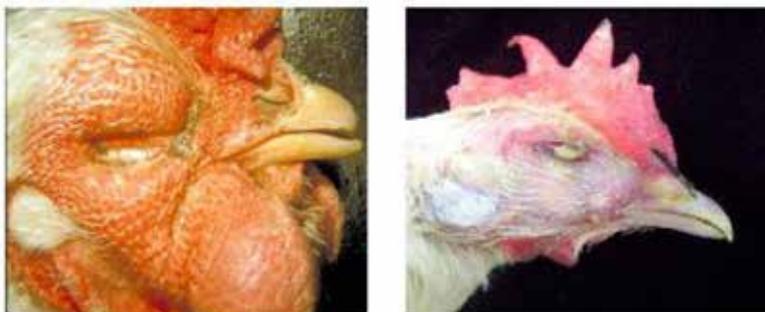


Figure 16: birds swollen areas around the eye. The swelling mainly just below the eye and contains pus.

Treatment

- Sulphur drugs, tetracycline, streptomycin

Prevention

- This is mostly a disease of management so practice better hygiene and practice all-in all-out system to break cycle of transmission.

Bumble foot

Bumble foot is caused by bacteria that are common on the skin

This disease mainly occurs after injury of the foot pad and signs of wound will be seen.

There are skin abscesses and swelling of joints of foot (figure 17).

Signs

- Lameness, swollen foot-pad, at times with pus.

Treatment:

- Antibiotics such as erythromycin may be useful during outbreak. Prevention is much more important than treatment.



Figure 17: swollen foot pad in bumble foot with pus. This should be differentiated from gout in which the swelling has urate crystals

Prevention

- Avoid rough surface and remove sharp objects which can lead to injuries.
- Avoid wet litter or leaking drinkers.

Collibacillosis (Navel ill)

This is an environmental disease caused by common bacteria, present in intestine of birds and mammals and is disseminated in feces. Birds are infected by direct contact with dirty litter and hatchers or contaminated egg shells. Not transmitted from bird to bird. This is therefore a disease of poor hygiene.

Signs

Birds commonly appear sickly, ruffled feathers, enlarged and swollen navel (Figure 18), decreased appetite, depression and diarrhea with pasting of feathers around the vent.

Treatment

- Many different antibiotics and drugs have been used for treatment. These include tetracyclines, enrofloxacin, neomycin, Terramycin, sulfa drugs and others. Treatment is usually effective if given early.

Prevention

- Vigorous sanitation program in poultry house and Control dust in the poultry house.
- Avoid stress from other diseases and parasites.

- Clean and disinfect waterers and feeders and avoid fecal contamination of these.



Figure 18: Birds with navel ill or colibacillosis.

Chronic Respiratory Disease (Mycoplasmosis)

- This disease is characterized by respiratory signs (especially cough) which is persistent for long time in the flock.
- The disease affects all age groups of birds but signs are commonly seen in semi-mature and mature birds.
- The disease can be transmitted through eggs laid by infected hens
- Can also be transmitted through air droplets and contamination of feed, water or environment.

Signs

- Signs usually develop slowly in the flock and may persist for weeks or months. Signs include; coughing, sneezing, snicks, rales, eye and nose discharge, reduced appetite, drop in eggs production among laying birds.

Prevention and treatment

- Buy chicken without history of chronic cough
- Marketing an infected flock with a low incidence of the disease Improve the management (improve ventilation), husbandry, or nutrition if possible. Eliminate all possible sources of stress.
- Antibiotics e.g. Tylosin and tetracyclines can be used..

Coccidiosis

This is one of the devastating diseases of housed birds, especially chicks.

Many farmers associate coccidiosis with blood in the dropping, but at this time the disease has reached a critical level and losses are high.

Coccidiosis in poultry affects the intestines.

The disease occurs when litter management is not proper (leaving wet litter in house).

Signs

- Affected birds are dull with no appetite, weak, dehydrated and thin. There is diarrhoea with blood tints in the droppings at advanced stage of the disease.
- The birds get infected when they pick eggs of the parasite from contaminated litter.
- Birds whose intestinal walls are severely damaged by the parasite often die despite treatment. Therefore, prevention of coccidiosis outbreak is the most important in managing this disease.

Prevention of coccidiosis

- Give coccidiostats e.g. sulphamonomethoxazole, amprolium after every two weeks till 4 months of age.
- Avoid unhygienic conditions e.g. wetting the litter.
- Buy feed and water troughs which cannot easily be dirtened or allow spillage of water on the litter. Remove any wet litter around the drinkers and keep litter dry and friable.
- Avoid overcrowding and provide adequate ventilation.

Brooder pneumonia (Aspergillosis)

- The disease is acquired by breathing in (inhalation) of fungal spores from mouldy feed or litter.
- The disease is not transmitted from bird to bird.

Signs

- Difficulty in breathing, gasping (Figure 19), blindness and abnormal behaviour when the brain gets involved. Disease attacks lungs, air sacs and liver.



Figure 19: Chicks affected by aspergillosis showing respiratory problems (difficult breathing).

