

# **Good Practices in Fodder and Fodder Seed Production and Marketing for Increased Private Sector Investment**

**Proceedings of a Regional Workshop Organized by ICPALD/IGAD and  
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# **Executive Summary**

## ***Introduction***

Livestock production supports livelihoods of millions of people in IGAD region whose life depends on livestock in one way or another. Livestock contribute about 57% of the agricultural gross domestic product (GDP) and about 10-20% of the overall GDP in the region. However, the sustainable development of livestock sector is seriously impacted in most countries of the region mainly by the perennial challenge of fodder scarcity. Inadequate quantity and quality of feeds is the major constraint affecting livestock production and productivity.

ICPALD has been very keen to address the fodder scarcity problem and intervene through a series of regional events as well as through formation of a regional fodder and rangeland platform. This regional workshop was organized to contribute to increased investment by the private sector in improved fodder and fodder seeds in IGAD member states. It brought together private sector actors who are known to invest or potentially can invest on production and marketing of fodder and fodder seed as well as some development workers from the member states. The overall objective the workshop was to provide a conducive environment for sharing some practical lessons on good practices on fodder and fodder seed production and marketing with selected private sector actors that are either currently engaged or have the potential to invest in forage and forage seed business in the IGAD member countries.

## ***Methodology***

The workshop created a forum for sharing best practices from the different countries, discussing gaps and challenges and to recommend a road map for increased investment in fodder and fodder seed business by the private sector. Regional and global experiences in fodder and fodder seed production and marketing were presented by the facilitator, which was followed by presentations of best practices from the different member states by private sector participants. The program included power point presentations, participatory discussion and experience sharing, plenary discussions, and a field visit to one of the private farms in Nakuru county of Kenya to observe the fodder and fodder seed production and utilization practices of the farm. The event was concluded with a rap up discussion to formulate recommendations for the way forward.

## ***Brief highlights of presentations***

The presentations highlighted an overview of the potentials, opportunities and challenges of livestock production in the IGAD region with particular emphasis on fodder and fodder seed production and marketing, including some regional and global examples of good practices. In general, the region is characterized by shortage of livestock feed supply. The available feed supply is dominated by poor quality feeds, which are inefficiently utilized. In addition to the expert review of regional and global experiences and good practices, both the small scale and large scale fodder and fodder seed producers in the IGAD member states also presented their

experiences, practices, challenges and perspectives for further development. These included the fodder and fodder seed production and marketing experiences of Kulmiye multipurpose cooperative and Eden Field Agri-Seed Enterprise from Ethiopia; DAL Integrated Dairy Farm and Alarak International Enterprise Fodder Production from Sudan; Kazo Dryland Husbandry Agro Pastoralists Association (KADHAPA) from Uganda; Kavatini Pasture and Livestock Improvement Group and Kerio Valley Development Authority from Kenya; and the Somali Agricultural Technical Group (SATG) from Somalia. The presentations showed the current fodder and fodder seed production situation as well as the challenges and opportunities.

### ***Summary of good practices and lessons***

There is increased private sector (including private entrepreneurs, farmers or pastoral cooperatives, youth groups, and individual smallholder farmers or pastoralists) interest and engagement in forage and forage seed production and marketing. At the same time, there is increasing engagement of research and development organizations in providing technical support and conducting adoption studies.

There are good examples fodder conservation as hay or silage from Kenya, Sudan, Ethiopia and Uganda. Production of fodder tree leaf meal such as *Leucaena leucocephala* leaf meal is another possibility of conserving forage for dry season. Forage legumes leaf meals are rich in protein and could be used as a component of concentrate mixture, fully or partly replacing oilseed meals.

Forage and livestock development interventions Sudan was based on prior assessment of the livestock and feed resources base and identification of gaps in feed supply. In order to address the feed gap, Sudan encouraged engagement of large scale private companies in irrigated high quality fodder production such as sorghum and alfalfa using both surface and center pivot irrigation. Moreover, the irrigated fodder production schemes are undertaken in the desert part of the country without affecting the land used by the pastoral communities.

