Sheep grazing in a paddock (Paul Kahiga)

Rotational grazing (Kenya)

Rotational grazing

DESCRIPTION

Rotational grazing is a process whereby livestock are strategically moved to fresh paddocks, or partitioned pasture areas, to allow vegetation in previously grazed pastures to regenerate.

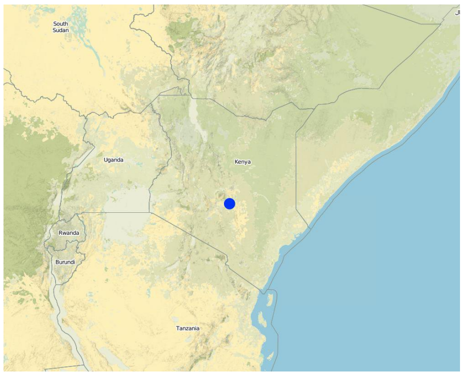
Mbeere South District is relatively dry and farmers have large chunks of land as compared to the Embu North District within the same county. Grazing is done on rotation from one piece of land to another depending on grass availability. Animals are either left to graze freely within the paddock or tethered depending on availability of laborer. In Mbeere South District, when the grass in paddocks gets exhausted, animals are fed on dry maize stalked harvested on the previous seasons. The dry maize stalks (fodder) is usually stored on a raised nest/perch where its covered from rain and sun.

Purpose of the Technology: Using this method cattle are concentrated on a smaller area of the pasture for a few days then moved to another section of pasture. This movement allows the grazed paddock a rest period that permits forages to initiate regrowth, renew carbohydrate stores, and improve yield and persistence.

Establishment / maintenance activities and inputs: When the animals have been shifted to the next paddock, this will allow grass and shrub to grow naturally and at the same time, the farmers are able to do repair of fence and hedge.

Natural / human environment: When utilized properly, rotational grazing can help farmers increase forage productivity. Rotational grazing can help improve productivity, weight gain or milk production per acre, and overall net return to the farm. Rotational grazing allows for better manure distribution that acts as a source of nutrients to the soil. Rotational grazing also has the potential to reduce machinery cost, fuel, supplemental feeding and the amount of forage wasted.

LOCATION



Location: Mbere South District, Eastern Province, Kenya

No. of Technology sites analysed:

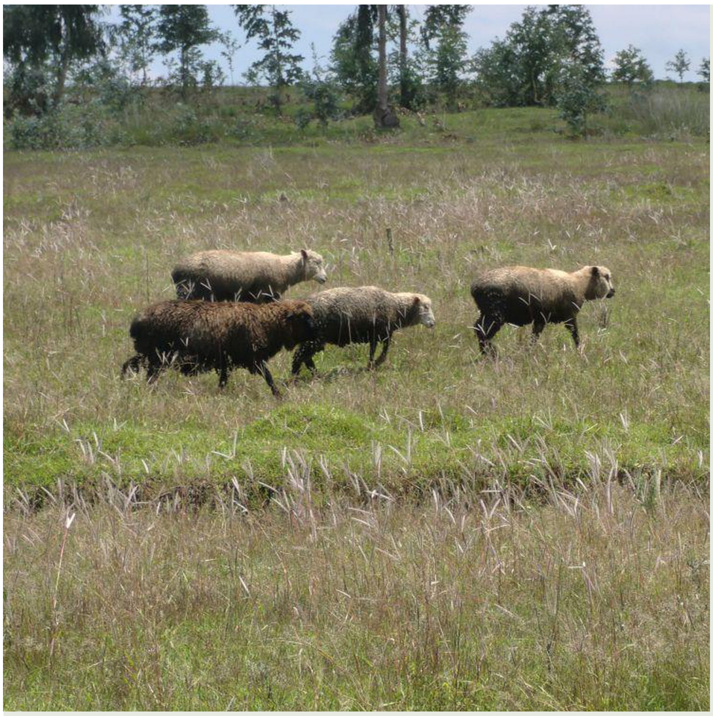
Geo-reference of selected sites
- 37.79466, -0.5747

Spread of the Technology: evenly spread over an area (approx. < 0.1 km2 (10 ha))

In a permanently protected area?:

Date of implementation: 10-50 years ago

Type of introduction
- [x] through land users' innovation
- [ ] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [ ] through projects/ external interventions



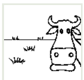
Sheep grazing in a paddock (Paul Kahiga (8444-00300 Nairobi Kenya))

