**The Inclusive Dairy Enterprise project Phase 2**

**Terms of Reference**

**Support to the Pasture improvement and management - 2022**

**Introduction**

TIDE-2 focuses on the following areas within the dairy value chain

1. Dairy Farm Productivity: deepening the market in knowledge, inputs and finance through quality offerings with a focus on knowledge and skills transfer and supply mechanism (T&E in coops, private dairy advisory, PDTFs, others) and sustainable forage intensification; up scaling to other commercial farming areas by following the private sector.
2. Milk Quality: deepening by introducing/supporting milk tracking & tracing for various food safety parameters and critical control point analysis in the entire supply chain; up-scaling Quality Based Milk Payment System, using a processor-led model.
3. Dairy Value Chain: deepening dairy value chain linkages through support to cooperatives and inclusive business models; up scaling by supporting more cooperatives in other districts, lobby for and support the diversification of the domestic market.
4. Nutrition: deepening the school milk and yoghurt project in SW Uganda by increasing nutritional effects and upscaling the approach outside the project area through e.g. social campaigns and collaboration with processors to enter this market.

**Dairy Farm Productivity**

TIDE-2 supports this agenda through the Units Training, Extension and Advisory (TEA) and Forage and Dairy Nutrition (FDN).

The FDN activities focus on, among other things, improved pasture management and forage crop production and preservation. This is done through technical advice for on-farm production, support to agricultural contractors or service providers for commercial silage making, demonstration of new quality forage seed varieties, and linking forage seed suppliers and research to the market.

Promotion of climate smart agricultural practices and reduced environmental footprint and reduction of GHG intensity, are cross cutting. TIDE interventions aim to increase productivity per unit of land and per animal through better farm practices, improved soil and manure management, enhanced availability of quality forages and pastures will be reduced NDF, well-balanced cow rations, suitable breeds and reduced numbers of unproductive animals. Resulting amongst others in increased resilience to cope with prolonged droughts, reduced soil degradation and mitigation of GHG emission.

**Pasture Management and Improvement on farms**

Since most dairy farmers use pasture-based production systems in SouthWestern Uganda, a correct balance between feed supply (carrying capacity) and animal demand (stocking rate) is required in natural grasslands and rangelands. Native grass species in these areas will get attention for soil restoration in addition to improved species adapted to the (local) conditions.

Currently, the FDN unit is carrying out the following activities to support the pasture management and improvement intervention.

1. Selection of lead farmers that will show case over-sowing or re-seeding natural grasslands/rangelands with grasses, legumes, shrubs or establishing tree cover to restore degraded areas, improve soil cover, increase plant density, and increase the quality and the quantity of grassland forage supply. Animal stocking rates, herd management and herd movement systems will also be demonstrated
2. Organize field days around these farms for training and knowledge sharing on the above aspects.
3. Support private sector companies to implement rangelands scaled mechanization activities for efficient use of land and labour and provide scaled machinery and technologies for smallholder farms, farmer organizations, or private service providers (e.g., commercial forage producers) that is affordable.

To do this, the project is setting up is setting up 15 demo plots on Pasture management and improvement based on the best practices in range management. These demos include several mechanized activities that requires a service provider to carry out. These activities are based on the SOPs for pasture improvement and management developed by TIDE2 ( see attached annex 1 and 11). They include;

1. Slashing / mowing of the overgrown grass/ forage
2. Top dressing with urea fertilizers for pasture re-growth
3. Spraying of the unpalatable grass using round up turbo
4. Planting of improved forages seeds for grazing (Brachiaria Basilisk) using the no till planting technology-
5. Top dressing using Urea fertilizers after the first grazing
6. Grazing management using the strip grazing technology

The unit requires the services to be able to implement the above-mentioned activities (1-5)

**Deliverables.**

1. 65 acres of grassland mowed at the 13 demo sites @ of 5 acres under the pasture maintenance approach
2. 65 acres of grassland top dressed in urea fertilizer under the pasture maintenance approach
3. 4 acres of grassland top sprayed with glyphosate and planted with improved pasture seeds using the no till planting technology, 2 demo sites @ acres
4. 4 acres of grassland top dressed in urea fertilizer under the pasture improvement approach, 2 demo sites @ 2 acres

**Annex 1**

**Benefits of Pasture Management**

The proper management of pastures will provide the farmer with the following benefits:

* As pastures are improved the availability of pasture in the dry season will increase due to an improved soil structure and root development of the improved varieties introduced.
* Excess grass grown in the rain season can be preserved as grass silage or hay.
* The quantity of supplementary forage that must be planted to cover feed requirements in the dry season will be reduced.
* A steadily improving stand of good quality grasses and legumes is achieved.
* A steadily increasing quantity of Dry Matter per acre available for grazing.
* Increased milk production per cow due to the better quality of dry matter intake by the cow.
* A reduction in the quantity of concentrates required to achieve a balanced diet in the Rumen8 ration program.
* An increase in the liters of milk produced per acre.
* The stocking rate of cows per acre can be increased.
* More cows can be kept on the farm.
* Existing land can be freed up for utilization in other agricultural activities
* A beef herd can be established that will be complimentary to the Dairy herd.
* The farmer will produce more liters of milk from his existing land.
* The farmer reduces his costs per liter and will make more profit.