The irrigated commercial fodder production scheme in Sudan is based on the notion that agriculture and animal production are promising areas of investment and fodder is produced both for export and local supply augmented with value addition through processing (drying, baling, pelleting etc.).

Some countries such as Sudan and Uganda have better incentive packages (e.g., facilitation of land lease at nominal fee, facilitation of bank loan and tax exemption) to encourage private sector investment in fodder and fodder seed production.

### ***Key recommendations***

The recommendations were categorized under three major categories viz. scaling up of the good practices, capacity building and strengthening of the regional range and forage platform.

#### **Scaling up**

- Good practices and experience sharing visits have to be documented so that others can learn the good practices being practiced elsewhere in the region.

- ICPALD/IGAD should open dialogue with the African Development Bank and make efforts to convince the Bank to support developments efforts in livestock feed sector in the region.
- Forage species options should be diversified and overreliance on single species (e.g. Rhodes grass) should be avoided.
- The impact of taxation on the development of the livestock and fodder sector in the region should be critically assessed and addressed at policy level in each member state.
- It is important to engage the policy makers for the purposes of enhancing sound policy formulation and implementation.

#### Capacity building

- Capacity building gaps varies from country to country and needs to context specific.
- Appropriate awareness creation and/or training should be given to the actors involved in the fodder and fodder seed sector including the government extension and regulatory bodies, smallholder farmers, cooperatives and the private sector actors engaged in livestock and/or fodder/fodder seed production and marketing.
- Strengthen capacity of the extension system for supporting the private sector. The extension system should be strengthened in terms of human (number, experience and technical knowledge and skills) and physical resources (facilities) to be in a position to effectively support smallholders as well as the private sector.
- The private sector should consider building own extension capacity and should work closely the public research and extension system.
- In the face of recurrent droughts affecting the region with huge negative impacts, it is imperative that all member states consider enhancing development of capacity for establishing feed reserves at strategic locations.
- The private sector actors should consider engaging and capacitating out growers to increase seed availability and forage production.

#### Strengthening regional platform

- The Regional range and fodder platform is necessary for sharing lessons, experiences and challenges; and for advocating for change of unfavorable policies that may hamper development of the livestock and fodder sector in the region.
- Proposals should be prepared by a selected group of experts drawn from the region to mobilize resources to support activities of the platform.
- The experts, responsible government agencies and development partners in each member state should look for funds to support establishment of a national platform in each member state.
- It is necessary to harmonize policies so that countries can collaborate in cross border trade and livestock movement.
- The country platforms should be linked to the regional platform.

# **1. Introduction**

## ***1.1. Background and Rationale***

Agriculture is the major economic driver in Intergovernmental Agency on Development (IGAD) region, with livestock contributing about 57% of the agricultural gross domestic product (GDP) and about 10-20% of the overall GDP. A major proportion of the IGAD region falls in the arid areas characterized by highly variable rainfall that is not suitable for crop production where livestock production would be a more viable form of land use. Considering the above fact and the high global demand for livestock and livestock products, livestock is expected to be the largest contributor to agriculture in the region. In most countries of the region, the sustainable development of livestock sector is seriously impacted, among other factors, by the perennial challenge of fodder scarcity which in some cases results in conflict over grazing lands among pastoral communities. Changing land use patterns, erratic rainfall and declining grazing lands are among the factors that caused that scarcity. Many reports and studies have shown that the main constraint to livestock productivity and profitability is inadequate quantity and quality of feeds. For instance, live animals and meat exports from IGAD member states to the Middle East and North Africa (MENA) countries usually fluctuates due to several challenges such as diseases and lack of feed among others. Feed inadequacy in terms of quantity and quality has negatively impacted the trade in livestock and livestock products as well as the livelihoods of many livestock producers. A good example is animals are dying due to mainly lack of feed and water during the frequent drought facing the countries in the region