Prevention and control

- Sanitation in house where birds sleep or reared.
- Litter (if used) should always be dry and friable and caked litter should be removed to prevent growth of fungus.
- Fresh processed feed should be fed. Do not give mouldy feed to the birds.
- Can use Copper Sulphate following manufacturer guides.

Nb:

- Most of the infectious diseases present with general signs and so post-mortem is very necessary in disease diagnosis. Seek the help of a Veterinarian near you.
- Birds should not be slaughtered before the withdrawal period of the drugs for human consumption. Follow the manufacturers' instruction about withdrawal period and dosage of drug for the given condition you are treating.
- Most drugs come in trade names, so you should find from the drug seller the true drug name for right treatment.

Vitamin deficiency diseases

Birds may show signs like;

- Retarded growth,
- Discharge from nose and eye,
- Pustules in mouth,
- De-creased egg production,
- Rickets-leg weakness,
- Swollen joints (hock joints, joints of ribs plus others),
- Nervous signs (e.g. inclination in movement, paralysis),
- Poor hatchability,
- White stuff covering eyeball,
- Curled toes and other nonspecific signs

Note: In scavenging local chicken, vitamins are obtained from vegetables that they eat, in commercial intensive chicken; deficiency may result from insufficient levels of vitamins in the diet or when feeds have overstayed or gone bad.

Supply vitamin powder in water or buy vitamin / minerals powders (premix) and provide greens to birds. You can also inject a solution of multivitamin to each bird if they are few to handle.

Parasites of chicken

External Parasites

The common external parasites include fleas, lice and mites (Figure 20).

Fleas

- The most is Stick tight flea is a common type
- They are deep red in colour
- Found around the eyes, on the wattles and combs.
- They draw blood from the birds and may cause anaemia.
- They also discomfort birds and eventually decrease production.

Control

- Smear some Vaseline or little paraffin. Avoid getting paraffin into contact with the eyes.
- Apply a little pye-grease on the affected parts or
- Remove all the litter and dust the house with insecticide (Sevin dust or leaf powders).

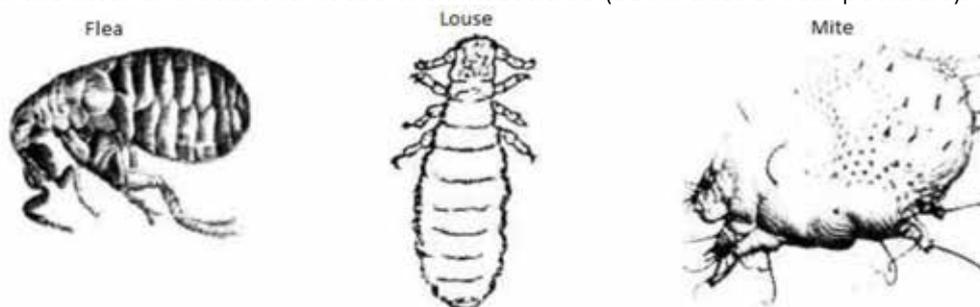


Figure 20: The common external parasites

Lice

- These are light brown in colour
- May appear as white eggs on the feathers around the head, wing and breast.
- Cause a lot of discomfort,
- Suck blood leading to anaemia and hence decrease production.
- Itching and scratching will reduce appetite and retard growth of young birds.
- Birds shed a lot of feathers.
- Claws and/or body pecking.

Control

- Dust the birds with available anti-parasitic powders like Sevin dust. Ideally do this in the evening when the birds are going to sleep.
- Replace the litter (in heavy infestation) and dust the house with insecticide paying particular attention to the cracks and crevices.

Mites

- Mites are very small and difficult to see with naked eyes.
- Mites feed on blood, feathers, skin or scales.
- The most common mites of poultry include feather mites, scaly leg mites, red mites and many others.

Feather mites (Depluming Mites)

- These are very small creatures which cause a lot of discomfort to the birds and even to human beings.
- They suck blood.

Control

- Dust the birds with powders and replace the litter.

Scaly leg mites

- These are small creatures which hide/burrow on the shanks of birds causing rough scaly or thickened legs (Figure 21).

Treatment/Control

- Dip the legs in either waste engine oil mixed with some paraffin or in cooking oil mixed with paraffin (kerosene) in ratio of 1:1. You can also use common petroleum jelly mixed with paraffin in the same ratio. This should be done daily for at least 2 weeks with washing of the legs with soapy water before dipping.



Figure 21: Scaly legs due to burrowing mites.

Red Mite

- Common red mites are red when fed with blood.
- They feed mostly at night and may not be found on the birds during the day (hide in the cracks or joints of roosts or nests at day time).
- Inspection at night is usually necessary to confirm infestation.

They can survive for over 30 weeks without food. Anemia and mortality can result from heavy infestations, especially in young birds.

Control

- Treat both birds and facilities. Repeat treatment in one week.

House flies and their relatives

- Non biting flies on poultry farms which have poor sanitation
- Therefore are a health and sanitation hazard to the poultry producers and neighbours.
- Intensive farms produce a lot of manure which must be properly managed without allowing fly production.
- Flies are a vector of many chicken diseases. through their feeding habits

Control

- Dispose of manure by burying or give it away to crop farmers.
- Keep litter in poultry houses dry.

