

## Report on the development of 1 feeds and forages upscaling approach

### GIZ Task Force on Scaling - Scaling Case

#### CIM EXPERT

**Name:** Uwe Ohmstedt

**Center:** International Center for Tropical Agriculture (CIAT)

**Country:** Kenya

New technologies are widely developed by the industry, individual inventors and also by research centres. New technologies can be new approaches, procedures or tools describing a better or more economic way to reach out to an objective, they can be described as 'software' or 'soft skills'; technologies in the form of machines, seeds etc, they can be described as 'hardware' or a combination of the above delivering a 'hardware' combined with a 'software' describing how to use the technology to make best use of it.

CIAT and its partners developed in a long term process of selection and breeding new improved forage Hybrids and the decision to bring the uptake and use of these materials to scale in a first step in Kenya and in a second step in neighbouring countries was taken. We judge the presence of these materials as a privilege. As the large scale uptake in South America has proven the potential of these forages to make a change in livestock systems, they can create similar positive effects in East Africa. However, as the livestock systems in South America and East Africa differ a lot (large ranches versus mainly small holder farms, grazing versus semi zero to zero grazing, beef cattle versus dairy cows etc) in the end it is all about feeding livestock with high quality forage in sufficient quantities to lift the potential in productivity of livestock, especially the dairy herd.

Up to the art feeding around the year has been named in many publications as one of the main bottlenecks to increase the productivity of dairy cows and to overcome the seasonality which is still characterizing the dairy sector in Kenya. As feed accounts to 60 -70% of milk production costs, this is another strong argument for increased use of improved forages. Identifying a problem, as well as having a potential to at least mitigate it by the introduction of improved forages is only a very first step. It is always a long term process to introduce new technologies in a farming system. The mid-term objective is to familiarize dairy farmers with the existing and upcoming improved forages, to create interest, show the added value of using them and finally create a growing demand for the introduction of the improved forages in the farming systems. At the same time, the cooperation with the private seed companies has to be intensified to assure the availability, accessibility and affordability of the seeds once the demand for it has developed.

In the following we describe the chosen scaling approach.

## 1. SCALING CASE CORE DATA

<b>Name:</b>	<b>Scaling the uptake and use of improved forages by familiarizing potential users with the performance, planting, management and conservation of <i>Brachiaria</i> and <i>Panicum</i> grasses</b>
<b>Technology / Innovation:</b>	<b>Improved forages (planted livestock feed)</b>
<b>Target (people reached):</b>	<b>100.000 +</b>
<b>SDG Link (only one!):</b>	
<b>Duration:</b>	<b>2020-2022</b>
<b>Funding Requirements:</b>	<b>1.200.000 €</b>
<b>Countries:</b>	<b>Kenya +, Rwanda</b>
<b>CGIAR Lead:</b>	<b>CIAT Tropical Forages, Feeds and Forages Flagship in the Livestock CRP</b>
<b>CGIAR Partners:</b>	<b>ILRI, ICARDA</b>
<b>Other Partners:</b>	<b>SNV, Papalotla/Tropical Seeds, Advantage Crops, SaC, Heifer Int., GIZ, NARIs, farmers, farmer organizations, Dairy enterprises, hay producers</b>

## 2. EXECUTIVE SUMMARY OF SCALING CASE (1pg)

Scarcity in quantity and quality of feed is among the most limiting factors for higher productivity in livestock systems, especially in dairy.

Wide scale use of improved forage varieties can contribute substantially to improve the feeding situation. The feed sector in Kenya is characterized by relatively good feed availability within the rainy season but a scarcity in the dry season resulting in a feed gap and rising prices especially for dairy products. Drought tolerant forages can narrow the period of low forage productivity and decrease the necessary amount of conserved feed (hay, silage) for the scarcity season. The introduction of drought tolerant varieties also creates employment opportunities for youths to absorb the labor in the dry season, reducing drudgery for women and creating a more efficient system.

Another crucial aspect is the quality of feed and the influence of nutritional values on the animal wellbeing and productivity.

Improved forages with better nutritional values will also address the quality aspect of feed and thus contribute to a higher productivity of dairy cows (milk production) generating more income for women who mostly trade in milk and beef cattle (weight gain).

Despite well acknowledged feed shortage / seasonality and a growing demand for feed, the knowledge, uptake and use of improved forages is still not wide spread.

This project is designed to make improved forages better known, to create evidence of the performance of these forages under different conditions in Kenya and to promote their use at scale while the project period January 2020 to December 2022.

