Zero grazing

Uganda - Okurisiza hamwe

Stall-fed livestock production is an efficient method to produce organic fertilizers (manure) for the conservation and improvement of soil fertility.

Zero-grazing has been a common livestock (cattle and pigs) management practice in most areas of south-western Uganda due to reduced communal grazing land. In the predominantly annual cropping system communities, free grazing livestock often damage crops and are a major cause of conflict. On the other hand, farmers observe that crop yields have declined season after season. For example, the bunch of bananas has grown smaller, it has smaller fingers, and many banana stands have no fruit during much of the year. The most important ways through which croplands in Rubagano are degraded include nutrient transfer through harvest and crop residue movement and use; nutrient mining whereby continuous cultivation is done with little or no replenishment; and soil and water runoff on steep slopes. Farmers know that one of the most important ways to reverse declining soil fertility is to apply manure, but it is expensive. Therefore farmers acquired goats or pigs primarily for the provision of manure for their cropland, but also as a household income generating enterprise. In stall-fed goat or pig production, The zero-grazing unit is designed in such a way that it is well ventilated and protected from wind, rain and constant direct sunshine to avoid livestock developing coughs, colds and stress. The unit has 3 major parts: the feeding and rest area, the exercise area and the manure collection area. The feeding/rest area is raised 1 m above the ground. Below it is the manure collection area and above it, a corrugated iron roof. There is a feeding vat on each side of the feeding/rest area in which mixed fodder is fed to the livestock. A wooden food preparation slab for cutting and mixing fodder is in front of the feeding/rest area. The unit for housing 12 goats is 4 m by 8 m on the ground and 3 m high at the feeding area.
The major objective of stall-feeding is to maximize manure collection for sustaining soil fertility in cropland. Other goals are to improve household income, reduce expenditure on pests and disease management through livestock isolation from other animals and to reduce labor by cutting and storing fodder for use over a period instead of grazing in distant pastures daily.
The materials required for establishment of the zero-grazing unit for goats are wooden posts or poles, cut-off planks, wooden slats/timber, iron sheets and nails. The 4 m by 4 m feeding/rest area is raised 1 m above the ground on strong Eucalyptus or pine posts of diameter 5-10 cm. Its wall is 2 m high and is made of widely spaced cut-off planks or light wooden poles not more than 3 cm diameter nailed to strong upright posts. The floor is made of wooden slats placed 2 cm apart, big enough to allow livestock droppings to fall through but too small for adult goats' or kids' hooves pass, in order to avoid injury to livestock. There is a 1.5 m by 0.5 m feeding vat on each side of the feeding/rest area and a 1 m by 1 m fodder mixing wooden slab at the front. On the ground to one side of the feeding/rest area is the 4m by 4m exercise area. The unit can be constructed at any time of the year.
Regular maintenance of the unit is done to ensure the floor does not develop holes that can lead to injury of the livestock, and the roof does not leak when it rains. Increased manure collection and application increases crop yields and supports crop diversification.

left: View on the zero-grazing shed and fodder preparation (Photo: Charles L Malingu)
right: The fodder vats placed above the ground level and around the shed (Photo: Charles L Malingu)

Location: Uganda
Region: Mbarara District
Technology area: 0.002 km^2
Conservation measure: agronomic, vegetative, management
Stage of intervention: mitigation / reduction of land degradation
Origin: Developed externally / introduced through project, recent (<10 years ago)
Land use type:
Grazing land: Intensive grazing/ fodder production
Land use:
Grazing land: Extensive grazing land (before), Grazing land: Intensive grazing/ fodder production (after)
Climate: subhumid, tropics
WOCAT database reference: T_UGA021en
Related approach: Community Development (A_UGA014en)
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Classification

Land use problems:

- Reduction of soil organic matter content (expert's point of view)
Decline of soil fertility and decreased crop yields (land user's point of view)

Land use

Intensive grazing/ fodder production
Grazing land: Extensive grazing land (before)
Grazing land: Intensive grazing/ fodder production (after)
rainfed
intensive grazing land

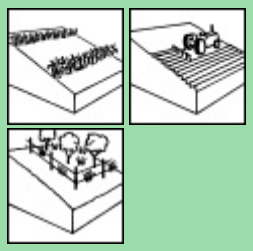
Climate

subhumid

Degradation

Chemical soil deterioration: fertility decline and reduced organic matter content,
Biological degradation: reduction of vegetation cover

Conservation measure



agronomic: Organic matter / soil fertility
vegetative: Grasses and perennial herbaceous plants
management: Change of management / intensity level

Stage of intervention

- Prevention
- Mitigation / Reduction
- Rehabilitation

Origin

- Land users initiative
- Experiments / Research
- Externally introduced: recent (<10 years ago)

Level of technical knowledge

- Agricultural advisor
- Land user

Main causes of land degradation:
Direct causes - Human induced: soil management, crop management (annual, perennial, tree/shrub), over-exploitation of vegetation for domestic use

Main technical functions:
- improvement of ground cover
- increase in organic matter
- increase in nutrient availability (supply, recycling,...)