Internal Parasites

The common ones are:

Round worms (*Ascaridia galli*)

- Found in small intestines.
- Are round, white or yellowish- white and 1-4 inches long (Figure 22).
- When the parasite are many, the birds develop appears sickly, with poor growth, lower productivity and death may occur. May cause intestinal obstruction (intestines closing).

Prevention and control

- By routine use of anthelmintics e.g. piperazine once every month.
- Avoid overcrowding and if rearing chicken intensively, provide fresh litter when introducing new poultry stock.



Figure 22: Round worm (*Ascaridia galli*) in the small intestine of chicken.

Gape- worm (*Syngamus trachea*)

- This worm lodges in the windpipe/trachea
- Causes gaping/gasping in birds.

Control

- De-worm regularly with antihelmintics.

Caecal worm

- Found in the caecum
- Are harmless but are carriers of the poultry diseases like blackhead.

Tape worms

- Chicken get these worms by eating snails, earthworms, and flies having the tapeworm.
- Cause anaemia, poor growth and decreased production.

Control

- Use antihelminthics regularly.

Other conditions that can occur in chicken

Crop Impactions

- Caused by birds eating coarse substances (like feathers, grass, coarse feed/leaves, litter) in large quantities.
- Avoid these conditions.

Prolapse of Oviduct

- Here the oviduct (egg passage tube) of a laying hen comes out through the cloaca.
- Caused by the hen laying oversized egg or hen having much fat deposits thereby leading to narrowing of the passage.
- A hen with prolapsed oviduct draws the attention of other birds which peck on the oviduct and so injuring the bird.
- “Internal laying” (Egg Bound)
- The hen fails to lay the eggs due to either extra-large egg or over fatness of the bird or injury in the oviduct or egg being broken before being laid.
- The bird will have distended abdomen.

Poison and Toxins

- These include drugs (overuse of chemotherapeutic drugs), disinfectants, chemicals (feed additives, salt), fumigants, fungal toxins, insecticides and rodenticides.
- Avoid circumstances that can lead to ingestion of the poisons.

NB: The old saying that prevention is better than cure is true of poultry diseases and parasites. This can be got by vaccination and good, clean husbandry.

Vaccinations

Vaccination prevents birds from diseases

- Vaccine used should be stored properly in the cold/cool environment, usually 4-8 °C.
- Vaccines should be used promptly (within 2½ hours) after reconstitution. Always follow manufacturer's guidelines when you are using vaccines (contact a veterinarian for guidance)

Vaccination program for poultry local birds

Age (weeks)	Type of Vaccine	Route of administration
7 days	Newcastle + Infectious bronchitis (IB)	Intra ocular, intra nasal, spray
14 days	Gumboro	Intra ocular, oral
21 days	Newcastle + IB	Intra ocular, intra nasal, spray
28 days	Gumboro	Oral/ intra ocular
6th week	Fowl pox	Wing web
8th week	Newcastle	Intra ocular, intra nasal
5th month	Newcastle + IB	Oral
Every after 2 months	Newcastle	Oral

4.46 THE GENERAL PRINCIPLES OF PROFITABLE POULTRY KEEPING AND ECONOMICS OF PRODUCTION

Any business person aims at making maximum profits within the limits of operation. As keeping local birds become commercial, the farmer must pay attention to cost of inputs and expected returns. To realize profits, the farmer should ensure the following among other things:

Efficient use of feed

- Feeding constitutes 60 to 70 % of total costs in poultry keeping. Getting cheap source which does not compromise growth and production of the birds should be sought.
- Feed wastage should be avoided by providing feeders that prevent birds from spreading feeds to the litter. Do not fill troughs to the brim unless they are automatic feeders.
- Ensure that theft of food and ingredients do not occur especially when you mix your own feeds. This is by ensuring proper records and security checks.
- Stores should be constructed to prevent rodents and animals from eating the feeds. There should be no water leakage in the store as to cause feed spoilage.
- Non productive birds are unnecessary burden in a poultry house and should be culled to save feeds.
- Buy feeds only to last for 2-3 weeks period to avoid feed spoilage and nutrient deterioration.
- Buy feeds from reputable suppliers who provide feeds with the correct weight and nutrient contents as stated on the labels.
- You can also make feeds on farm to save a lot of costs. Try to identify cheap sources of feeds locally.
- **Birds older than 8 weeks of age should be released and only supplemented on what they have scavenged on to reduce costs.**

Targeting correct time of the year and certain market

Produce poultry in periods coinciding with good markets. For example, producing birds for meat around festive seasons of different cultural/religious groups, periods of workshops by organizations, for hotels, schools and other event of social gatherings will guarantee all round market. This is possible with programmed hatching and batch rearing. Also ensure that birds produce to the maximum.

Disease control

Follow disease control measures strictly. A disease outbreak may reduce the number of birds drastically and you will also spend money on drugs, disinfectants, vaccines, veterinary consultations, fresh litter and many other contingencies. Imagine running a poultry business on a loan and disease reduces your investments to nothing? The total loss of birds in a flock in a year should not exceed 12% for profitable production.

Use good quality labour

It is a false economy to use cheap untrained labour to manage your birds. Unskilled labour can quickly render the flock non productive and non profitable. The person working in a poultry unit should know feeding techniques, light regulation (for laying birds), disease prevention, culling birds, general management and good record keeping. An untrained labour is a great risk to your business and can create many non productive birds.