The project will apply measures to foster the uptake and use of improved forages by potential users, a combination of well proved and working traditional approaches (e.g. demo plots, which delivered interesting insights to farmers, raised a great deal of interest and lead to first adoption of the technologies), will be combined with innovative and user centered approaches, addressing male and female farmers with a special focus to reach the rural youth. If they are familiarized with the technology from the beginning of their farming activities this will create a strong pull effect on the adoption of these technologies. We are focusing on forages for which -through interaction with private enterprises and public partners- the supply of sufficient quantities of good quality seed will not be a bottleneck as experienced in many other forage scaling efforts.

In 2017 and 2018 preparatory steps and first efforts have been undertaken to build the enabling environment for the scaling case here presented.

In cooperation with SNV (Dutch Development Cooperation) demo plots have been established to showcase performance of different improved forages under different conditions (soil, altitude, rainfall pattern) in the regions of Meru and Eldoret. Initial participants are private farms of different sizes, an agricultural training center, a school and 2 dairy cooperatives. The plots on the one side, familiarize a limited number of farmers (projected 2017-2018 2500 farmers, but in reality ~11000 have been reached by January 2019) with the forages and allow them to choose the best options for their needs. On the other side, CIAT will widen its evidence and data base on which the scaling case and its activities can build on for extension, scaling and complementary research.

Based on these intervention, generated knowledge and lessons learned, the scaling activities of CIAT and its partners (e.g. dairy cooperatives, hay producer associations, more NGOs and NARIs) will spread out regionally to reach out to all areas in Kenya with dairy activities, as well as in the neighboring countries Tanzania, Rwanda and Uganda.

Field activities (e.g. establishment of demoplots, fielddays, participatory selection of best bet forages) will be accompanied by policy advocacy, financing advocacy and M&E activities. Production of radio emissions, extension videos and use of modern media (e.g. interactive Apps for information and data exchange) will additionally increase the outreach.

Selected accompanying studies will be undertaken within that term to backstop the effect of the interventions and support refinement of the interventions and scaling methods.

While the second year of the project CIAT's role will gradually change towards brokerage of the scaling process and we will foster the gradual uptake of the process by private sector players who have an economic interest in the development of the livestock and feed sector, dairy companies who will profit from steady milk supply, hay producers who will have a better product to sell and have an increased turnover and seed companies which profit from forage seed sales.

This will make the use of the technologies sustainable and more than 100,000 farmers (> 30% youth and female) should be reached within the project period.

### **3. DEVELOPMENT CHALLENGE TACKLED BY SCALING CASE (0,5pg)**

The demand for animal sourced food (ASF) in SSA is increasing as well as the number of livestock is. In parallel, the demand for livestock feed is increasing in terms of quantity as well as quality.

The feed situation in most of East African countries is characterized by scarcity resulting in a low productivity of livestock in general and dairy cows in special. Feed availability is one of the limiting

factors for higher productivity and at the same time for reduced greenhouse gas emissions and natural resource use per produced unit of milk and meat.

By improved availability of quality feed this central problem can be mitigated. The use of improved forages will improve the feed situation in the dairy value chain and increase the productivity and profitability. By using more drought resistant grasses the actual gap during the drought season will be shortened. The higher protein content of the grasses will increase productivity. The possibility to conserve excess production of improved forages like *Brachiaria* and *Panicum*, which is not needed for feeding while the peak production periods, as hay and silage, is offering the producers and users wider options.

#### **4. DESCRIPTION OF TECHNOLOGY / INNOVATION TO BE SCALED (1pg)**

CIAT and partners in the mid 80s collected grass germplasm in East Africa. The material was transferred to the CIAT Gene bank located in Cali, Colombia. The material has been enhanced through breeding and selection processes which resulted in very promising lines, cultivars and hybrids of *Brachiaria* and *Panicum*. *Brachiaria* and *Panicum* based forages are now planted on about 120 million ha in Brazil alone (Jank et al,2014), while about 35% of improved grasses in Colombia or over 13 million ha in Colombia, Peru, Nicaragua, Honduras and Costa Rica can be traced back to the efforts of CIAT and partners and revolutionized the livestock industry in Latin America. CIAT-bred *Brachiaria* hybrids, through partnership with the private sector, are now planted on over 800,000 ha in over 30 countries, with uptake in East Africa estimated at several thousand farmers indicating the demand for wide scale uptake.

The improved forages show several improved characteristics, like a good digestibility, high crude protein content, high water stress tolerance (depending on the variety to flooding or drought tolerance), high water and nutrient use efficiency, just to name a few.

CIAT, as well as other CG centers and partners, see a big chance to improve the feeding situation in East African Countries by the repatriation of these improved forages.

