

Theme 2: Forage production and pasture management

# GUIDELINES FOR TROPICAL PASTURE & GRAZING MANAGEMENT



*A publication sponsored by the ICSTIAPL project*



## **You will learn about**

- How to manipulate grazing to achieve increased milk production with healthy cows.
- How to control grazing behaviour of cows in tropical perennial pastures.

# Introduction

- Pasture management is the practice of growing healthy grass and legumes to profitably sustain forage availability and livestock production while ensuring ecological health.
- The real value of the pasture lies in the growing plants and the harvested (hay) crop, but this value is never realized until the grass/hay is converted into milk (or meat).
- The payoff depends on the yield per acre and the quality of the pasture.



# Pasture quality

Pasture quality is a broader term which includes:

- Palatability of the forage
- Daily intake of the forage (referred to as dry matter intake (DMI))
- Chemical composition of the forage (nutritive value)



Cows grazing on hybrid Brachiaria grass



**Note:** Fertilised perennial tropical grasses have higher quality forage than native pastures.

## Factors influencing pasture quality

Pasture quality will depend on many factors including:

- Location
- Climate zone (temperature, humidity, precipitation)
- Type of grass and/or legume
- Grazing management



## Daily feed intake

Feed intake is the driver for animal production; this means with pasture management, the focus needs to be on optimising both the quantity and quality of forage material available.



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## Establishing pastures

### Seedbed preparation

- Tropical perennial grasses require a well-prepared fine seed bed.
- Mechanical seedbed preparation should be done well before the rains. The dry conditions makes it easier to prepare the land and kill weeds.



### Seedbed preparation to fine tilth

- Cultivate to a fine tilth and level field with a spring tine cultivator. Cross cultivating helps to level the field.
- The fine tilth will increase germination rates.
- A levelled field is much better if the grass will be mowed frequently. This will spare your machinery and results in quality forage material after cutting.



## Broadcasting grass seeds

- Seeding can start after at least 30 mm of rainfall.
- The soil needs to be moist.
- Broadcast the seed at the recommended rate in kg/ha. Grass seeds are generally very light.



## Seeding perennial grass seeds

- For drilling using seed drills, be very careful not to bury the seed too deep > 1 cm.
- Roller drills are preferred because they do not bury the seed too deeply.



Roller drills



Seed drills

## Bring the seeds in contact with soil moisture

- The seed, especially seeds that are very light must be pressed into the soil or lightly covered by dragging.
- The seeds can also be pressed into the soil using a tractor and drive over the field "tyre to tyre."
- On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil.
- Be careful not to bury the seed no to cover the seeds with to much soil (>1 cm).



## First year after sowing

- In the establishment year, it is best to avoid grazing until plants have flowered and set seed before commencing grazing.
- Young tropical perennial grass plants have a poorly developed primary root system.
- Test how well plants are anchored by pulling the plant by hand.



## Weed control

- Weeding can be done manually by pulling out the weeds that are germinating.
- Broadleaf weeds can be sprayed with a herbicide after they have germinated.



## Grazing management

- Under good grazing management, grasses harvested by cows will be in a vegetative state and approximately 15 to 20 cm tall, depending on the type of grass.
- Grasses harvested as hay or silage are typically more mature than when harvested as pasture.
- Grazed pasture should be of higher quality than stored forages.



- Legumes such as centrosema, stylosanthes, desmodium, sunn hemp or alfalfa are usually grazed at an earlier stage of growth than when harvested as hay.



Native  
Brachiaria/Centrosema  
mixture at young leafy  
stage



Field of  
Desmodium



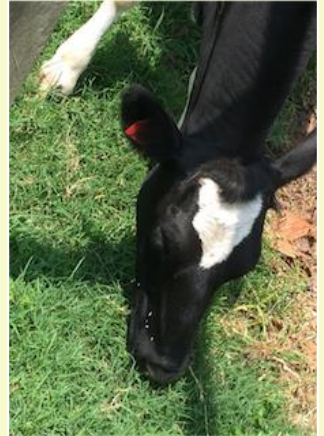
Stylosanthes

## Fertilization

- For initial fertilization during planting, use a phosphorus dominated fertilizer such as DAP at rate of 50 kg/acre to support root development.
- Subsequent applications can be done annually with nitrogenous fertilizer at a rate of 50-100 kg/acre of calcium ammonium nitrate (CAN).
- Application should be done after rains when the soil is wet enough to dissolve the fertilizer and to enhance regrowth.