**Pasture Maintenance Protocol – when can this be considered as an intervention?**

Paddocks that have a >50% coverage of quality pastures suitable for dairy cows.

**Advantages vs Other Pasture Interventions**

* High cost of seed bed preparation is avoided.
* Farmer will be motivated to protect his investment and the fencing off these treated areas will reduce the paddock size and contribute to an increased standard of Pasture allocation.
* A mixed species pasture will be established and is recommended.
* The re-establishment of the legumes such as Green and Silver Leaf Desmodium is facilitated.
* Good quality grass varieties such as the natural Brachiaria will gradually become dominant in the paddock when the pasture is grazed in a well-managed pasture rotation system combined with this Pasture maintenance protocol.

**Disadvantages**

Establishment of total paddock area to a high-quality stand of pasture will take a few years. The hard pan is not eliminated, and root penetration of the pastures is not enhanced over the total paddock area.

**Challenges**The farmer will have to ensure that a high level of management is put in place with the necessary discipline to ensure the daily pasture management routines are carried out.
Paddock sizes will have to be further reduced to ensure the required pasture rotation protocols are achieved.
The subdivision of the paddocks can be achieved by permanent fencing or by utilising Solar strip grazing kits.
Water provision must be of a high standard and the cows should not have to move more than 300 meters to get to a source of drinking water.

**Protocol for Pasture maintenance.**

This protocol assumes that a farm plan has been drawn up.

The following tasks must be implemented in this chronological order.

1. **Paddock Selection**
	1. Select a paddock that has > 50% coverage of quality pasture.
	2. The slope of the paddock must enable a tractor to be safely operated with a slasher attached. If the slope is too steep, then manual interventions will have to be carried out.
	3. The surface of the paddock must be even to ensure that a tractor mounted slasher can be operated.
	4. The paddock should be securely fenced.The farmer is encouraged to further divide the paddock into 1-acre paddocks to facilitate the required standard of pasture rotation.
	5. The selected paddock must have a source of drinking water for the cattle.
2. **Paddock preparation**

This preparation must be completed by the commencement of the rain season.
To prevent damage to the tractor and the slasher the following must be completed beforehand:

* 1. All shrubs must be removed.
	2. Excess trees must be removed.
	3. All tree stumps must be removed.
	4. Loose rocks must be removed.
	5. Un-even surfaces must be levelled.
	6. Antheaps must be removed and flattened.
	7. Brachiaria vegetative splits and Chicory seed can be utilised to establish pasture on the sites where the antheaps were removed.
	8. A supply of cool clean drinking water must be available to the cattle within the boundaries of the paddock.
	9. The farmer must be encouraged to sub divide the paddock into 1-acre paddocks to facilitate a well-managed grazing rotation schedule.
	(This can be carried out after the initial slashing of the pasture.)
1. **Slashing and Urea application**The slashing/ mowing of the paddock should be carried out just prior to the commencement of the rain season.
The Urea must be applied immediately after the onset of the first rain of the rain season.
	1. Walk through the paddock with the tractor operator to check for stumps, holes, and rocks prior to slashing. Remove or mark any that pose a risk to the tractor and slasher.
	2. Mechanically slash the areas where tractor can access.
	3. Hand mow the areas where the tractor cannot access.
	4. Normally there will not be large amounts of slashed material post the dry season.
	If however, there is a large amount of cut material, this should be removed before the urea is applied to the pasture.
	5. The tractor mounted fertiliser spreader must be calibrated correctly, as per the suppliers’ specifications at a spreading rate for urea at **50 kg per acre.**
	6. All animals must be kept out of the paddock as the urea is poisonous to animals when they ingest it in large enough quantities.
	(See annexure 1 for symptoms and treatment of Urea poisoning)
	7. Any visible spillage of urea must be collected and spread by hand. Goats and cattle that accidentally access the paddock might eat the urea and can then die from Urea poisoning.
	8. The urea will rapidly dissolve with the dew and rain and then no longer pose a danger to any animals.
2. **Spot spraying regrowth of unwanted grass species.**

Unpalatable grass species will regrow after the slashing, and they should be treated as per the “Eradication of unpalatable grass species by Spot Spraying” protocol.
 See Annexure 2

1. **Grazing of the Paddock**
	1. Grazing must only commence when the pasture has grown to 30cm average height
	2. The cows must be removed from the allocated area after 4 days or when the pasture has been grazed down to a 15cm residual.
	3. Allow regrowth to 30 cm and then put the cows in to graze again.
	4. The cows must be removed from the allocated area after 4 days or when the pasture has been grazed down to a 15cm residual.
	5. Repeat the above cycle.
2. **Preservation of excess pasture growth.**
	1. When the pasture growth exceeds the 30 cm growth height and there is sufficient pasture for the cows, then the excess pasture should be mowed and preserved as hay or grass silage.
	2. If there is excess pasture growth at the end of the rain season this must be left in place and allocated to the cows during the dry season
3. **Standing Hay for dry season**
	1. Apply 50kg Urea 4 weeks before the end of the rain season and allow pasture to grow as a standing fodder to be grazed during the dry season in combination with silage feeding.
4. **Repeat the above protocol at the onset of the following rain season.**
	1. Repeat from point number 3. (Slashing and Urea application)