The proposed scaling case will contribute to make these forages and its additional value for its users known and scale their use. In addition to the production of forages for direct use, trainings for its conservation will complement the offer to the users and further allow them to reduce or eliminate the time of feed scarcity.

Our M&E, during the 1<sup>st</sup> half of the project, will deliver information on the cost of installation, management and calculate the overall cost/benefit ratio of the use of the technology. This will support the decision making process of the users about the integration of forages in the farming systems. The M&E data about the effectiveness and efficiency of the scaling process will inform future scaling efforts.

#### **5. ENVIRONMENT OF THE SCALING CASE (2pg)**

Livestock sector plays significant contribution to Kenya's Gross Domestic Product among other countries in Sub-Saharan Africa (SSA). The sector contributes at least 47% of the agricultural GDP with >17 million cattle alone, while the sector employs at least 50% of the agriculture labor force. In Kenya there are an estimated 1.8 m smallholder farmers (ILRI 2006), who produce about 80% of the marketed milk. The latest reports estimate the number of dairy cows at 4,2 Million (Feed quick scan, SNV 2019). With sustained population increase in SSA, that has currently hit a billion mark (World

Bank, 2017), livestock will play a bigger role to meet the estimated doubling demand for livestock products by 2050, albeit with challenges including global warming. Currently, in Africa the livestock production efficiency is low leading to high methane production per unit livestock product (meat, milk) and is associated with the unimproved poor quality forages.

In animal production, feeding alone accounts for 55–70% of the costs (Odero-Waitituh 2017). However, use of quality forages has been identified as one of the triple win solution that can contribute to improved production efficiency of animal products and enhance economic incomes while ameliorating climate change through carbon sequestration and ecosystem health. While past and current efforts have identified forages with potential to improve livestock productivity, they are not in use at scale for the benefits to be realized. For example use of *Brachiaria*, has contributed to profound improvement in beef industry in Latin America and the Caribbean with well over 100 million ha under *Brachiaria* out of 250 million ha in native and introduced pastures. Further, a profitable tropical seed production industry valued at US \$600 million annually has developed in the Cerrados of Brazil to supply *Brachiaria* and *Panicum* seeds to livestock producers in Latin America and around the world (Jank et al. 2014).

---

One of the barriers to *Brachiaria*'s (and complementary *Panicum*) wide-scale spread and impact is the often uncoordinated effort by different stakeholders. However, their activities across different regions in Kenya - and other Eastern African countries - provide fertile ground for identifying bottlenecks and developing a joint strategy for addressing them. For example, already there is – though anecdotal - evidence about a growing demand for the *Brachiaria* seed, but this comes against under-developed forage seed system in Kenya. Therefore the current seed system depends on imported seeds mostly sourced from outside the continent, resulting in high costs, exorbitant for smallholder livestock keepers.

The productivity of the dairy cows (as well as the beef cattle) are highly influenced by the feeding regime, respectively by the availability and quality of the feed. The availability and quality is highly dependent on the rainfall pattern and thus varies extremely throughout the year. The Kenyan feed market is characterized by a strong seasonality of availability of feeds and forages, which has extreme effects on the cattle's productivity. As a lot of the cattle is fed far from the optimal diet, often productivity is going down by 80% in dry season with corresponding negative effects on farmers' incomes, negative economic effects for the dairy industry which operate far below their capacities and last but not least rising prizes for milk consumers.

In addition to the seasonal fluctuation of forage availability and the corresponding fluctuation in productivity of the cattle, the knowledge about quality of forage and optimal feeding rationing is generally poor. In the scarcity periods of the year (dry season), cattle is often just kept alive and not fed with an objective of productivity.

The total availability of feeds and forages in the country is impossible to number, but it is relatively easy to calculate the need for feed and forages based on the daily need of fresh forage (50-60 kg) respectively 9-12 kg (average 10,5) dry matter (DM) per day and head of cattle, or differently expressed 2-2.5 % of the bodyweight. Taking the latest numbers for the dairy herd of 4,200,000, the yearly need for feed is 16.1 MMT DM / year. As the average hay bale weights 14 kg this translates to 1.15 Billion hay bales.

The actual situation on the feed and fodder market is dominated by scarcity throughout the year and even more so during the dry seasons. To face the scarcity, feeds and forage production has to be

intensified and offers business opportunities on different levels from small scale farmers to commercial forage producers.