Good practices on fodder production and marketing or fodder value chain have been documented in many parts of the globe including in the IGAD region by many actors and development practitioners. On the other hand, there is a high demand for fodder in the domestic, regional and international markets. Typical examples of regional and international demand for feed include the high demand of for feed by the export quarantines in Djibouti and Somalia as well as in the MENA countries. ICPALD since its establishment has been very keen to address, among others, the issue of fodder scarcity and intervene through a series of regional events as well as through formation of a regional fodder and rangeland platform. The main objective of establishing the platform was to compile and share lessons and good practices on fodder/range and to technically support member states in up scaling proven fodder/range interventions.

Against this background, this regional workshop was organized by ICPALD and jointly supported by the RISP3 and Vet-Gov projects and is meant to contribute to increased investment by the private sector in improved fodder and fodder seeds in IGAD member states. One of the ways of making this practical is to bring together actors from private sector within member states

who are known to invest or potentially can invest on production and marketing of fodder and fodder seed.

### ***1.2. Objectives of the Workshop***

This regional workshop was organized and conducted with the overall objective of providing conducive environment for sharing some practical lessons on good practices on fodder and fodder seed production and marketing with selected private sector actors that are either currently engaged or have the potential to invest in forage and forage seed business in IGAD countries, with the following specific objectives.

- i. To contribute to the regional learning exchange initiated by ICPALD
- ii. To promote selected good practices with a potential for up-scaling and large scale production of improved fodder and fodder seed;
- iii. To gain better understanding of the current status of the private sector involvement/investment in the field of fodder/seed production and marketing and livestock development;
- iv. To stimulate debate about the factors that may hinder adoption and/or enhance the success of adoption including policy issues and incentives on fodder investment

## **2. Methodology**

The workshop brought together various categories of participants from IGAD member states including the private sector that are currently engaged in forage and/or forage seed business or have the potential to do so in the near future, representatives of government livestock extension staff and development partners as well as ICPALD staff. It created a forum for sharing best practices from the different countries, discussing gaps and challenges and to recommend a road map for increased investment in fodder and fodder seed business by the private sector. Regional and global experiences in fodder and fodder seed production and marketing were presented by the facilitators, which was followed by presentations of best practices from the different member states by private sector participants. Overall, the methodology included power point presentations, participatory discussion and experience sharing, plenary discussions, and field visit. The event included a field visit to one of the private farms in Nakuru county of Kenya to observe the fodder and fodder seed production and utilization practices of the farm. The event was concluded with a rap up discussion to formulate recommendations and chart the way forward.



### **3. Presentations - Regional Workshop on Fodder and Fodder Seed**

#### ***3.1. Opening remarks***

On behalf of ICPALD Director, Dr Osman Babikir, Head of Socio-economics and Policy welcomed the participants to this important workshop, thanked them for their participation and emphasized its importance in the context of feed insecurity as main constraint to a productive and profitable livestock sector in the region. Official opening was made by Mr. Fredrick Aloo on behalf of the Chief of Range Resource Development Division, Kenya. He emphasized the importance of good practices on improved fodder and fodder seed production and marketing for increased private sector investment. He recognized the role of stakeholder participation and involvement at grass- root level. He also highlighted that the current drought has resulted in high livestock mortalities mainly due to scarcity of livestock feeds. He noted that the private sector should be encouraged to invest in fodder production in order to market both the fodder and the seeds. Demand for fodder seed in quite high.

#### ***3.2. Highlights of the Rationale and Objectives of the workshop***

Dr Osman Babikir made a presentation on the rational and objectives of the workshop. In his presentation Dr Osman emphasized the existing mismatch between demand and supply of feed in the IGAD region and that feed inadequacy in terms of volume and quality has negatively impacted the traded livestock and livelihoods of livestock keepers. In an effort to address these problems ICPALD compiled feed interventions and established the regional fodder and rangeland platform. Accordingly, the current workshop is a follow-up of the fodder platform that was meant to support or complement/reinforce the efforts of the regional governments in fodder development. Dr Osman indicated that the workshop will contribute to two results areas of two regional programs (RISP3 and Vet-Gov) implemented by ICPALD. He also highlighted the overall and specific objectives of the workshop, expected results and methodologies and modalities to be followed during the workshop.