Using good productive breeds

- Getting cheap birds from unreliable sources is false economy. Start your flock with breeds with known production performance or select the good performers and rear them.
- **Attempt to improve the local breeds by crossbreeding so as to improve their productivity.**

Business plan indicating inputs, outputs and the actual profits

- It is advisable to keep proper records of expenses and returns involved in the business. The farmer should plan right from the start what expenses he is going to incur before starting to receive income from the poultry enterprise. A good business plan is therefore essential.
- Local birds may start laying around 7 months of age and a farmer should ensure that he/she has enough resources to take care of costs of housing /equipment, feeds, vaccines/ drugs, transport, labour, fuel and others to the point of lay. Any change in maintenance in this period can lead to permanent low productivity of the birds especially when they get stunted, sick or have under developed reproductive tract.
- **Get ideas on making business plans from veterinary extension workers or progressive farmers near you.**

Marketing

Eggs

Marketing of eggs should be done promptly to avoid spoilage and loss of income. The eggs should be cleaned and stored in cool dry place. Eggs are transported in trays (box or plastic type). Good transportation and advertisement are necessary for marketing the eggs. They can be sold as fresh whole eggs or egg products (processed/ready-to-eat form). Conversion into various products fetches more money than the fresh form. The prices of eggs are affected by supply in the market, size of eggs and cost of production.

Whole birds

Non productive hens should be culled and sold for meat. Old layers above 3 years should also be sold off for meat. It is advisable to sell off cocks every six to seven months to avoid inbreeding. Cocks may be sold any time when they attain market weights of 1.8 to 2kg.

Birds may be sold live or as dressed carcasses as the particular market demands. Formation of farmers' associations and seeking joint solutions to market problems may be of help when production is in surplus. Alternatives for carcass preservation should be sought to prevent spoilage. Establish good communication with hotels, training institutions and retail operators to provide quick market for your products.

Record Keeping

- A well-managed poultry unit should have proper records to show whether it's making profits or not.
- From the records you can tell if the birds are producing normally and if not, you can easily find why.
- Keep simple records that are easy to fill, read and follow.

- **Records should be kept about egg production, eggs given for incubation/number of chicks hatched and those that reach maturity, number of hens, cocks, feed intake (amount eaten) and/or feed supplements, average weights, mortality and items that require money, drug treatment and vaccination records, chicken sales, batch/flock performance.**

Examples of record cards that can be used in poultry units are given in Tables 12-17.

A record card for Brooder

Date of Hatch Number of incubating hens							
Number of eggs set Number of chicks hatched							
Age	Date	No culled	Number Dead	Total remaining at end of week	Feed consumed (Kg)	Average weight of chicks	Treatments, Activities, Remarks, (Drugs, Cause of Death, litter added, etc)
Week 1							
Week 2							
Week 3							
Week 4							
Week 5							
Week 6							
Week 7							
Week 8							

Production Records of the hens

Date of Hatch Number of incubating hens							
Number of eggs set Number of chicks hatched							
Age	Date	No culled	Number Dead	Total remaining at end of week	Feed consumed (Kg)	Average weight of chicks	Treatments, Activities, Remarks, (Drugs, Cause of Death, litter added, etc)
Week 1							
Week 2							
Week 3							
Week 4							
Week 5							
Week 6							
Week 7							
Week 8							

Vaccination Record

Date	Vaccine used	Number of birds vaccinated	Method of vaccination	Remarks

Flock Numbers (count weekly if possible, then monthly)

Date	Weeks	Hens (from laying onwards)	Pullets (8 weeks to laying 1 st egg)	Cocks (from 7 months and above)	Cockerels (2 to 7 months)	Chicks (all birds less than 2 months)	Remarks
	Week 1						
	Week 2						
	Week 3						
	Week 4						
	Month 2						
	Month 3						
	Month 4						
	Month 5						

Economics of Production.

In evaluating cost and benefits of the enterprise, one has to calculate the costs below.

Fixed or Non Recurring Expenditure

- Cost of buildings (poultry houses, store), depreciations and repairs on them.
- Cost of equipment (water troughs, feeders, feed mill, nests, overcoats, heater etc) and depreciation on them.
- Repayment of loans and interests
- **Get the totals of these fixed items.**

Variable or Recurring Expenditure

- Cost of day old chicks
- Cost of feeds to the point of disposal
- Cost of labour, water, electricity, drugs, vaccines, litter, fuel, transport, advertisement
- Marketing costs
- Wages and allowances
- **Get the totals of these variable costs.**

These fixed costs and variable expenses have to be recovered by the sale of birds or eggs.