CIAT (Colombia) and its partners, as well as EMBRAPA (Brazil) and others at a smaller scale have bred and selected over the years a number of improved forages which are characterized by better drought tolerance, higher nutritional values (e.g. Crude protein content, metabolizable energy content, digestibility) or tolerance to water logging and shade or others. The first 3 commercial hybrids of *Brachiaria* (Mulato 2, Cobra, Cayman) have undergone the national licensing procedures and are commercially available in Kenya since September 2016. Papalotla's local partner Advantage Crops is undertaking efforts to promote these 3 hybrids in a few East African countries, but they are not yet widely known nor planted in big numbers. Actually the registration procedures for two other hybrids with even higher tolerance to shade respectively to drought are in process.

KALRO (Kenya Agricultural and Livestock Research Organisation), BeCA-ILRI, SLU and CIAT tested in the 'Climate Smart *Brachiaria* Project' a number of *Brachiaria* cultivars (mostly EMBRAPA selections) in different agro ecological zones in Kenya. A participatory assessment by local farmers identified 4 cultivars as best bet solutions for the local use (*Brachiaria* cv Piata, *Brachiaria* cv Xaraes (syn. cv. Toledo), *Brachiaria* cv Basilisk, *Brachiaria* cv MG4).

All the *Brachiaria* named above, hybrids as well as cultivars, have promising characteristics compared to the main grasses currently in use, i.e. Napier and Rhodes Grass.

Napier is planted by many farmers in Central and Western Kenya for fresh feed and the main trade product on local level for small traders and hawkers. In relatively small quantities it is also transformed into silage but due to its structure does not qualify for haying. Challenges for Napier are 1) smut and stunt diseases – partly solved by the development by KALRO of varieties which resist at least for 3 years against infections and 2) the poor management practices. As the awareness of quality is poorly developed and most producers go for pure quantity, the bulk of traded and fed Napier is of limited nutritional value, low crude protein, low metabolisable energy and high non digestible fiber content. However seeing the pure biomass production per area unit, it is unbeaten by all other grasses.

In the dryer areas hay is produced by a growing number of farmers. The main grass used is Rhodes grass, here in Kenya either Boma or Elmba Rhodes grass. The productivity and quality of Rhodes grass depends a lot on the variety, soil fertility, rainfall patterns and cutting frequency. Productivity can range from 10 – 25 t Dry matter/ha/year. The crude protein content depends on the nitrogen availability and very strongly on the age of the grass (based on dry matter up to 17 % for very young leaves decreasing to 3% for overaged grass after flowering stage). As for the Napier, also for hay, quality aspects play a minor role and quantity is in the focus of most producers resulting in low quality hay.

In the years 2017 and 2018 CIAT's Tropical Forages Team and partners like SNV, Send a Cow, KALRO and others have undertaken the first steps to bring the use of improved forages to scale.

This project is building on the results of the 'Climate Smart *Brachiaria* Project' (KALRO, ILRI, SLU, CIAT) leading to the recommendation of 4 *Brachiaria* varieties and the national performance trials leading to 3 Hybrids of *Brachiaria* being commercialized through Advantage Crops Ltd and meanwhile a 2<sup>nd</sup> distributor, Amiran, joint. The further spread and awareness creation has now been initialized through the establishment of 30 (the initial planning of 18 was outnumbered due to growing interest in participation of farmers, dairy cooperatives, a school and an Agricultural Training center) demonstration plots with improved forages in selected locations (different agro-ecological

zones, different farm sizes) in Central Kenya and further engagement with development partners (GIZ, Send a Cow) to set up on-farm trials in a few selected counties.

In 2017 CIAT's Tropical Forages and SNV's Kenya Market-led Dairy Programme (KMDP) agreed to joint efforts to make improved forages more known to farmers in Central Kenya and started to install up to 18 demonstration plots in different agro ecological zones in cooperation with farms of different sizes.

The chosen varieties for these demonstration plots are Brachiaria hybrids commercially available in Kenya, Brachiaria cultivars selected by the 'Climate Smart Brachiaria Project', selected Panicum varieties and two legumes:

3 Brachiaria Hybrids (Mulato 2, Cayman, Cobra)

4 Brachiaria cv (Piata, Xaraes, Basilisk, MG4)

3 Panicum (Tanzania, Mombassa, Massai)

2 Legumes (Vetch, Desmodium)

Depending on the availability of land and the agro ecological conditions, farmers and KMDP staff have chosen the varieties and defined plot sizes. In the Meru Area, the planted area though vary between 50 sqm and 800 sqm per variety. The number of different forages planted also vary from farm to farm.

In the Eldoret Area, where we are working with larger farms, the demo plots have been arranged in a way that harvesting with machines can also be tested.

Contractual arrangements have been established to define the roles of the three parties (CIAT, SNV and the farmers) to create ownership on the farmers' side.