## Selective grazing

- The potential for selection is great in tropical pastures because of the large variation in nutritive value (nitrogen, digestibility, fibre and chemical composition), both within and between the leaf and stem components of tropical pasture swards.
- Those plants can be so heavily grazed that they eventually weaken to the extent that other less desirable plants encroach and push them out.
- This results in 'weedy' fields, which further emphasises the importance of rest periods.



## Avoid over-grazing

- Divide your land into (fenced) paddocks and rotate your cows between the paddocks every 4-6 days.
- Use grass species or pasture mixes that are known to tolerate intensive rotational grazing.
- During the wet season, 4-6 weeks rest periods between grazings are recommended depending on soils and fertilization.

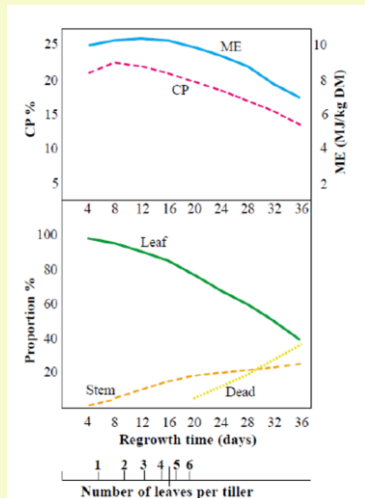


- During dry season without irrigation, longer rest periods of 8-10 weeks are recommended.
- On good soils with fertilizer applied, quicker recovery periods between grazing's (4 weeks in the wet season) and more frequent cutting can be practiced.
- Once plants are well rooted during the season then light grazing may increase tillering.



Leafy kikuyu at the 4.5 leaf stage – ready to graze

- The upper graph on the right shows the changes in crude protein percentage (CP%) and metabolizable Energy (MJ ME/kg DM) with age (number of days on x axis) of regrowth.
- The bottom graph on the right shows the proportion of leaf, stem and dead components of total DM above 5 cm stubble (lower).



## Grass-based pastures: Kikuyu Grass

### Fertilizing kikuyu grass

- Pasture quality is optimised with good fertilization.
- Application of nitrogenous fertilizer increases crude protein levels by up to 5%.
- Alternatively, mixed grass/legume swads will benefit from the leguminous plants in the swad which can fix nitrogen that benefits the growth of the grasses in the swad.



### Nutritional quality of kikuyu grass components

- The previous graphs and the table on the left show that to maximise metabolizable energy and protein, grazing management needs to maximise leaf available to the cow and reduce the development of stems.
- This is achieved by maintaining an optimum "grazing interval" that is based on the plant maturity; as indicated by the number of leaves on each tiller.

Kikuyu component	Metabolisable energy (MJ/kg DM)	Crude protein (%)
Leaf	9.2	21
Stem	7.4	17
Dead	6	9

Metabolisable energy (MJ/kg DM) and crude protein (%) content of kikuyu leaf, stem and dead material Kikuyu component

## Nutritional quality of mixed (grass/legume) pastures

- In general, pastures containing some legumes are higher in nutrient value and will likely be consumed in higher amounts than straight grass pastures.



## Nutritional quality of pastures during wet season

- For most grasses and grass/legume mixtures, the protein and energy content are higher in the beginning of the wet season, gradually declining towards the end of the wet season.



## Nutritional quality of grasses in early vegetative stage

Grasses in the early vegetative stage are high in:

- i. Protein
- ii. Energy
- iii. Forage quality
  - Palatability
  - Intake

↑ Crude Protein

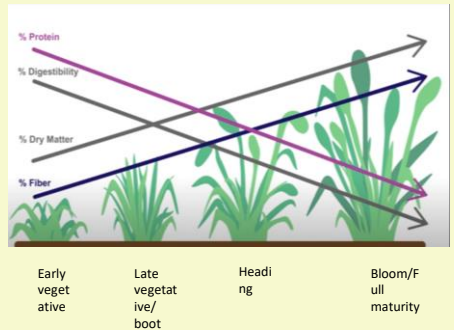
↑ Energy Concentration

↑ Forage Quality



## Forage quality as related to maturity

- Forage quality varies depending on time of year and stage of growth cycle.
- In the graph on the right is shows that as the grass matures the protein content declines.
- The dry matter content and yield of the forage increases.