Capital Investment

Capital investment = Fixed costs + Variable costs

Sales or Receipts

- Sale of eggs/culled birds
- Sale of manure
- **Entrance fees for agricultural tourism**

Gross Profit (gross margin)

Gross profit = Money from sales – Variable (recurring) expenses (gross margin)

Net Profit

Net profit = Sales – (Variable costs + Fixed costs)

Part 5: Collective Marketing

Methods:
Lecture, Brainstorming
Question and answer
Group work

Objectives:

By the end of the session, participants are able to:

- Identify the economic gaps of individual agricultural marketing
- Explain the benefits of collective agricultural marketing
- Understand the requirements for successful collective marketing
- Identify the challenges and solutions of collective marketing

Sub-topics

1. Understanding existing agricultural marketing practices
2. The benefits of collective marketing
3. Setting up and ensuring an effective collective marketing

Duration: 180 Minutes

Introduction

Welcome the participants and take 5 minutes to review the lessons and experiences learnt from the previous session. Ask the youth on what practical things, as agripreneurs, have they done since the last sessions.

Introduce today's session objective of learning how to produce and conduct collective marketing. Emphasize that agribusiness today is faced with different markets, which do not generate the same benefits to farmers. Other than producing, without a good market, farmers can hardly get out of poverty. Thus, to understand how youth agripreneurs can reap good returns from their efforts requires a thorough understanding of agricultural marketing.

Group Work: Divide the learners into 4 groups and ask each group to take 15 minutes to answer the following questions. They should have a secretary who will report to the plenary.

Group 1: Where do farmers [of the enterprise selected by the youth group] in the area sell their products?

What challenges do they face with their market?

Group 2: Why is a good market important for youth agripreneurs?

Group 3: What are the advantages and disadvantages of farmers selling their products individually?

Group 4: What advantages would youth agripreneurs derive by selling their products collectively?

Wrap Up the responses with emphasis as below

- There are many different markets for the same commodity – farm gate, local and far off markets;
- There are different buyers of the same commodity – middlemen, retailers, wholesalers, processors, and direct consumers
- There are different buyer preferences – price, volumes, quality, and nature of transactions
- There are, to a large extent, no government restrictions on buyer-seller transactions because the market is a free arena.
- In the market, “clever actors” exploit the other players to maximize their “profits.”
 - A good market and marketing is important for the following reasons:

- It provides information on what customers want thereby targeting production and how to attract buyers.
- It enables customers to know what farmers produce thereby influencing buyer decisions.
- It enhances farmers' ability to sell their products at the right places and price and to right people.
- Collective marketing simply refer to a process where a group of farmers with the same product aggregate their produce and sell them in larger quantities to an identified buyer. This process, however, entails that:
 - Individual farmers/youth agripreneurs organize themselves into a groups and agree to;
 - Farm the same agroenterprise/commodity;
 - Farm the selected commodity individually according to their capacities and economic goals;
 - Follow the same farming seasons, good agronomic/husbandry practices including post-harvest management;
 - Sell their commodity together in the same market using same agreed upon buyer and price.
 - Either bulks their produce together on the day of selling or store to sell later.
- The advantages of collective marketing revolves around its higher economy of scale- ability to aggregate together many small volumes into one bigger volume that is able to:
 - Share a number of transaction costs – transport, storage, handling, and risks.
 - Attract buyers who always want “quick turn around transaction time.”
 - Strengthen farmers' negotiation capacity for better prices given reduced transaction costs.
 - Improve and standardize quality of the produce offered for sale.
 - Ensure one-off payment to farmers compared to small selling practices. With this lump sum payment farmers are able to effectively plan and use their funds effectively.
 - Reduce the high individual sales risks due to indecisions for timely sales.
 - Enhance farmers' access to market information given shared role allocations.
 - Improves a group capacity to acquire and improve communal facilities for improving the quality of their produce e.g., stores, access roads.
 - Open group members' access to credit from input suppliers or banks that they may use to boost their agribusiness.
 - Build social coherence and trust among group members.
 - Strengthen groups voice and visibility thereby building political space to lobby and advocate for local government support
- The challenges of collective marketing, which can all be solved through group strengthening, include:
 - Lack of established financial trust among group members
 - Negative individual competition that bars collective actions
 - Requires many regular meetings for consensus building
 - Often farmers fear product standardization thereby compromising quality, volume, etc.
 - Requires effective records keeping that sometime only few group members can do (thereby inhibiting transparency)
- The key drivers for a successful collective marketing includes:
 - Trust among the members
 - Transparency from group leaders and committee members
 - Strict adherence to the enterprise calendar so that all activities are concluded at the same time
 - Strict adherence to recommended agricultural practices
 - Timely access to market information to avoid exploitative markets of inputs and produce
 - Proper records keeping for generating real time production and marketing data.

- For collective marketing to be effective, there is need to:
 - Identify a good buyer able to offer the group members fair price.
 - Bulk and sell the produce together in an organized manner and pay every member.
 - Document all the processes for future planning.
 - Keep clear records for transparency and accountability

Below is how to conduct and document the buyer survey and sales.

5.1 Conduct Market (Who is the Buyer) Survey

Given that production is geared towards the market, and that few (if any) group will engage in contract farming, it is important that youth agripreneurs are constantly aware of who is the better buyer. To know these buyers, it is important that the Marketing Committee conducts regular market surveys- pre-season, during production phase, and at the harvest time- to collect market information about the market. This survey will help group members to:

- a) Know the potential buyer to sell to once their product is ready for sale;
- b) Know the trends of change in the market – prices, buyers, conditions, etc.