Secondary technical functions:
- improvement of surface structure (crusting, sealing)
- promotion of vegetation species and varieties (quality, eg palatable fodder)

Environment

Natural Environment

Average annual rainfall (mm)

- > 4000 mm
- 3000-4000 mm
- 2000-3000 mm
- 1500-2000 mm
- 1000-1500 mm
- 750-1000 mm
- 500-750 mm
- 250-500 mm
- < 250 mm

Altitude (m a.s.l.)

- > 4000
- 3000-4000
- 2500-3000
- 2000-2500
- 1500-2000
- 1000-1500
- 500-1000
- 100-500
- <100

Landform

- plateau / plains
- ridges
- mountain slopes
- hill slopes
- footslopes
- valley floors

Slope (%)

- flat
- gentle
- moderate
- rolling
- hilly
- steep
- very steep

Soil depth (cm)

- 0-20
- 20-50
- 50-80
- 80-120
- >120

Growing season(s): 120 days (February to May), 90 days (September to November)
Soil texture: coarse / light (sandy)
Soil fertility: low
Topsoil organic matter: medium (1-3%)
Soil drainage/infiltration: good

Soil water storage capacity: low
Ground water table: > 50 m
Availability of surface water: poor / none
Water quality: poor drinking water
Biodiversity: low

Tolerant of climatic extremes: temperature increase, seasonal rainfall increase, seasonal rainfall decrease, heavy rainfall events (intensities and amount), droughts / dry spells
If sensitive, what modifications were made / are possible: Forage and fodder usually become scorched during seasons of long drought and livestock may die from lack of food. Grass is cut in the wet season while it is plentiful and turned into hay for the time of scarcity. For this, a barn unit needs to be constructed.

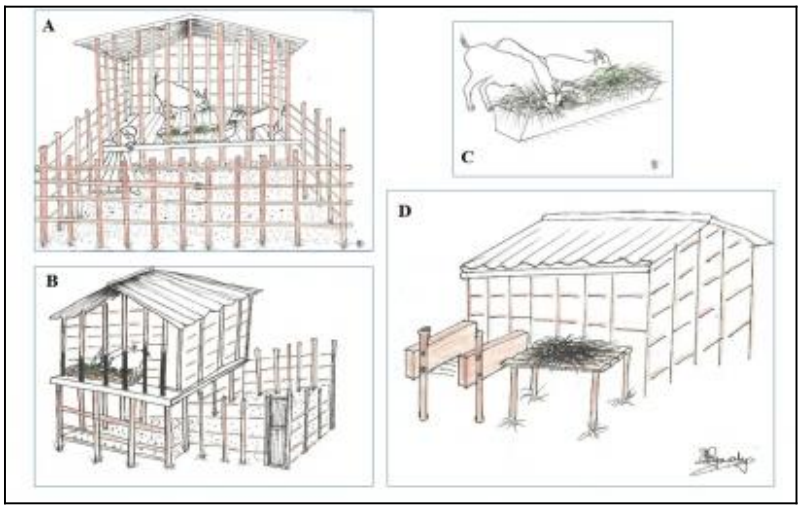
Human Environment

Grazing land per household (ha)

	<0.5
	0.5-1
	1-2
	2-5
	5-15
	15-50
	50-100
	100-500
	500-1,000
	1,000-10,000
	>10,000

Land user: Individual / household, Small scale land users, common / average land users, men and women
Population density: 100-200 persons/km2
Annual population growth: 2% - 3%
Land ownership: individual, not titled
Land use rights: individual
Water use rights: open access (unorganised) (Individual land ownership. Recent introduction of the water harvesting measures provided land owners with access to own water sources)
Relative level of wealth: average, which represents 48% of the land users; 42% of the total area is owned by average land users