### ***3.3. Fodder Promotion for Increased Private Sector Investment: Good Practices on Fodder and Fodder Seed Production and Marketing***

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#### **Importance of livestock in the IGAD region**

Livestock production significantly contributes to the livelihoods of millions of people of in the IGAD region. It serves as means of employment, sources of income, source of nutritious food (meat, milk, eggs etc.) and important inputs in crop production (draught power, manure and cash income for purchase of various inputs). Animals, esp. equine and camels, serve as very important means of transport in rural areas. The manure for livestock can be used to improve soil fertility for crop production and dried dung and biogas can be used as source of fuel for rural communities. In addition, livestock play important social functions and can be used as a means of saving and security. Livestock production also makes significant contributions to the national economies of the countries in the IGAD region as they contribute about 57% to the agricultural GDP and 10-20% to the overall GDP on average in the region. They also contribute to the export earnings of the countries and as sources of industrial raw materials. On a global scale, livestock production enables the utilization of over 60% the land surface (the rangelands), which cannot be effectively utilized otherwise. In addition, in mixed crop-livestock production systems, integration of livestock production into the system enables the use of over 50% of the plant biomass (crop residues), which cannot be directly used by humans and convert them into highly valuable products and increase the resource utilization efficiency of the overall system.

#### **Livestock production potentials, opportunities and challenges**

The IGAD region is endowed with high livestock population, diverse animal and plant genetic resources, diverse agro-ecologies and different livestock production systems suited to the different agro-ecologies. There is a potential for expansion of crossbred dairy cattle production in cooler highlands and a potential for stratified beef production (stocker animals in pastoral areas and finisher animals in feedlots in the highlands). Moreover, there is increased demand for livestock products (domestic and export) driven by increasing population, urbanization and economic growth as well as increased interest by the regional governments and the private sector operators to develop the livestock sector and benefit from it.



But when one looks at the productivity level of livestock, the productivity of the livestock sector is extremely low and much below the potential by all measures of productivity. Feed shortage and poor quality of the available feed resources constrain animal output all over the region. Hence, the overall livestock productivity is unsatisfactory. Poor quality pastures and crop residues are the major feed resources. Even when supplementary feeds are given, the focus would be only on protein and energy and very little or no attention is given to the mineral and vitamin contents and nutritional balance of the diets. Nutritional constraint leads to low birth weight, slow growth rate in growing animals and low production and reproduction performance. Poorly fed animals give low output of meat and milk and have compromised immune system and ability to fight diseases. Nutritional problems also lead to delayed age of onset of puberty, long parturition intervals, low conception rates, and low overall lifetime productivity. In addition, feed resources utilization is highly inefficient in poorly fed animals.

### **Challenges and opportunities for improving feed supply in the IGAD region**

Nowadays there is increased interest for promoting intensive and market oriented livestock production in most of the IGAD member states. But as discussed above, inadequate feed supply and the low quality of available feed resources have been persistent bottlenecks to increasing livestock productivity. Intensification and market orientation of livestock production demands increased supply of high quality feed.

#### **Livestock feed related challenges**

In general, there is shortage of feed supply and seasonal variation in feed quality and quantity. Both the quantity and quality of feed resources are lower during the dry season and the problem exacerbated when drought strikes. The available feed resources dominated by poor quality natural pastures and crop residues. Grazing areas are decreasing from time to time due to expansion of cropping and other development intervention on traditional grazing areas. The commonly available feed resources are characterized by low content of essential minerals and vitamins. The production and utilization of cultivated forage and pasture crops is significantly limited. Feed industries are at low level of development and the supply of agro-industrial by-products and nutritionally balanced concentrate feeds is limited. As a consequence, the utilization of available feed resources is inefficient.