The process of this market information collection involves:

- Brainstorm in the group on who knows which buyers.
- Going to known markets and discussing with existing buyers.
- Talking to other farmers/groups dealing in similar commodity, Project Officers, Extension officers, government Trade and Cooperative officers and asking current buyers how much more they would be willing to take or do they know who else is buying.
- Watching out for passing trade

Other information sources on prices can be got on the internet and via SMS from the following service providers:

1. Infotrade (www.infotradeuganda.com) provides a weekly market report with retail and wholesale prices from 31 districts.
2. Farmgain provides market prices for an SMS service. You write the name of the produce e.g. “maize”, “rice”, “beans” in an SMS and send it to 8198 or 198. You will then receive an SMS with regional prices for that produce. The service costs Ushs. 220 per SMS.
3. Foodnet (<http://www.foodnet.cgiar.org/market/Uganda/uganda.htm>) provide weekly retail and wholesale prices collected by Farmgain in 13 locations.
4. FEWS Net Uganda (<http://www.fews.net/pages/country.aspx?gb=ug>) provides a monthly price bulletin covering 6 important crops.
5. Regional Agricultural Intelligence Network (www.ratin.net) provides daily market prices from the capitals in the five East African countries.
6. Use the *174# option to show the youth how they can access information on their phone(at a fee)

Procedure:

- a) The marketing Committee should develop a clear work plan for when they will collect market information.
- b) The information to be collected using the tool below – Seasonal buyer survey form – should be collected at the same time and using the same units of measurement.
- c) Only 1-2 members should be involved in this information collection.
- d) Once the data collection period is over, the data collectors must fill the form.
- e) The data collectors should also liaise with the Project Staff to help update their market survey.
- f) The filled form (including information from the group and project staff survey) should be presented to members during one of the group meetings so that members can decide on which buyer is most suitable for them at that time. This process must be participatory so that members have valid reasons they want to sell to a particular buyer (and also to avoid suspicion that the few selected members are not representing them effectively).
- g) The agreed upon buyer will become the focus for market monitoring and further discussions.
- h) In case a buyer/buyers are finally selected at the harvest time, the Marketing Committee members will then embark on the negotiation task to ensure that the group products get the best price (for the season).
- i) Once all these are done, then the group leaders should fill the Form below and ensure that it is duly signed by all the required persons. This form MUST be filled in 4 copies – 1 copy each for the group executive committee, Young Model Farmer, Project Officer, and Project Manager.
- j) Note that overtime, the group should be able to develop a Buyer Register for their product.

Seasonal Buyer Survey for Period (e.g., Feb- July.....)

Name of Youth Group:		Contact Details	Enterprise:
District:	Sub county:	Parish:	Village:

Core issues to explore	Descriptions	Name of buyer A Tel.	Name of buyer B Tel.	Name of buyer C Tel.	Name of buyer D Tel.
Location of buyer	Geographical point of sales				
Distance to market	Distance (Kilometers)				
	Suitable transport is available? Yes/ No				
	Transport fare (UGX)				
Frequency of market	Daily, weekly, seasonal				
Average price/ unit	Minimum (UGX)				
	Maximum (UGX)				
	Average (UGX)				
Quantity required	Minimum volume				
	Maximum volume				
Quality conditions	Standard of product				
Payment method	Cash /Cheques				
	On delivery/ delayed				
Delivery method	By group/buyer				
	Cost saved/ incurred (UGX)				
Taxes	Fees charged (UGX)				
	Paid by group/ buyer				
Any other conditions					
Member's preferred buyer					

For Youth Group:

Group Chairperson: Date, name, signature & stamp

Group YMF: Date, name and signature

For Implementing Partner:

Project Officer: Date, name, and signature

Project Manager: Date, name, signature & stamp

5.2 Monitor Production and Compliance

During the entire production season, the YMF and the Executive Committees must conduct field visits to individual member gardens in order to assess:

- i) If they have planted the targeted acres or reared the targeted birds;
- ii) If they are following agreed upon dates set for specific activities;
- iii) If they are following the recommended agronomic and livestock husbandry;
- iv) The need for (as well as to provide) mentorship in recommended practices; and
- v) The likely production level for the season.

The Assessment form below must be used for the visit and reporting back to the group meeting.

Agroenterprise Production Monitoring Form for Period (e.g., Feb- July.....)

Name of Youth Group:		Contact Details	Enterprise: Variety:
District:	Sub county:	Parish:	Village:

No.	Name of Member	Crop sector (Are you currently practicing..... 0=No; 1=Yes; 2=Somehow)													Livestock sector					TOTAL PRODUCE FOR THE SEASON				
		Acres planted	Early land opening	Correct nursery preparations	Timely planting	Correct spacing	Integrated pest & disease control	Better post-harvest handling	Intercropping	Crop rotation	Erosion control	Mulching	Manure	Terracing/Contour digging	Fallow system	Proper records keeping	Number birds	Housing	Supplementary feedings		Parasite and disease control	Routine works	Proper records keeping	Number of Trees planted
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20																								
GROUP GARDEN																								
TOTAL																								

For Youth Group:

Group Chairperson: Date, name, signature & stamp

Group YMF: Date, name and signature

5.3 Bulk and Sell Produce

Once members have harvested their produce or have their birds ready for sale, it is important that they hold a meeting to agree on and do the following:

