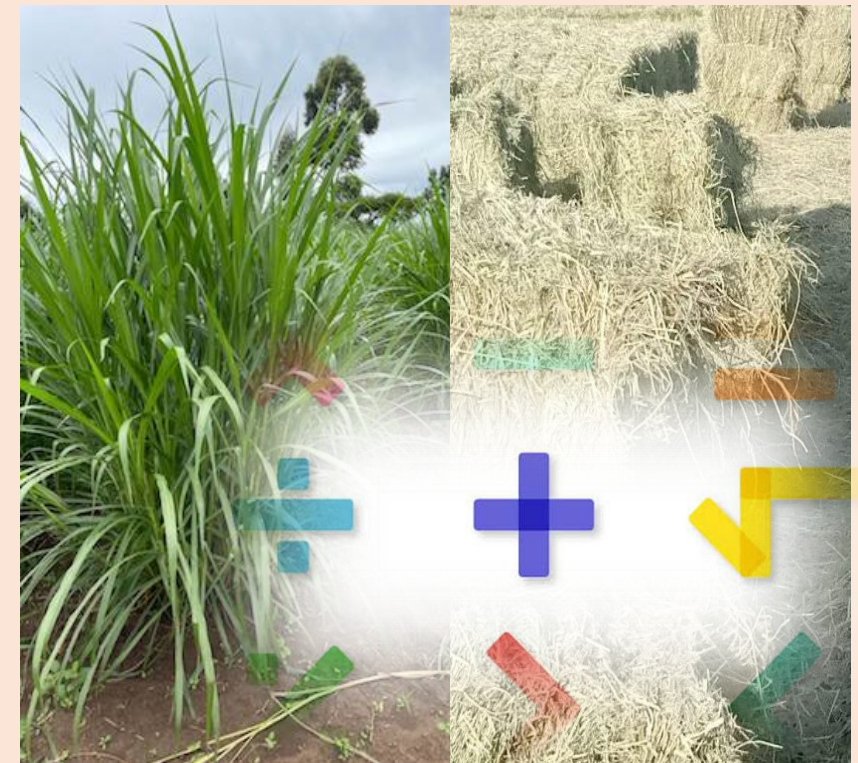


ECONOMICS OF FORAGE AND PASTURE PRODUCTION (Level 3)

Topic	Training & information Content
1.1	Planning of fodder/feed requirements for the dry season
1.2.1	Integrated soil fertility management I
1.2.2	Integrated soil fertility management II
1.3	Use of natural resources, compost making, farmyard manure, manure storage and use
1.4	Growing maize and sorghum for fodder and estimating time of harvest and yield
1.5	Brachiaria, Panicum, & Napier (cut and carry) grass management
1.6	Growing fodder trees and use of feed
1.7	Estimating of dry matter content, feeding value and yield of various fodder crops
1.8	Guidelines for Tropical pasture management and grazing management
1.9	Scaled mechanization of forage production and harvesting (harvesting practices)
1.10	Operating farm equipment and self-propelled tractors
1.11	Mechanization of feeding management
1.12	Economics of forage and pasture production



1. You will learn about (learning objectives):

- ❑ The cost behind various forage productions and how to calculate production cost of various types of forages, including;
 - Pasture grass
 - Cut & carry forage
 - Forage crop



2. Introduction

- Feed costs are a major expenses in farms, taking up about $\frac{3}{4}$ or 75% of the costs spent by cows.
- Sustainable forage and pasture production systems in the long run influences stable and economic productivity all round.
- Farms have to find ways to maximize economic feed production to satisfy feed utilization by cows, increasing forage yield and quality per area of production.



3. Importance of forage and pasture economics

Considering forage & pasture economic helps in:

- i. Identifying production cost of forage and pasture production.
- ii. Determining return on investment from forage and pasture production.
- iii. Understanding and selecting a profitable forage and pasture system that fits your farm.
- iv. Ensuring access of highly nutritive forage to animals for best performance.