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [ ] improve production
- [x] reduce, prevent, restore land degradation
- [x] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [ ] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [ ] create beneficial economic impact
- [ ] create beneficial social impact

Land use



Grazing land

- Rotational grazing

Animal type: sheep

Water supply

- [ ] rainfed
- [x] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [x] prevent land degradation
- [x] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

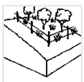
Degradation addressed

biological degradation - Bc: reduction of vegetation cover

SLM group

- rotational systems (crop rotation, fallows, shifting cultivation)

SLM measures



management measures - M2: Change of management/ intensity level

TECHNICAL DRAWING

Technical specifications

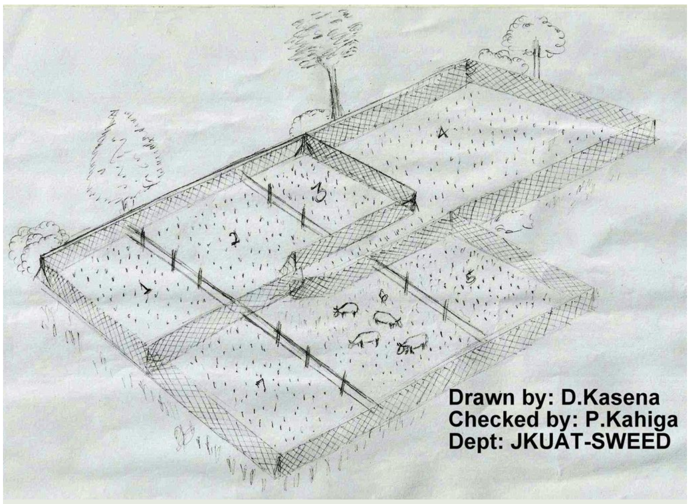
The technical drawing on the left shows a typical rotational grazing system. The animals are moved from one paddocks to the next on rotational basis.

Location: Mbeere South District. Eastern Province
Date: 30.11.2016

Technical knowledge required for field staff / advisors: low
Technical knowledge required for land users: moderate

Main technical functions: Allows for regeneration of pasture
Secondary technical functions: increase in nutrient availability (supply, recycling,...)

Change of land use practices / intensity level: Grazing in a particular paddock for sometime before moving the livestock in another paddock.
Major change in timing of activities: Rotational grazing



Author: Paul Kahiga, 8444-00300 Nairobi, Kenya

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **Kshs**
- Exchange rate (to USD): 1 USD = 100.0 Kshs
- Average wage cost of hired labour per day: 500.00

Most important factors affecting the costs

The most determining factors of this technology is labour and initial cost of constructing the paddocks and the overall maintenance.

Establishment activities

1. Fencing (Timing/ frequency: Initial stage)
2. Clearing the bushes (Timing/ frequency: Initial stage)
3. Building the watering troughs and feeding points (Timing/ frequency: initial stages)

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Kshs)	Total costs per input (Kshs)	% of costs borne by land users
Labour					
Labour	ha	1.0	250.0	250.0	100.0
Equipment					
Tools	ha	1.0	200.0	200.0	100.0
Construction material					
Nails and barbes wire	ha	1.0	100.0	100.0	100.0
Wooden post	ha	1.0	50.0	50.0	100.0
Total costs for establishment of the Technology				**600.0**	
Total costs for establishment of the Technology in USD				*6.0*	

Maintenance activities

1. Repairing of the fence (Timing/ frequency: when the livestock have moved to other paddocks)
2. Repairing the watering points and feeding troughs (Timing/ frequency: when the livestock have moved to other paddocks)
3. Moving the livestock to the subsequent paddocks (Timing/ frequency: any time of shift)

Maintenance inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Kshs)	Total costs per input (Kshs)	% of costs borne by land users
Labour					
Labour	ha	1.0	200.0	200.0	100.0
Equipment					
Tools	ha	1.0	150.0	150.0	100.0
Construction material					
Nails and barbes wire	ha	1.0	50.0	50.0	100.0
Wooden post	ha	1.0	30.0	30.0	100.0
Total costs for maintenance of the Technology				**430.0**	
Total costs for maintenance of the Technology in USD				*4.3*	

NATURAL ENVIRONMENT

Average annual rainfall

- ☐ < 250 mm
- ☐ 251-500 mm
- ☐ 501-750 mm
- ■ 751-1,000 mm

Agro-climatic zone

- ☐ humid
- ☐ sub-humid
- ☑ semi-arid
- ☐ arid

Specifications on climate

Thermal climate class: subtropics

- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Slope
- [ ] flat (0-2%)
- [ ] gentle (3-5%)
- [x] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms
- [x] plateau/plains
- [x] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [ ] valley floors