- a) Who the current preferred buyer would be? It is advisable to pre-select at least 2 buyers from the harvest time market survey.
- b) What volume of their produce they will pool/bulk and sell together. It is important to note here that members should not be forced to sell their product collectively. Rather the market benefits of collective sales should prevail in attracting them. Equally, members should be allowed to have some of their product for home consumption.
- c) Protracted negotiations with the selected buyers. In this case, the Marketing Committee members should go and discuss with the buyers the price, volume needed, the quality accepted, and date of purchase (among other issues).
- d) After the negotiations, the Marketing Committee should provide feedbacks to the members in order to help them:
 - Sorting their product in line with the buyer quality requirement
 - Prepare the bulking point/central location where the buyer will meet them
 - Bulk their produce at a central location on the day of purchase
 - Agree and sign a contract with the buyer.
- e) On the day of buying, members should bring their produce to the central location where the Marketing Committee members will be. In this way, each member will meet her/his own transport cost.
- f) As the buyer arrives and assesses product-by-product, all quantities that are accepted by the buyer will be recorded on the form overleaf.
- g) Payments will be made directly to the marketing Committee members in the presence of the group members.
- h) Once the buyer has left, the Marketing Committee members will pay all the members for their produce sold. All payment MUST be made on the day produce is taken to avoid fraud and risks associated with late payment. Every member must sign for her/his money in public.
- i) Once all payments have been made, the Group Chairperson and YMF will sign the form for filling. Any outstanding money unpaid MUST be declared to members.
- j) Worth noting are should a group agreed to:
 - Transport its product to the buyer, it will negotiate the transport cost with the transporter and deduct the cost according to the volume sold per member. A column for transport cost paid per person can be included.
 - A Sales Commission, this amount will be deducted according to the volume sold per member. A column for commission paid per person can be included.
 - A group decides to recover its outstanding loan, the VSLA Management Committee will liaise with the Marketing Committee to ensure that the process runs smoothly. A column for loan payment per person can be included.

CONTRACT AGREEMENT FOR YOUTH GROUP MARKETING

THIS AGREEMENT made this day of between Youth Group of Village Parish, Sub county and District, whose members are involved in agroenterprise (“herein after referred to as the Seller).

AND

..... of, sub county, District, Phone number who will buy from the Farmer Group (“herein after referred to as the Buyer).

Both parties have agreed to operate under the following terms and condition (please delete whichever is inapplicable);

The Farmer Group agrees to;

- 1- Update the buyer about the volume of produce that is ready for sale.
- 2- Bulk the produce at one point/store.
- 3- Transport the produce to the buyer.
- 4- Sell within their bulking point or in the buyer’s store.

The Buyer agrees to;

- 1- Buy the produce at a **price** of _____ UGX. per unit. (*Indicate agreed unit*)
- 2- Pay cash/cheque for the produce when it is collected, verified, and accepted.
- 3- Collect/receive the produce on the Day: _____ Month: _____ Year: _____

Produce Specification

State here the details of products (quantity, quality, packaging, etc.)

.....
.....
.....

Warranties; Both parties must acknowledge themselves to be bound by all the terms and conditions of this offer, which shall, unless otherwise stated, be determined in accordance with the laws of Uganda.

Arbitration; This agreement is executed based on mutual understanding that both parties are working to ensure a successful transaction and as such should not arise the need for disagreement. But should there be any, this agreement shall be construed and enforced under the laws of the republic of Uganda.

In witness of the above contract; the representatives of the two parties with full consent have agreed to implement this contract under the above terms and conditions.

For Youth Group:

Group Chairperson: Date, name, signature & stamp

For Buyer:

Name, Date, and signature

Group YMF: Date, name and signature

For Witness:

Name, Date, and signature

Bulked Produce Registration and Payment Form

Name of Youth Group:		Contact Details	Enterprise: Variety:
District:	Sub county:	Parish:	Village:

SN	Name of youth	Sex	Accepted quantity bulked (unit)	Price / unit (UGX)	Amount paid (UGX)	Agreed deductibles (UGX)				Net take home (UGX)	Signature
						Transport	Commission	Tax	Loan		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
Group Garden											
TOTAL											

For Youth Group:

Group Chairperson: Date, name, signature & stamp

Group YMF: Date, name and signature

Part 6. Performance Review and Planning

Methods
*Question and answer,
group work,*

Objectives

At the end of the session, participants are able to:

- Assess their performance by identifying their strong and weak agribusiness areas.
- Suggest innovative solutions to improve their agribusiness performance.
- Develop their seasonal production and marketing plans.

Sub topics:

1. Performance accountability
2. Seasonal planning

Duration

120 minutes

Introduction

Welcome the participants and take 5 minutes to review the lessons and experiences learnt from the previous session. Ask the youth on what practical things, as agripreneurs, have they done since the last sessions.

Introduce today's session by asking the following brainstorming questions:

- What should an agripreneurs do at the end of the business season? And why?

Points to Emphasize

Once the seasonal transaction is accomplished, the Executive Committees together with the YMF should convene a general meeting during which the group will primarily:

- (a) Receive up to date accountability from the various committees/leaders;
- (b) Review its progress; and
- (c) Plan for the next season.