Through the installation of the demonstration plots the farmers will familiarize with the improved forages, learn about their performance, planting, management and the conservation. In a first step these demonstration plots have been installed on farmers' land at the beginning of the rainy season in March 2018. For the planting of the first demo plots, farmers and staff of SNV's KMDP received an on the job training on planting the plots with the different varieties and how to manage them.

The demonstration plots will not only serve the farmers to familiarize with the improved varieties but also allow them to choose the best performing varieties for planting in larger scale. Peer consulting with other farmers and field days organized by CIAT, KMDP and partners will make the forages and their performance better known and increase the uptake in the different farming communities.

The demo plots will be monitored and data taken to provide a solid information base for further uptake by other farmers (M&E). The collected data will include ground coverage, height of the forages, production of organic material and general performance on site. Beside this quantitative assessment of the performance of the planted forages, samples will be taken of the harvested forages and analyzed in a laboratory for their nutritional value. The main elements of the analysis will be crude protein content, metabolisable energy content and the digestibility of the material. These data collected will increase the data base on the forages and feed into cost benefit analysis and help (at least the more commercial oriented) farmers in the choice of the right forage aligning with their needs and farm conditions. The data will also feed in the factsheets and awareness campaigns.

Extension material will be developed. In a first activity 10 factsheets on the improved forages (Brachiaria and Panicum) have been developed, additionally one on Special Operation Procedures (SOP) concerning the establishment and management of forages. More factsheets are planned on other Forages, Legumes and Conservation (Hay making, silage making, etc). The awareness and information campaign will be reinforced by the production of radio emissions, extension videos and field days.

In the next step we will address agricultural training centers and colleges for the establishment of demo plots and try to integrate the production of improved forages in their training curricula.

In the rainy season 2018, up to end of May, 27 demo plots have been established in Meru county and 3 in Eldoret county. The majority was established on farmers' land but also 2 on land of dairy cooperatives which represent 1800 respectively 2700 farmers. 1 demo plot was planted in an Agricultural Training Center which attracts in its Farmer Field days in average 3000 farmers.

Ongoing activities till the beginning of the scaling case:

- Training of farmers and development partners' staff in establishment and management of the plots.
- Data collection, peer consulting to other farmers, participatory selection of best bet forages meeting the needs of the individual farmer, field days, development of extension material, checking of possibilities of use of new media.
- Increase the number of demo plots in other areas to achieve a better coverage of the other areas and including of agricultural training centers and colleges to introduce forage cultivation and use in the training curricula.
- Strengthening relations between stakeholders in exchange platforms (e.g. roundtables)

Partners: farmers, SNV, CIAT, Papalotla, SaC, GIZ

## **6. EXPLANATION OF SCALING MECHANISM AND TARGET NUMBERS (4pg)**

The scaling will start from the beginning of the 3 years project period and build on the activities of the previous years and data collected within that time (described above), data from projects like the 'Climate smart Brachiaria Project' and experiences of farmers on the performance of the improved forages made within the years before.

This scaling case will build on the improved forages, enhanced through breeding and selection by CIAT and its partners over the last years. Large scale use of the grasses in South America show the maturity of the technology for introduction in scale also for Eastern Africa. Experiences since the establishment of the demoplots are very positive, farmers show lively interest in the technology and we register a growing demand for seeds.

On the supply side we can build on the in Kenya already registered Brachiaria Hybrids from our private sector partner Papalotla. After the signature of a long term contract for 20 years between Papalotla and CIAT with strong commitment to Africa, both partners have declared their willingness to develop the uptake in scale of the improved forages in the region. We will capitalize on existing (e.g. Kenya) and evolving licensee partners partners of Papalotla in the region, several of the technologies already being registered and several to be approved by local authorities (e.g. KEPHIS) in 2019, thus ready for scaling before the start of the proposed project



As it is evident that a large scale and sustainable implementation of new technological innovation in agriculture needs partners on different levels and from different socioeconomic background. CIAT will integrate these partners from the very beginning. This will integrate state institutions like the Ministry of Agriculture, the national research institutes e.g. KALRO in Kenya and KEPHIS (Kenya Plant Health Inspection Service), but also Development partners and NGOs which have established trust and well functioning networks in the rural communities over decades . Even important is the integration of the private sector. CIAT signed in October 2018 a longterm contract with Papalotla, a Mexico based seed company and is working closely with it's local representative Advantage crops to improve seed provision in Kenya. Meanwhile a second commercial partner for seed provision has joined with ,Amiran', a well established agricultural input supplier.