4. Benefits of forage crops

Forage crops:

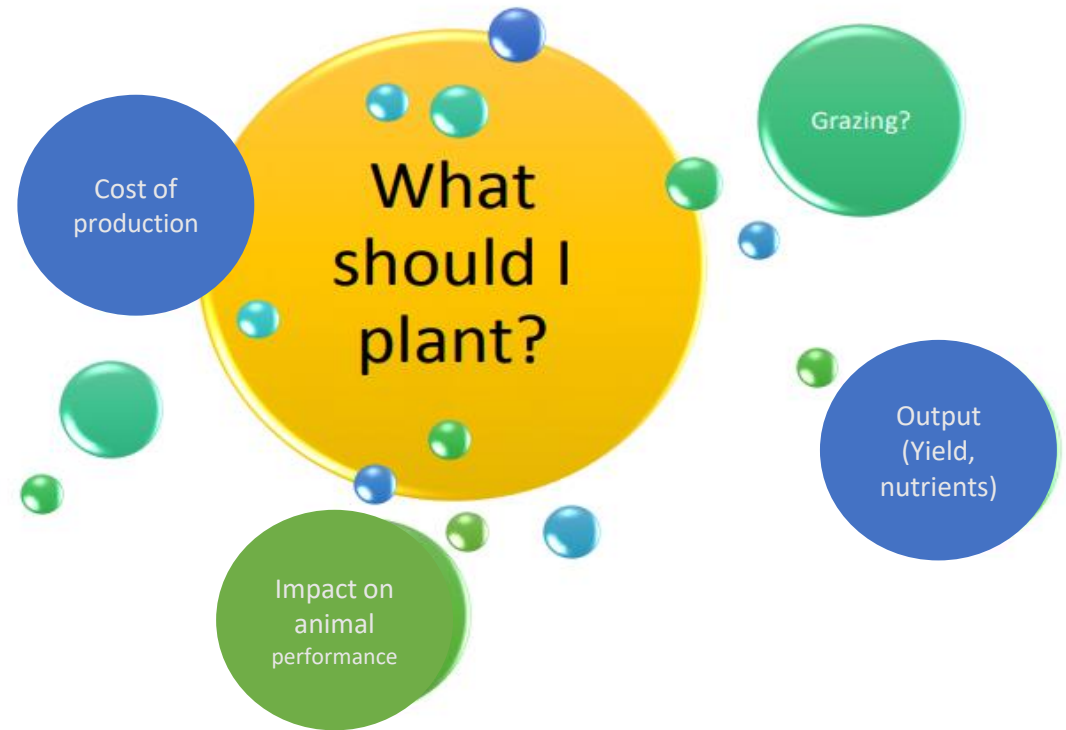
- Improve soil fertility if legumes are used and when manure and urine is distributed in pastures evenly.
- Reduce weed population when crops are planted densely in fields.
- Forage legumes complement grasses (pastures).
- Offer repeated harvests each year.
- Increase the yield of subsequent crops in rotational systems.
- Reduce cost of production in subsequent crops in rotational systems.



5. Economic aspects of forage production

Before selecting the forage or pasture to produce in a farm, it is important to consider the:

- Cost of producing the forage.
- Feed cost implications on farm management.
- Impact of the forage variety on animals' performance.
- Output (yield and nutritive content over the year) of the forage.



6. Types of forage costs

- Cost of production is a significant factor that affects profitability in a farm, aside from other external factors.
- Cost of production can be split into four (4):
 1. Materials and service (inputs)
 2. Labour
 3. Machinery operations
 4. Machinery ownership/contracting



7. Material and service (inputs) costs

- This refers to all inputs or services needed at every stage of production, from land preparation to harvesting period.
- These costs comprise of;
 - a. Planting materials (seeds / suckers)
 - b. Herbicides
 - c. Fertilizer & lime



7.1 Material and service (inputs) costs Cont'd...

- The amount of materials purchased by the farmer should be in regards to;
 - Size of land under production.
 - Type of forage crop: Influences spacing and input quantities i.e. fertilizer and lime.
 - Soil fertility analysis: Offers information on pH and right quantities of fertilizer.
 - Location and climatic zone: Influences plant spacing and method of production.
- This is largely influenced by financial capacity of the farmer but has an impact in the long-term running cost of production.
- Purchase of high quality, forage and soil specific products should be a key consideration.