Below is a highlight of the process of managing the review meeting.

- a) The various group committees/leaders **MUST** hold a meeting prior to the meeting to fill out the required information in the reporting template below.
- b) The Project Officer and the Community Based Facilitator **MUST** attend the meeting.
- c) The templates below will guide the meeting. These templates **MUST** be filled, signed and submitted to the Project Manager.
- d) During the meeting:
 - (i) The YMF shall provide accountability on the progress of production in the season. They should mention names of those who may take the group behind due to low adoption to better agronomic/husbandry practices so that the group can echo reprimands.
 - (ii) The VSLA Management Committee shall provide accountability on Savings and Loan performance. They should mention names of members who may lack consistent savings and loan repayment so that the group can echo reprimands.
 - (iii) The Executive Committee-cum-marketing Committee shall provide accountability on the progress of marketing including, volume sold, amount earned, the buyers, etc. They should also point at the difference between yield and volume bulked so as to reduce on side selling. Equally, they should mention names of members who are engaged in side selling when they compare volumes bulked versus yield for the period.

- e) After listening to the figures and trouble spots, the group should discuss the season in details by seeking answers to the challenges they faced in order to provide practical solutions for the way forward into the next season. Key information from this discussion should then be filled in a template for sharing with the project management.
- f) Finally the group should plan for the next season. The same procedure used during the start-up planning is also to be used. However, because market conditions are dynamic, it will be important to pay attention to changes in prices of inputs as well as of produce. The team should jointly conduct a new enterprise analysis so that costing is based on new market trends.

Group Seasonal Review Form for Period (e.g., Feb- July.....)

Bio-data to be filled by Executive Committee:

Name of PO:		Name of YMF:		Name of CBF:	
Name of Youth Group:		Contact:		Enterprise:	
District:	Sub county:	Parish:	Village:		
Males:	Females:	Total:	Date of review:		
Has valid certificate: (Yes/No)	Has functional Executive Committee (Yes/No):	Has a functional bank account (Yes/No):	Months of operations:		
# Members in micro franchise:	# Members in agribusiness:	# Members in vocational skills:	# Members participating in VSLA:		
# of members self- employed	Males	Females	# of members formally employed	Males	Females

Production data to be filled by Young Model Farmers:

Name of YMF:			
Crop Enterprise		Contour digging	
Total acres planted		Fallow system	
Total yield in the season		Proper records keeping	
Early land opening			
Correct nursery preparations		Animal Enterprise	
Timely planting		Number start-up birds:	
Correct spacing		Number of birds sold	
Integrated pest & disease control		Number of birds now	
Better post-harvest handling		Animal housing	
Intercropping		Supplementary feedings	
Crop rotation		Parasite and disease control	
Erosion control		Routine works	
Mulching		Proper records keeping	
Manure application		Number of Trees planted:	

VSLA data to be filled by VSLA Management Committee:

Number of members participating in VSLA	
Total amount saved (UGX)	
Total amount saved as Social Fund (UGX)	
Total amount saved for Agro-inputs (UGX)	
Total amount loaned out (UGX)	
Loan recovery rate (%)	
Total amount deposited in a bank account (UGX)	

Marketing data to be filled by Executive Committee:

Number of members who farmed in the season	
Total Acres/birds planned:	
Total Acres planted/birds kept:	
Number of non-family members employed	
Yield attained	
Number of members who bulked their produce for sale	
Quantity sold by the group	
Total sales income earned (UGX)	
Total amount paid as tax to government (UGX)	
Total net take home income (UGX)	
Number of members who insured their business	
Total amount paid as premium (UGX)	
Name of insurance company engaged	
Number of members whose claims were paid	
Total amount received as claims (UGX)	

General information to be filled by all Group Members:

Which partnerships/linkages did we gain?:
What are we doing to ensure social inclusion/gender?
What are we doing to ensure environmental conservation?
What are we doing to ensure sustainability?
What positive results did we achieve?
What challenges did we face?
What solutions do we suggest?

Production and Marketing Seasonal Planning Form for Period (e.g., Feb-July.....)

Name of Youth Group:		Contact Details	Enterprise: Variety:
District:	Sub county:	Parish:	Village:

No.	Name of Member	Actual last season (acres/birds)	Planned Acres/Birds	Yield expected (units)	Estimated yield loss + food	Estimated yield to be sold	Estimated sales price per unit (UGX)	Estimated Income (UGX)	Estimated production cost (UGX)	Estimated net Income (UGX)
	(a)		(b)	(c)	(d)	(e=(c-d))	(f)	(g=(e*f))	(h)	(i=g-h)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
GROUP GARDEN										
TOTAL										

Planned Seasonal Activities

Activity	Period																Responsible
	Month 1				Month 2				Month 3				Month 4				
	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15	W 16	
Nursery management																	
Clashing																	
Ploughing																	
Procurement of inputs																	
Planting																	
Weeding																	
Spraying																	
Harvesting																	
Marketing of produce																	
Review of achievements																	

For Youth Group:

 Group Chairperson: Date, name, signature & stamp

 Group YMF: Date, name and signature

For Implementing Partner:

 Project Officer: Date, name, and signature

 Project Manager: Date, name, signature & stamp