On the 'user side', hay producer Associations (e.g. Rift Valley Hay growers association, Laikipia Hay Growers Association), Dairy companies (e.g. Mount Kenya Dairy company etc) , Seed companies and their networks of hay producers, dairy farmers (pure dairy farmers, mixed dairy-crop farmers), feed traders and seed customers will be addressed by information campaigns (demo plots, field days, radio emissions, new media etc.) A growing number of extensionists and trainers will be trained to achieve big outreach and uptake of the improved forages.

We also will address agricultural training centres and colleges for the establishment of demo plots and try to integrate the production of improved forages in their training curricula, which will disseminate the comprehensive knowledge on forage to the generation of the upcoming agricultural professionals and rural youth. In this way we tend to reach the next generation of young farmers, female as well as male, which will know about the positive influence of planting and using forages not only on the productivity of the livestock, but also on erosion control, conservation of soil fertility, carbon sequestration and a whole range of business opportunities around forage production.

For the sustainable implementation of the project we will partner with different institutions like development agencies (e.g. GIZ, SNV), NGOs (e.g. Send a Cow, Heifer International), National Agricultural Research Institutes (e.g. KALRO) and farmer organisations. All these partners will not only play an important role in the implementation but will serve as knowledge hubs.

We will work on innovative and user centered approaches while still connecting these with more traditional (but working) approaches such as demonstration plots, field days etc which raise a great deal of interest and do lead to adoption

Traditional approaches as demonstration plots. field days, peer consulting from farmer to farmer and participatory assessment of the forages will still play an important role to familiarize farmers to the improved forages. As needs of farmers vary, as also the agroecological conditions of the farms, this opens opportunities to chose the forage(s) which best match with the farmers conditions and needs. Depending on the areas and countries ,farm radio' programs and ,farm TV emissioons' will be used to reach the rural farming community, while in other areas and countries the reach out will be more effective by ICT.

These activities will gradually be scaled to all the ,dairy areas' in Kenya from the very beginning of the project. Kenya with its well developed dairy sector will be the focus of all activities. In the 2nd half of the project they will be rolled out to Rwanda. These ,traditional approaches' have been described under point 5.

Innovative approaches (ICT) will be used for spreading information, reaching out to a huge number of potential users, to get feedback on the number of users, but also to collect data and receiving feedback.

We will link up with IT start ups in Kenya (a center of this kind of approaches, e.g. 'Icow') as well as with established Communication companies like Safaricom , which recently launched ,DigiFarm'. There are already many apps ,in the market' with agricultural content and many more will follow most likely. CIAT established first contacts with operationg companies to prospect possibilities of either establishing an ,own' forages app or if it would be more promising to join ,established apps' with e.g. dairy content. The coverage with smart phone in Kenya is already very high, more than 50 % of the population is meanwhile using smart phones for payments of goods and bills and seeing the dynamic in this sector, smartphone use will further increase.

Social media is another ,innovative' approach which is intensively used to interact within groups of dairy farmers, hay producers, members of cooperatives etc. Using e.g whatsapp will open new windows for scaling our technologies and create outreach which is hardly achievable with the traditional approaches.

Somewhere in between innovative and traditional approches are located agricultural emissions / shows in radio and tv. These shows are very popular and reach a wide puplic not only in rural areas but also in semiurban and urban areas, as links to agriculture are still strong in the urban population. As these urbanised people building up growing wealth, they are a interesting source for funding and investment in agricultural modernisation.

All these more user centered approaches will be accompanied by engagement in Policy advocacy for forages, positioning of forages as a cash crop to ease access to finances for the establishment of forages, processing and storage, capacity development, knowledge collection. One of the forums to address the policy advocacy will be the recently initiated 'Brachiaria Roundtable' and the 'National Fodder Conference' being first time organized in December 2017. Training of selected (rural) banks in agricultural literacy, especially about the aspects and chances of forage production could be a way to create access of forage producers to financial services. M&E will have a crucial role and deliver data for the accompanying studies.

For the sustainable anchorage of the improved forages in the farming systems of the target countries and beyond, CIAT will change gradually its role while the progress of the project towards a broker's role

- Collecting data, process them and make them available to the different stakeholders.
- 'Translate the different languages' of the stakeholder to create a common understanding of roles and interests.
- Moderate the exchange process between the stakeholders.
- Policy advocacy
- Improvement of 'agricultural literacy' in financial institutes and on potential investors side

and foster the gradual uptake of the process by private sector players who have an economic interest in the development of the livestock and feed sector, dairy companies who will profit from steady milk supply, hay producers who will have a better product to sell and have an increased turnover and seed companies which profit from forage seed sales.