**Annex 1**

**Urea Poisoning**
Predominately nervous signs observed.
These may include:

* head tremor with side-to-side twitching
* weight shifted off front feet with circling on hind feet in the one spot
* tail flicking
* eye lid twitching
* high stepping in front
* apparent blindness
* slight bloating
* licking at flank
* depression
* sternal recumbency with death often occurring in this position.

**Treatment**

The antidote for ammonia toxicity (urea poisoning) is oral dosing with vinegar if treated in the early stages of poisoning.Dosage for cattle is 600ml;
Sheep and Goats 120ml diluted with water.

**Annex 2**

**Pasture establishment – Greenfield**

Seed bed preparation followed by no-till pasture planting.

**Advantages**

Shorter timeframe than Maize Pasture protocol

The improved pasture will be available for grazing within the same rain season as establishment.
The seedbed of natural pastures will be more viable.
A mixed species pasture will establish well and is recommended.

**Disadvantages**

No cash flow offset with a cash crop.

Undesirable pasture species will reappear in the pasture if not controlled by weeding.

The fencing is normally of a lower standard allowing goats and cattle easier access during the critical early establishment phase of the pasture.
Gap filling will have to be done utilising splits.

**Protocol**

This protocol assumes that a farm plan has been drawn up.

A paddock evaluation and then a selection of the area to be established to improved pasture must be done.
This will include:

* Soil compaction testing
* Soil profiling by means of profile pits.
* Chemical Analysis Soil testing for fertiliser recommendations

Selection of pasture variety
This will be based on a paddock, soil, topography, and climate evaluation.

Clearing of Paddock
Removal of shrubs and anthills.
Removal of excess trees leaving sufficient for shade at 20m spacing between trees.

Two weeks after the onset of rain, the paddock is sprayed out with Glyphosate utilising a tractor mounted boom sprayer.
After 10 days the paddock is again sprayed out with Glyphosate to ensure effective weed control over the total area selected.

14 days post 2nd spraying, the area to be planted is cleared of excessive plant material.
This can be done with a controlled burn or by slashing. (All the necessary protocols for a controlled burn should be adhered to.)

Planting of the seed.

After the removal of the dried plant material, the pasture seed is planted with a no-till planter.
A cross stitching method with 2 passes of the planter at right angles is recommended.

Pure stand of single pasture species.
If a pure stand of Brachiaria or chicory is to be planted the planter must be set to plant 50% of the required rate per acre. This will ensure that the seed is sufficient to plant according to the cross-stitch method.

Mixed pasture of Brachiaria and Chicory.
The Brachiaria should be put into the planter and planted in one direction.
This is followed by planting the Chicory in the other direction at 90º to the Brachiaria.

Seeding rate

Single species pasture
Brachiaria - 3.5 kg per acre (Planter is set to 1.75 kg per acre for Cross stitching.)
Chicory - 3 kg per acre (Planter is set to 1.5 kg per acre for Cross stitching.)
Mixed species pasture

Brachiaria - 2 kg per acre (Planter is set to 2 kg per acre and the seed is planted in the one direction.)
Chicory - 1.5 kg per acre (Planter is set to 1.5 kg per acre and the seed is planted at a 90º direction to the Brachiaria.)

Planting depth:

Brachiaria - 10 → 15mm.
Chicory - 10 → 12mm.
Fertiliser must be applied at planting time according to the recommendations based on the soil testing results. If no soil test were conducted, then DAP should be applied at 50 kg per acre.

1 st Grazing
Grazing can only commence when the pasture passes the pull test.
The pull test is a simulated grazing action where the pasture is grasped by hand and twisted and pulled. The grass should tear off and the roots should not be disturbed with this action. If the roots are disturbed, the plant will not survive the grazing, and the paddock should not be grazed.

Pasture care and maintenance
The pasture must be kept weed free and should be weeded regularly until a full cover of the desired plant species has been established.
All natural legumes must not be weeded, and they must be left to establish themselves in the pasture.
Any intruder type grasses such as Couch Grass must be removed as soon as possible with regular weeding.
Gap filling using vegetative splits of the Brachiaria must be done after the 1st grazing.

Nitrogen applications
Two by applications of 50 kg of Urea per acre per application are highly recommended for each rain season.
Urea applications:

Short rain season
Application 1 - 50 kg per acre with the onset of the rain in March
Application 2 - 50 kg per acre immediately after rain at the end of April.

Long rain season
Application 1 - 50 kg per acre with the onset of the rain in August/September

Application 2 - 50 kg per acre immediately after rain at the end of November