There are four major livestock production systems in the region. These include pastoral and agro-pastoral system, mixed crop-livestock production system, small scale urban and peri-urban (landless) livestock production and relatively large scale commercial livestock production. The

different livestock production systems differ in resource endowments, available feed resources and livestock feeding practices.

**Pastoral and agro-pastoral production system:** Grazing and browsing (foliages and pods of trees and shrubs) of rangelands are the main source of feed in the pastoral and agro-pastoral production livestock production systems with occasional use of crop residues, stubble grazing and conserved forages. Seasonal mobility tracking forage and water resources a common practice of coping with seasonal feed and water shortage. During periods of severe drought pastoral herds become dependent on emergency feeding on feeds sourced from highlands (hay, straw and agro-industrial by-products). Recently irrigated fodder production along river basins is increasing. Seasonal variation in fodder availability and quality, encroachment of invasive species, restricted livestock mobility, land use change, recurrent droughts, weakening of customary institutions and lack of sustained investment in rangeland improvement among the major challenges affecting livestock feed supply and pastoral livestock production. The scope for traditional coping strategy through mobility has also diminished because of loss of key dry season grazing areas as a result of expansion of cropping and other land use changes as well as increased population pressure.

Table 1. Land use change in Yabello district, southern Ethiopia (1973-2003)

Land use class	Area cover (km <sup>2</sup> )		
	1973	1986	2003
Bush lands	80	100	115
Woody grasslands	134	161	198
Open grasslands	173	106	24
Crop lands	13	33	63
<b>Total</b>	<b>400</b>	<b>400</b>	<b>400</b>

Source: Sintayehu *et al.* (2006)

**Mixed crop-livestock systems:** The major sources of feed in this system include grazing of poor quality natural pasture (private or communal) including road sides and crop boundaries as well as crop residues and stubble grazing. These are rarely supplemented with green forages, tree leaves, household wastes and purchased feeds. Natural pastures are the traditional major source of feed. However, the area of grazing land decreasing from time to time due to expansion of cropping into razing lands causing shrinkage of grazing land. In some places grazing is restricted to roadsides and marginal areas. The existing grazing lands exhibit decreased productivity due to heavy use and other factors (prolonged and excessive use). Crop residues are becoming increasingly important sources of animal feed. They make up >50% of biomass of crops and

contribute about 50% of feed supply. However, they are characterized by low nutritive value, wide variability in quality, seasonal availability and bulkiness to transport over long distance. Food-feed crops such as maize, sorghum, cassava, sweet potatoes etc. offer promising opportunities for dual purpose use as source of human food and animal feed.

In general, there is marked seasonal fluctuation of feed supply and quality. Nowadays there is increased interest in use of purchased feed (sourced off-farm) because of inadequate supply of feed produced on-farm. There is a possibility of integrating forage production with sustainable land management activities.

**Urban and peri-urban livestock operations:** These include small to large scale dairy farms, feedlots and poultry farms. Most of such operations do not have land for grazing or feed production and as a result they are dependent on purchased feed (both roughage and concentrate). They are affected by unreliable supply and quality and increasing price of purchased feed. The unavailability and very high price of vitamin and mineral supplements is a particular challenge.

**Large scale commercial livestock production:** These include commercial dairy farms as well as cattle and small ruminant ranches and feedlots. They have better access to land, financial and material inputs for feed production, conservation and storage.

### **Effect of climate change on feed availability and livestock production**

Climate change, particularly drought, reduces pasture and crop production. The increased temperature during drought periods also leads to decreased nutrient content, increased lignifications and decreased digestibility of pasture grasses. The decreased production of crops leads to decreased availability and increased price of compound feeds. Drought also causes shortage of water supply and may necessitate travel over long distance in search of feed and water. The increased mobility livestock in search of feed and water increases stress on pastoral communities and their livestock and could also be a cause for conflict among neighbouring communities over the scarce resources. Overall, climate change induced droughts decrease productivity of livestock and their contribution to food security and household as well as national incomes.