Planned activities:

- Training of farmers and development partners' staff in establishment and management of the plots.
- Data collection, peer consulting to other farmers, field days, development of extension material,

- check possibilities of use of new media
- establishment of a 'forage homepage' with key information, links to the app(s), CIAT's Tropical Forages, facebook groups, seed sources etc
- Development of a 'forages app' with key information on performance, establishment, management and conservation of improved forages or selection of established apps (e.g. on dairy) to feed in content.
- 'Agricultural Literacy' sessions on forages to inform banks about business options related to forages and though ease access to finance for forage investments
- Policy advocacy on national and county level, e.g. by exchange forums like the Brachiaria round table.
- Increase the number of demo plots in other areas to achieve a better coverage of the other areas and including of agricultural training centers and colleges to introduce forage cultivation and use in the training curricula.
- Out scaling of activities to RW together with ILRI, NARIs and NGOs
- Integration of Dairy enterprises and their 'substructures' like milk collection networks and milk producer networks in the project activities. (1. Information visits in the dairy companies / presentation of the idea/project 2. same in the substructures 3. Establishment of demo plots in / near the substructure 4. Field days and sensitization of the dairy farmers and the dairy farmer 'representation' / association about the advantages and chances of forage production)
- Integration of seed companies in the activities.
- Activities towards improved seed availability of the selected varieties together with seed companies, NARI and regulating bodies (e.g. for Kenya KEPHIS).
- Integration of other potential interested stakeholders like hay producer associations or dairy farmer associations.

For the better understanding on the effectiveness and efficiency of our approach and to get a critical feedback on the scaling case we will commission 5 accompanying studies, which will deliver additional information and support steering processes within the project.

Accompanying studies, proposed:

- Adoption factor study(ies): why are people adopting or not, who is adopting, what has to be done in order to make people adopt (strategy development)
- Studies on the effectiveness, efficiency and sustainability of our proposed scaling approach (lessons learned)
- Gender studies: What role do women and young people have in adoption processes? What implication does adoption have on gender roles, gender income, gender possibilities?
- What other social and economic impacts does the adoption at such scale come with?
- Economic analysis: provide cost-benefit analysis with the technological packages suggested.

### **Calculation of outreach objectives**

September 2017 – January 2019, objective 2500

This is the period from the establishment of the partnership between CIAT and SNV till the end of the contract of the responsible IF(UweOhmstedt). The outreach objective of 2500 persons is stated in the contract of the IF. This objective will clearly be passed. Based on the number of members of the 2 dairy enterprises participating in the demo plot activities (1800 and 2700 members) and the average number of visitors at the field days of the Agricultural Training Center (3000 visitors) plus an

average of peer contacts (10 per plot, a conservative estimation), we expect to reach 7750 farmers in the first phase.

2019

The activities of the above described period will go on and build on the established partnerships and activities. This year will be used to make the forages more known, intensify existing partnerships and build new ones. As we register growing interest from user side and efforts from supply side to improve seed availability we expect to add at least 5000 new users, all depending on the availability of the necessary funds.

### **Scaling case, January 2020 – December 2022 objective 100.000 +**

The start of the project will still be dominated by direct interventions. In addition to CIAT more partners will be integrated in the activities which will go along with their intensification, dissemination and the activities per se will to be scaled to other regions and neighboring countries as described above

By the integration of commercially interested companies, mainly dairy enterprises and seed companies it should be possible to widen the outreach and as such, scale the uptake of improved forages by 100,000+ persons. This represents about 10 % of 1,000,000 (minimum figure) persons involved in dairy production in Kenya. The people reached in the neighboring countries by the scaling case actually play the role of a security margin if opposite to expectation, the numbers would not be reached in Kenya

### **Gender Strategy**

The need for improved forage varieties that meet climatic challenges and livelihood needs of farmers cannot be overstated. Having drought tolerant forage varieties to meet the demand in the dry season, will open up job opportunities and income generation for youths and reduce drudgery for women, who are often the ones accounting responsible for feeding of the dairy cow in small scale farms. The importance of having good quality and enough forages for increased milk production cannot be overemphasised. Scaling up the use of improved drought-tolerant forages requires a reach and benefits approach for youths and women within the two project countries.

### **Reach and benefit approach**

Women who are the primary producers of forages still have limited access to these improved varieties, capital and other agronomic technologies which hamper their productivity. Also, milk production of dairy cows is low as a result of near absence of forage production in the dry season. Youths and women will be integrated into demonstrations plots and chosen amongst those who have to select the best performing varieties. These will be done to create awareness and build the knowledge of women and youths in forage management to influence adoption. To successfully scale out these technologies, ongoing public and private collaborations will be strengthened to contribute to more job opportunities, capital and technologies which women and youths have limited access to meet the national, regional and international demand for forages.