Altitude
- [ ] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [x] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in
- [ ] convex situations
- [ ] concave situations
- [ ] not relevant

Soil depth
- [ ] very shallow (0-20 cm)
- [ ] shallow (21-50 cm)
- [x] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)
- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content
- [ ] high (>3%)
- [x] medium (1-3%)
- [ ] low (<1%)

Groundwater table
- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [ ] good
- [x] medium
- [ ] poor/ none

Water quality (untreated)
- [ ] good drinking water
- [x] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to:

Is salinity a problem?
- [ ] Yes
- [ ] No

Occurrence of flooding
- [ ] Yes
- [ ] No

Species diversity
- [ ] high
- [x] medium
- [ ] low

Habitat diversity
- [ ] high
- [ ] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [ ] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income
- [ ] less than 10% of all income
- [x] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [ ] manual work
- [ ] animal traction
- [ ] mechanized/ motorized

Sedentary or nomadic
- [ ] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [x] women
- [x] men

Age
- [ ] children
- [ ] youth
- [ ] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [x] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [ ] individual, titled

Land use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

Water use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

health	poor		✓		good
education	poor		✓		good
roads and transport	poor	✓			good
financial services	poor	✓			good

IMPACTS

Socio-economic impacts

fodder production	decreased						✓		increased
fodder quality	decreased					✓			increased

animal production	decreased							✓	increased	
risk of production failure	increased					✓			decreased	

Socio-cultural impacts

food security/ self-sufficiency	reduced			✓					improved	Agricultural land used for grazing
SLM/ land degradation knowledge	reduced					✓			improved	
conflict mitigation	worsened						✓		improved	Animals are restricted and don't go to neighbours land
Improved livelihoods and human well-being	decreased						✓		increased	Farmers have benefited from enhanced animal production

Ecological impacts

soil cover	reduced						✓		improved
nutrient cycling/ recharge	decreased						✓		increased
animal diversity	decreased						✓		increased

Off-site impacts

damage on neighbours' fields	increased						✓		reduced	Animals don't stray
damage on public/ private infrastructure	increased						✓		reduced	Animals don't stray

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative						✓		very positive
Long-term returns	very negative						✓		very positive

Benefits compared with maintenance costs

Short-term returns	very negative					✓			very positive
Long-term returns	very negative						✓		very positive

CLIMATE CHANGE

-

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- ☐ single cases/ experimental
- ☐ 1-10%
- ☐ 11-50%
- ☐ > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- ☐ 0-10%
- ☐ 11-50%
- ☐ 51-90%
- ☐ 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- ☐ Yes
- ☐ No

To which changing conditions?

- ☐ climatic change/ extremes
- ☐ changing markets
- ☐ labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

Strengths: compiler's or other key resource person's view

- In rotational grazing, there is increase in forage production.
- A well-managed rotational grazing system has low pasture weed establishment, majority of niches are already filled with established forage species.
- Spreading of manure around the whole pasture land

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- In rotational grazing, there is need for more fence to be constructed Construction of temporary fences that can be moved when need arises
- More time is required to move the livestock from one paddock to the next one. Adherence to the time schedules
- In rotational grazing, there is a need to have water and access to shade from each smaller paddock. The watering points can be automated

REFERENCES

Compiler
Paul Kahiga

Editors

Reviewer
Fabian Ottiger
Donia Mühlematter
Hanspeter Liniger
Alexandra Gavilano

Date of documentation: Feb. 19, 2015

Last update: May 7, 2019

Resource persons
Paul Kahiga - SLM specialist
Mwangi Gathenya - SLM specialist
Patrick Home - SLM specialist
Timothy Chege - SLM specialist
Abamba Omwange - SLM specialist
Baobab Kimengich - SLM specialist
Jane Wamuongo - SLM specialist
Andrew Karanja - SLM specialist
Sara Namirembe - SLM specialist

Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_1741/

Linked SLM data
n.a.

Documentation was faciliated by

Institution
- International Centre for Research in Agroforestry (ICRAF) - Kenya
- Jomo Kenyatta University (Jomo Kenyatta University) - Kenya
- KARI Headquarters (KARI Headquarters) - Kenya

Project
- n.a.