## **Status, challenges and opportunities for fodder adoption**

Cultivated forages and pastures offer a possible solution to address feed shortage problems. Many years of research and development efforts have been undertaken in the region. The research has also identified diverse agro-ecologies and wide range of species adapted to the different agro-ecologies and production systems. Different species and varieties of forage crops adapted to the different agro-ecologies and production systems have been identified. Different forage development strategies have also been designed to suit the different agro-ecologies and production environments.

### **Challenges of cultivated forages and pastures**

Forage and pasture research and development efforts were more focused on species/variety screening, adaptation and biomass production and relatively less attention was given to utilization. There were limited on-farm feeding and animal response studies to demonstrate impact on productivity. This has resulted in lack of compelling evidences demonstrating the benefits of forage production and use. Smallholder farmers have small and decreasing land holding and priority in land allocation is usually given to crop production. Forage production usually accorded a secondary status as there has not been any study to demonstrate opportunity cost of land for forage versus crop production. Moreover, poor market linkage for animal products could discourage investing on improved forages. Forage production is also knowledge intensive and lack of focus and long term commitment in extension may not encourage smallholder farmers to engage in the business. Difficulty of accessing suitable seeds or planting materials is another challenge. Entrepreneurs also face different constraints like access to land and credit, limitations of business skills or experience and lack of basic or certified seeds. Another important challenge is that fodder seed production could be risky as feed is an intermediate commodity and forage seed is further intermediate in the livestock value chain (Forage seed => Forage => Livestock => Livestock products). There is also risk of market distortion due to unrealistic price paid by governmental and non-governmental organizations. Currently these two entities are the major buyers of forage seeds.

### **Opportunities for commercial forage production**

The current scenario shows increased demand for livestock products and increased interest in commercial livestock production (e.g. dairy, beef) leading to increased demand for productivity enhancing inputs. Currently there is a huge gap between actual and potential livestock productivity levels. Feed supply has become a critical challenge. Shrinkage of traditional grazing areas has caused decreased availability of feed from natural pastures. In addition, there is shortage and high price of agro-industrial by-products and other concentrate feeds. Thus, there is increased demand for alternative, affordable and good quality feed resources and improved forage production has a huge potential to fill this gap. Commercial fodder production can serve as source of livestock feed in urban and peri-urban intensive landless ruminant production system, land constrained smallholder farms in rural areas, drought emergency interventions and for export to neighboring and MENA countries. Smallholder commercial fodder production helps to diversify and increase farm income (sale of fodder and fodder seed) and intensify smallholder livestock production.

## **Good practices in fodder and fodder seed production and marketing**

In recent years there has been increased private sector interest and engagement in forage and forage seed production and marketing. These include private entrepreneurs, farmers or pastoral cooperatives, youth groups, individual smallholder farmers or pastoralists as well as research and development organizations (governmental and non-governmental). Comparative net benefit studies of cultivated forages versus other crops are very much limited. However, the limited studies conducted so far show that production improved forage crops compares very well with crop production both under rain-fed and irrigated conditions. A typical example is comparison of irrigated Rhodes grass and other irrigated crops at Koga irrigation scheme in north western Ethiopia. Irrigated Rhodes grass was found to be 0.19 times less profitable than irrigated onion, but 4 times, 1.27 times and 1.25 times more profitable than irrigated barley, irrigated wheat and irrigated tomato, respectively. Profit from Rhodes grass is more robust to adverse business conditions such as yield reduction, cost increase and price reduction, assuring optimism about positive financial returns from investments to expand production.

Other good practices in the region include increasing private sector engagement, increasing commitments by governments and exemplary practices of irrigated fodder production along river basins in the pastoral areas. Among global examples of good practices fodder and fodder seed production and marketing the case of Thailand is worth mentioning. In Thailand, farmers transformed their rice and cash crops fields into permanent guinea grass pasture because of better economic returns from forage and forage seed production as compared rice production.