8. Labour costs

- Labour is an important aspect in forage production and can be offered through family and/or hired labour.
- Family labour is not accounted for mostly, but is of great contribution to production systems and are a major source of labour for households.
- Hired labour accounts for semi-permanent workers hired within the farm and paid monthly; as well as labourers hired for a short period of the production phase on a per hour or day pay basis.



8.1 Labour costs Cont'd...

- Labour is mostly needed during;
 - Land establishment stages (manual ploughing of land).
 - Forage production stages (manual planting, fertilizer application & weeding).
 - Forage harvesting stages (harvesting, loading & offloading processes).



8.2 Costing manual labour

- Calculating the cost of manual labour is important for any farm. Most farms calculate labour pay as per-hour, through man-hours i.e.;

Manhours = Total hours worked in a day * Number of workers * Number of days worked



8.3 Example of costing manual labour

Example: To plant maize in an acre of land, a farmer may require 10 workers working from 8.00 am to 1.00pm for the day (5 man hours) to complete planting within the day. A full working day has 8 working hours

Man-hours worked by the labourers/day = 5 hours
* 10 workers = **50 Manhours**

Assuming the pay/day per labourer for planting is UGX 10,675.20, total cost for the farmer for work done by workers = $UGX 10,675.20 / 8 \text{ hours} = UGX 1,334.40 * 50 \text{ Manhours} = \text{UGX } 66,720.$

Therefore each worker is paid UGX 6,672 for the 5 hours work.



9. Machinery operations and ownership costs

Machinery operations

- These are the costs of fuel, repairs and maintenance.

Machinery ownership

- These are costs that take into account depreciation, taxes, insurance and interests charged on investment.
- The cost of owning the machinery is often not taken into account by farmers when calculating the cost of forage production.



9.1 Calculating depreciation

$$\text{Depreciation} = \frac{\text{Purchased price} - \text{Salvage value}}{\text{Years of useful life}}$$

where;

- salvage value = Estimated book value after depreciation over the years; or cost of the machinery at the current condition if it is sold.



10. Forage and pasture production processes

i. Land preparation

Marks the start of production with ploughing taking place between 1-3 times, depending on levelling intended for particular crop.

ii. Planting

Done manually especially in small scale production mechanically.



10.1 Forage and pasture production processes Cont'd...

iii. Fertilizer application

Whether by use of organic (FYM) or inorganic fertilizers, this is an essential aspect in forage production.



Tip: Proper fertilization of perennial crops after cut goes a long way in reducing cost & increasing quality yield production.

iv. Weed management

Done manually using labourers or through use of chemicals, depending on appropriate mode of action for weed prevention.



10.2 Forage and pasture production processes Cont'd...

v. Water management

Is an additional measure undertaken when there is no enough rainfall; or for crops that are dependant on irrigation especially during dry season, or year round forage production.

vi. Harvesting

Poor timing and handling can cause a lot of losses of forage and misuse of manpower (cost) by farmers. A lot of labour is also used in these processes.



Tip: Production processes translate to the costs that farmers have to incur for the various forages.



11. Factors affecting forage production

- The common factors that influence the cost of producing forage crops are:
 - i. Management of forage/pastures – paddocking, water infrastructure, grazing system (rotational), frequency of cutting and harvesting.
 - ii. Mechanization of harvesting.
 - iii. Storage of the forage.



12. Cost implications on forage production

- Fodder production systems vary from farmer to farmer depending on the region, location and availability of inputs and farm machinery or machinery services.
- Farmers should work towards reducing losses that occur in the field till mouth (feeding) i.e. losses from farm to fork.
- Actions taken between harvesting stage to storage to mouth (feeding) or simply post-harvest losses, accounts to losses ranging at 15% - 50%.
- Proper handling at harvesting and storage reduces such losses significantly.