Women will be provided with seeds in small packs which are more affordable and accessible, to increase productivity, especially in the dry season. Thus, women will be able to generate more income from these activities, and their households will get better health and nutrition from the proceeds of the sale of forages or milk. Upscaling improved forages could also provide job opportunities for youths as seed multipliers or trainers of trainees for women multiplier, to increase

seed availability and subsequent productivity at the farm level. Youths as potential Information Communications and Technology (ICT) gurus in Africa can also provide ICT based agronomy, mechanisation, post-harvest services to farmers along the forage value chains in the different countries at an affordable rate.

Women and youth will have opportunities in feed processing and forage-seed production. We also need to understand how technology changes affect gender relations. Once a technology becomes more commercially oriented, gender roles may be affected, resulting in unexpected or undesirable effects. The do no harm approach has to be taken into considerations.

## **7. IMPLEMENTATION PLAN (1pg)**

The implementation steps are described in 6. Additionally please see the Implementation plan in the attached Gantt chart

---

## **8. REPLICABILITY (1pg)**

The activities started in Kenya in the Meru and Eldoret area and will be extended in the next season to other areas. They are based on knowledge creation about the improved forages and on trust building, meaning the users of the technology can see themselves how the varieties perform and choose the best bet matching with their needs.

This is not rocket science and the simple measures applied can be easily applied in other regions of Kenya and neighboring countries. The remaining challenge is to create the legal framework that builds the basis for large scale access to seeds by commercial availability in Kenya and surrounding countries. If the ongoing efforts materialize as planned actually, this challenge should be overcome till the start of the project and will not be a bottleneck any more.

By documentation of the process of introduction and the performance of the forages under different conditions, as well as the lessons learnt, accompanied by information and extension material (based on generated data) it will be easy replicable and support out-scaling. All will depend on the willingness of potential scaling partners and the availability of funds to support the activities.

## **9. RISK ASSESSMENT (1pg)**

A limiting factor is still the seed availability of all options indicates. Up to now only the Brachiaria Hybrids, Vetch and Desmodium are commercially available in Kenya. The Brachiaria cv and Panicum cv have been imported under research permission and are actually only available through research organizations as KALRO, ILRI, ICIPE and CIAT. KALRO has started the licensing process for the Brachiaria cv in a shortened procedure, as there is plenty of data available from the 'Climate smart Brachiaria project' and the licensing should be done by mid of 2019.

Tropical Seeds / Advantage crops have started the licensing process for one additional Brachiaria Hybrids, as well as for Panicum cv Mombassa. The process of registration should be completed by June 2019, and seed be commercially available in the second half of 2016.

The availability of seeds in Rwanda is also critical and has to be addressed.

How eventual gaps till commercial availability can be bridged through research centers has to be examined.

Another risk are unpredictable weather extremes, especially changes in rainfall patterns which cause either droughts or flooding.

Furthermore the willingness of dairy companies to cooperate is not yet clear, as the contacts are planned to be established from 2019 on, but we are optimistic to convince the dairy companies and other potential partners about the chances that go along with use of new forage varieties, based on the data from the ongoing activities and rising demand from the environment of our demo plots.

Overall success probability: 4,5

## **10. MONITORING AND EVALUATION (1pg)**

All activities are documented by the field assistant and the implementation partners in cooperation with the involved farmers, channeled through the farmer cooperatives which will send the data every 3 months to the project responsible.

The data will be registered on tablets using ODK and processed by a qualified staff of CIAT office Nairobi.

That allows to follow progress towards the project objectives and delivers information necessary for steering.

The data recorded will compile:

Partners involved

Farmers participating (male, female, youth), farm location and contact

Adoption rates by participants

Surface of planted forage (sqm of the different varieties)

Performance of the different forages (germination, soil coverage, height, harvest date, production and quality of produced forage (received by lab analysis))

5 Accompanying studies will deliver information on different aspects of the scaling case.

## **11. LEARNINGS (1pg)**

Accompanying studies, proposed:

- Adoption factor study(ies): why are people adopting or not, who is adopting, what has to be done in order to make people adopt (strategy development)
- Studies on the effectiveness, efficiency and sustainability of our proposed scaling approach (lessons learned)
- Gender studies: What role do women and young people have in adoption processes? What implication does adoption have on gender roles, gender income, gender possibilities?
- What other social and economic impacts does the adoption at such scale come with?
- Economic analysis: provide cost-benefit analysis with the technological packages suggested

A paper on the scaling case will be written and presented in CIAT to share experiences made and lessons learnt to support further scaling in the center. In a second step the paper will be published in