## **Fodder conservation**

The IGAD countries experience seasonal variation in quantity and quality of feed. The region experiences about 6-9 months of dry period each year during which there is shortage of feed and the quality of the available feed becomes very low. There is no green feed during the dry period, except in rare situations where there is irrigated fodder production. However, the tradition of fodder conservation as hay or silage is not well developed in the region. But in years there are encouraging developments and good examples are emerging.

Hay is forage conserved by drying .i.e. by reducing the moisture content of the forage to about 15% or less for safe storage. Silage is a product of acid fermentation of green forage crops that have been compressed and stored under anaerobic conditions. It can be made from cereals crops such maize and sorghum or other forage crops. The objective is preservation of high quality forage for later use. It can be very important component of the diet in dairies and beef feedlots. Properly made and preserved silage preserves nutritive value and palatability of the crop. There are good examples fodder conservation as hay or silage from Kenya, Sudan, Ethiopia and Uganda. Production of fodder tree leaf meal such as *Leucaena leucocephala* leaf meal is another possibility of conserving forage for dry season. Forage legumes leaf meals are rich in protein and could be used as a component of concentrate mixture, fully or partly replacing oilseed meals.

## **Marketing of fodder and fodder seed**

The actors involved in fodder and fodder seed marketing chain could differ from country to country in the region. The producers include smallholder farmers, cooperatives and private commercial producers. On the other hand, the buyers and potential buyers include urban and peri-urban livestock producers, smallholder farmers that have feed shortage problem as well as governmental and non-governmental organizations. The latter two buy forage seeds and distribute to smallholder farmers as part of their development or extension activities. They also buy and distribute conserved forages, mostly hay and crop residues, to drought affected areas as part of their intervention programs to drought emergencies. One of the private forage seed producers in Ethiopia, Eden Field Agri-Seed Enterprise, indicated that about 98% of the forage produced by the company is sold to the government and NGOs. This indicates that there is limited demand for forage seeds from smallholder livestock keepers and the private sector. Thus, more work has to be done to create market linkage and to balance demand for and supply of forage seeds to make the business viable for the involved actors.

## **Opportunities and prospects**

The current scenario and the trends in demand for livestock products show an increasing and positive prospect for fodder and fodder seeds. The following realities and trends are indicators for such positive future prospects for increasing demand for fodder and fodder seeds in the IGAD region.

- Livestock production is important to the livelihood of farmers and pastoralists
- Increasing demand for livestock products (domestic, regional and global)
- Increased attention given to the livestock sector
- Traditional feed resources have become difficult to access
- Recurrent droughts
- Increasing demand for good quality fodder (domestic, regional, MENA region)
- Potential for export and earning foreign currency

However, such positive trends and prospects need to be matched with appropriate government support and incentive packages to be fully realized. Incentive packages to motivate the private sector, cooperatives and individual farmers and pastoralists to engage in fodder and fodder seed production and marketing revolve around institutional and policy support as well as technical support. The institutional and policy supports include pertain to issues related to access to land and credit, access to needed machineries and inputs as well as formulation and implementation of enabling policies and regulations. The technical supports include supporting the sector in terms of extension, research and provision of basic seeds.

## **The ways forward**

- Assess supply and demand for improved forages. This would support targeting of hotspot areas (high intensification, market orientation and supportive institutions) for interventions. Moreover, it is important to consider trade-offs with existing use of land, labor and capital and matching forage species to niche