13. Measures of profit

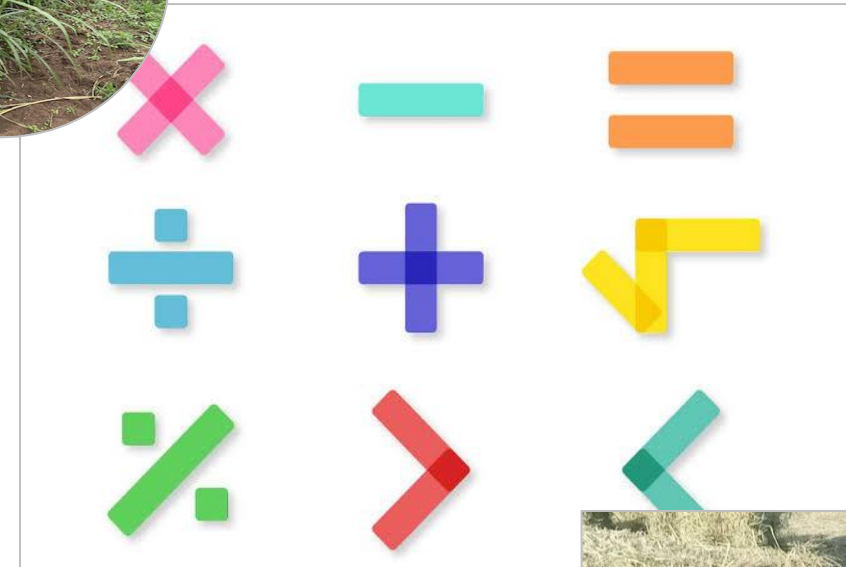
- As mentioned earlier, feed costs are a major expense in farms taking up about $\frac{3}{4}$ or 75% of the costs spent by the cows.
- Feeding also affects animal productivity to a large extent, in addition to other factors such as; animal welfare and health, environmental factors, genetics etc.



Photo: Felix Opinya | Courtesy: Eric Kimalit

14. Calculating the cost of production of forages

- Calculating the production cost for annual and perennial pastures/forages vary but have common approaches.
- Production cost for planting perennial pastures compared to annual forage crops are divided into various stages:
 - i. First / initial establishment
 - ii. Second cut
 - iii. Third to Fourth cuts etc.



14.1 Calculating the cost of production of forages Cont'd...

- We will take you through cost of production of the following forages:
 1. Rhodes grass – pasture grass
 2. Brachiaria grass – cut and carry grass
 3. Forage maize – Forage crop



15. Production of Boma Rhodes grass

- Under ideal management, harvesting of Boma Rhodes grass can be done every 3-4 months.
- Farmers can ensure proper yield of Boma Rhodes grass by ensuring management of:
 - i. Fertilization
 - ii. Right stage of harvesting
 - iii. Proper storage to avoid rotting and wastage.



15.1 Production cost of Boma Rhodes grass per hectare

Material/Service	Unit	Unit price (UGX)	Quantity	Total Cost (UGX)
Seeds	1 Kg	25,020.00	12	300,240.00
DAP fertilizer	50 Kg	95,076.00	2	190,152.00
CAN fertilizer	50 Kg	76,728.00	1	76,728.00
Weed / pest control (Bactril)	1 Litre	40,032.00	2.5	100,080.00
Baling services (cutting, raking & baling)	1 bale	1,668.00	500	834,000.00
Total				1,501,200.00
Labor				
Labor for planting	Man hours	1,334.40	50	66,720.00
Labor for herbicide application	Man hours	13,344.00	3	40,032.00
Labor for transporting hay bales	Man hours	2,001.60	30	60,048.00
Total				166,800.00
Machinery operations				-
Total				
Grand Total (UGX)				1,668,000.00

15.2 Production costs of Boma Rhodes at cutting intervals

Material/Service	Unit	Unit price (UGX)	Quantity	Total Cost (UGX)
Farmyard manure (top dressing)	Tonnes	-	4	-
CAN fertilizer	50 Kgs	76,728.00	1	76,728.00
Baling services (cutting, raking & baling)	1 Bale	1,668.00	500	834,000.00
Weed / pest control (Bactril)	1 Litre	40,032.00	2.5	100,080.00
Total				1,010,808.00
Labor				
Labor for herbicide application	Man hours	13,344.00	3	40,032.00
Labor for cutting and transporting	Man hours	1,167.60	125	145,950.00
Total				185,982.00
Grand Total (UGX)				1,196,790.00

16. Production of Brachiaria grass

- Brachiaria grass in small quantities/trial production is cost effective when splits are used.
- For extensive production of forage cut & carry crop, one should use seeds.