## Nutritional quality of grasses in early vegetative stage

As pasture matures:

- Leaf % decreases
- Stem % increases
- Protein and energy decrease
- Fibre and lignin increase
- Pasture intake decreases



## How to get the best out of tropical pastures

Tropical pastures, due to their high fiber and low energy content provide low to medium quality feeds for milk production. Note the following:

- Well-managed tropical pastures are capable of reasonable levels of production.
- Select and plant species of higher feeding value.
- Select species that are persistent/hardy.
- Adopt good grazing management practices, particularly by grazing less mature forage material.



How to get the best out of tropical pastures –



### Energy

- Tropical pastures are not sufficiently nutritious to meet the cow's energy requirements in the first phase of the lactation. It is therefore highly desirable to feed concentrate supplements at this time.
- Energy supplements such as maize bran, maize germ or molasses are required, in some circumstances protein supplements may be necessary.



Energy based concentrates packed in bags

How to get the best out of tropical pastures –



### Fibre

- Nutritional quality (chemical composition) of pastures is related
- to the maturity of the forage
- material when harvested.
- Farmers need to strive to achieve
- legume forage with 20 to 23%
- crude protein (CP), 26 to 30%
- acid detergent fiber (ADF), 38 to
- 42% neutral detergent fiber (NDF).



How to get the best out of tropical pastures –



### Protein

- The recommended requirement for rumen degradable protein (RDP) in the total dairy ration is between 62 to 68% of the total protein.
- When total protein in well-managed pastures is high:
  - the protein in the pasture is high in rumen degradable protein (RDP).
  - 70 to 80% of the protein in pasture will be degraded in the rumen.
  - providing carbohydrates available in the rumen, primarily from concentrates, and also from other forages, will help the cows to utilize the high levels of RDP in pastures more effectively.



Silver-leaf desmodium

# Balancing Rations to get the best out of tropical pastures



- When formulating rations with stored forages, forage tests are usually taken when a change in bunkers occurs, when the field harvested changes within a silo, or when a new source of forage is fed. The same applies for pastures.



How to get the best out of tropical pastures –



During drought

- During periods of heat and drought, additional forages (supplementation) may need to be provided to lactating dairy cows.
- While in the wet season, perhaps only single source or compounded concentrates and minerals are all that is necessary to maintain animal health and productivity.



Good pasture management can reduce the need for supplementation and yield enough biomass to make hay.

# Consequences of poor pasture management

Poor plant re-growth as a result of high stocking rate hinders proper re-growth of grasses to produce enough leaves (forage material).

This type of pastures cannot meet the nutritive requirements of the cows.



Over stocking will increase the chances of overgrazing.

Animal health issues relating from parasite infestation in pasture systems that are poorly managed, affect vulnerable groups like the young stock and milking cows.



Low pasture height stresses cows during grazing as they are not able to snip off as much forage from the fields.

Pasture density is affected by poor crop spacing and fertilization. These pastures are prone to constant weed attacks and soil erosion.



# Conditions for Pasture Condition Scoring (PCS)

Pasture scoring (PCS) involves evaluation of the pasture on different key indicators as observed in the field.



It is useful in determining when to move livestock to new pasture and plan for pasture management.



Pasture condition scoring should be done several times in a year at different production period such as;

Before introducing cattle to the pasture.	Period close to the end of pasture depletion by the cattle or when close to shifting the cattle to the next paddock.	At peak forage supply period.	At low forage supply period.	At periods of plant stress.
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## Pasture Condition Scoring (PCS)

Pasture scoring (PCS) is based on among others:

- i. Plant cover
- ii. Percentage of desirable plants.
- iii. Plant diversity
- iv. Plant residue
- v. Plant vigor
- vi. Livestock concentration
- vii. Uniformity of use
- viii. Erosion
- ix. Percentage of legume
- x. Soil







Ministry of Foreign Affairs of the  
Netherlands

## About the ICSIAPL Project

The Integrated & Climate Smart Innovations for Agro-Pastoralist Economies and Landscapes in Kenya's Arid and Semi-arid Lands (ICSIAPL) is a three-year (2021 -2023) project funded by the European Union (EU) and the Ministry of Foreign Affairs of the Kingdom of the Netherlands (DGIS). It is managed through a delegated cooperation with the Embassy of the Kingdom of the Netherlands (EKN) in Nairobi.

The EU fund is attached to the DeSIRA Initiative (Development Smart Innovation through Research in Agriculture).

The project is implemented by SNV Netherlands Development Organisation, SNV, (lead partner) and the Kenya Agriculture Livestock Research Organization, KALRO (research partner).