Importance of off-farm income: 10-50% of all income: There is increased yield where the technology has been applied, increasing the income generated on-site thereby reducing off-farm percentage.
Access to service and infrastructure: low: drinking water and sanitation, financial services; moderate: health, education, employment (eg off-farm), energy, roads & transport; high: technical assistance, market
Market orientation:
Livestock density:



Technical drawing

Details of zero grazing shed structure : A. Overview of the livestock shed with manure colelction area (below) B. View on the feeding arrangement with the fodder vats abouve ground level C. Deatils of the fodder vat D. Overview of the fodder preparation structures (Byonabye Proscovia)

Implementation activities, inputs and costs

Establishment activities

- Purchase of tools
- Purchase of construction materials
- Construction of zero grazing shed (including vats and manura collecion area)
- Purchase of livestock
- Grass seed procurement and sowing
- Converting part of the cropland (annual and perrenial crops) into fodder production

Establishment inputs and costs per ha

Inputs	Costs (US$)	% met by land user
Labour	115.40	100%
Equipment		
- tools	115.40	100%
Construction material		
- tree poles,nails,sorghum stalk	38.46	100%
- Corrugated iron sheets	250.00	100%
Agricultural		
- Livestock (3 Does)	173.10	100%
TOTAL	**692.36**	**75.00%**

Maintenance/recurrent activities

- Cutting and carrying and application of fodder
- Collection, composting and application of manure
- Purchase of tools and materials for reconstruction/repairs of the shed structure
- Weeding and gapping

Maintenance/recurrent inputs and costs per ha per year

Inputs	Costs (US$)	% met by land user
Labour	38.46	100%
Equipment		
- tools	11.54	100%
Construction material		
- tree poles,nails,sorghum stalk	3.85	100%
- Corrugated iron sheets	0.00	100%
Agricultural		
- Livestock (3 Does)	18.00	100%
TOTAL	**71.85**	**100.00%**

Remarks:
The most determinate factors in the establishment of the technology are: labour for planting, maintaining and cutting grass and other pastures and carrying the fodder to the zero-grazing unit; labour for fetching water for the animals; and labour for removing and composting manure and spreading into the garden.
The costs were calculated for the construction of the shed, acquisition of 3 does and establishment of fodder crops on part of cropland formerly used for annual and perrenial crops. The calculations were done for the technology in August 2011.

Assessment

Impacts of the Technology

Production and socio-economic benefits

+++ increased fodder production
+++ increased fodder quality
+++ diversification of income sources
++ increased crop yield
++ increased animal production
++ increased farm income
++ increased production area
++ increased product diversification
+ reduced risk of production failure

Production and socio-economic disadvantages

++ increased labour constraints

Socio-cultural benefits

++ improved food security / self sufficiency
+ community institution strengthening
+ national institution strengthening
+ improved conservation / erosion knowledge

Socio-cultural disadvantages

Ecological benefits

++ improved soil cover
++ increased nutrient cycling recharge
++ increased soil organic matter / below ground C
++ increased / maintained habitat diversity
+ increased biomass above ground C

Ecological disadvantages

Off-site benefits

+++ reduced damage on neighbours fields

Off-site disadvantages

Contribution to human well-being / livelihoods

+++ Food security and household income have improved. This has resulted in children in these households having more time for school and in case of illness, there in some money for accessing treatment.

Benefits /costs according to land user

Benefits compared with costs	short-term:	long-term:
Establishment	negative	very positive
Maintenance / recurrent	positive	very positive

The benefits far outweigh the establishment and maintenance costs. The negative on short-term returns is due to the cost of the technology (construction and procuring livestock) which is a little high for the farmers in this area.

Acceptance / adoption:

90% of land user families (18 families; 90% of area) have implemented the technology with external material support. The does were supplied to farmers using project funds.
10% of land user families (2 families; 10% of area) have implemented the technology voluntary. these farmers are rich and procured the technology without support from the project
There is moderate trend towards (growing) spontaneous adoption of the technology. 20 households in one village have adopted the technology

Concluding statements

Strengths and → how to sustain/improve	Weaknesses and → how to overcome
Animals are fed on selected pasture → Promote the growing of that pasture	The technology may contribute to loss of vegetation → Planting pasture & other grass for feeding the animals
The technology promotes us of organic manure → Use of compost pits to recycle the wastes into manure	
Technology easy to establish and maintain → Proper management of the livestock	
Helps in soil fertility management → Good manure management	
Imporove soil cover and reduce soil erosion → using the manure in a proper /recommended way i.e. using it when planting or putting it in the plot before primary cultivation	