Photo: Felix Opinya

16.1 Production costs of Brachiaria grass per hectare

Material/Service	Unit	Unit price (UGX)	Quantity	Total Cost (UGX)
Brachiaria seeds	Seeds	200,160.00	3	600,480.00
Farmyard manure (planting)	Tonnes	-	4	-
Farmyard manure (top dressing)	Tonnes	-	4	-
CAN fertilizer	50 Kgs	76,728.00	2	153,456.00
Herbicide	Liters		1	-
Ploughing	Acre	60,048.00	2.5	150,120.00
Harrowing	Acre	50,040.00	2.5	125,100.00
Total				1,029,156.00
Labor				
Labor for planting	Man hours	1,334.40	125	166,800.00
Labour for weeding	Man hours	1,668.00	125	208,500.00
Labor for herbicide application	Man hours	13,344.00	3	40,032.00
Labour for cutting & transporting	Man hours	1,167.60	125	145,950.00
Total				561,282.00
Grand Total (UGX)				1,590,438.00

16.2 Production costs of Brachiaria at interval cuttings

Material/Service	Unit	Unit price (UGX)	Quantity	Total Cost (UGX)
Farmyard manure (top dressing)	Tonnes	-	4	-
CAN fertilizer	50 Kgs	76,728.00	2	153,456.00
Herbicide	Liters		1	-
Total				153,456.00
Labor				
Labour for weeding	Man hours	1,668.00	125	208,500.00
Labor for herbicide application	Man hours	13,344.00	3	40,032.00
Labour for cutting & transporting	Man hours	1,167.60	125	145,950.00
Total				394,482.00
Grand Total (UGX)				547,938.00

17. Production costs of forage maize per hectare

Material/Service	Unit	Unit price (UGX)	Quantity	Total Cost (UGX)
Seeds	1 Kg	6,672.00	30	200,160.00
DAP fertilizer	50 Kgs	95,076.00	2.5	237,690.00
CAN fertilizer	50 Kgs	76,728.00	2.5	191,820.00
Herbicide	Litres	41,700.00	5	208,500.00
Pesticide	Litres	76,728.00	0.5	38,364.00
Plastic sheet	Meter	233,520.00	1	233,520.00
Ploughing	Acre	83,400.00	2.5	208,500.00
Harrowing	Acre	50,040.00	2.5	125,100.00
Planting	Acre	50,040.00	2.5	125,100.00
Maize chopper hire	Acre	233,520.00	2.5	583,800.00
Trailor hire	Acre	100,080.00	2.5	250,200.00
Total				2,402,754.00
Labor				
Labor for planting	Man hours	1,334.40	125	166,800.00
Labor for weeding (manual weed control)	Man hours	1,668.00	125	208,500.00
Labour for herbicide application	Man hours	13,344.00	3	40,032.00
Labor for compacting and covering pit	Man hours	1,167.60	50	58,380.00
Total				473,712.00
Machinery operations				
Total				
Grand Total (UGX)				2,876,466.00

18. Calculating production costs of grown forages

- With the help of data on production of forages, farmers can be able to further calculate the cost of producing one kilo (kg) of product that sums up to allocating forage cost in feed cost calculation.



18.1 Calculating production costs of grown forages Cont'd...

Example: Taking the total average output for fodder maize production on an acre to be **10 tonnes (10,000 Kgs)** and cost of production as follows to be a total of **UGX 1,247,997.60**

Cost of producing 1kg of fodder maize =

$$\frac{\text{Total cost of production}}{\text{Total output}}$$

$$\text{UGX } 1,247,997.60 / 10,000\text{Kgs} = \text{UGX } 124.80$$

To produce 1 kg of fodder maize costs the farmer **UGX 124.80 or UGX 125**



19. Reducing forage production costs

- Can be done through:
 - i. Practising zero tillage.
 - ii. Maintaining good soil health over the years.
 - iii. Using improved forage varieties.
 - iv. Selecting cost-effective production systems i.e. Agro-forestry systems.
 - v. Use less competitive companion crops.
 - vi. Using right agronomics strategies for crop and soil i.e. fertilizer application.