- Assess the extent and stability of demand for forage seed. This includes assessing the willingness farmers to pay and assessment of indicative net margins for potential entrants.
- Apply innovation system approach. This involves looking for ways of linking actors with relevant source of knowledge and assessing alternative knowledge sharing methods to raise awareness of economic and environmental (soil, water) benefits of forages. It also entails assessment of enabling environment and needs for policy development to support forage seed supply and agribusiness.
- Knowledge sharing. It is important to share information on cost benefit of forages and forage seeds production more widely and to share market information (forage seed demand and supply) to link growers and buyers (traders).
- Capacity development. This involves developing the capacity of the farmers, the private sector, extension workers (government and NGO) and policy makers. Farmers need practical training on forage and forage seed production management. The extension workers need to have good understanding of how forage fits into the systems (benefits of forages, targeting species to niches, source of seeds). They also need to expand their technical knowledge on forage and forage seed production management to support farmers. It is very important to work closely with policy makers and provide them with the necessary information for sound policy decisions concerning fodder and fodder seed production and marketing.
- Link forage production with utilization. Forage research and development interventions should go beyond screening of species and varieties for adaptability and biomass production. Forage production should be linked with utilization of the forage to enhance animal production and productivity. Market access for animal products is also very important so that farmers can benefit by selling their products to generate income and improve their livelihood.
- Eliminate market distortion for forage seeds. The forage and forage seed market is mostly dominated by NGOs and governmental agencies who buy these items at high price and distribute to beneficiaries for free. This practice may discourage the development of dependable demand from the end users.
- Develop dependable seed/planting material supply system at affordable price. This may involve establishing quality standards and systems for testing and regulating quality of forage seeds and developing a mechanism of certifying forage seed suppliers.

### **Key points discussed and highlighted**

At the end of the presentation some pertinent questions were raised and discussed. These include.

1. Is it forage or water which is more important? It appears that more attention is given to forage only and water is mostly neglected.

Water is very vital for livestock drinking and for producing feed. Thus, it is appropriate to give due attention to it.

2. Who has developed the forage on the road side that is used for roadside grazing?

That is not cultivated forage. Thus nobody has developed it. It is just natural pasture available on the roadside, especially in areas where most of the natural pasture is converted to crop land.

3. On issues of production system changes from pastoral to agro –pastoral system, why is it happening and is it based on the consent of the local community?

This is an issue that requires proper understanding and handling. It should be based on sound understanding of how the pastoral system operates as well as the global and local trends in the development of the pastoral system. There should be adequate consultation with the pastoral communities and development efforts should not erode but rather strengthen the roles of customary institutions in the management of pastoral resources.

4. How can the forage seed systems be developed and sustained?

It depends on awareness creation and expanding the market base for the products. If the buyers of forage seed are only NGOs and government agencies, it could create price distortion and the market demand may not be predictable.

### ***3.4. Experience on fodder /fodder seed production and marketing: A cooperative Approach from Ethiopia***

Mr Ismail Handule

Kulmiye multipurpose cooperative, Somali Region, Ethiopia

The Kulmiye multipurpose cooperative was formed with 11 members in the after math of the 2015/16 drought. The main purpose of the cooperative is to engage in fodder production and marketing in Shinile zone of the Ethiopian Somali region. The Cooperative has around 200 hectares of land. The main enterprise is production of Sudan grass which is bought by the government. The mode of fodder production is by gravity irrigation. The cooperative produced more than 105,000 bales of Sudan grass. The main challenge is marketing problem. The pastoralists are not ready to buy the hay produced and offered for sale. However, the Regional Government is settling the problem by making contractual agreements between the producers (the cooperative) and the buyers (mainly the Government and NGOs).

#### **Key points discussed and highlighted**

Is the market dependable? What was the effort made to develop market? Is there possibility of reaching the market found in the quarantine area of animal marketing? How about the Middle

East market? Is there any incentive mechanism for purchase of machinery and other related issues?

There is limited demand from the pastoralists. Currently the buyer is only the government. The government buys bales of hay and distributes to drought affected pastoral communities in the Ethiopian Somali Region. But the Ethiopian Somali Regional government has started creating market linkage with pastoralists. Participants also suggested that the cooperative must be encouraged to seek other buyers apart from relying on the government. They can explore possibility of selling the forage hay to quarantine stations in Ethiopia and neighboring countries such as Djibouti and Somaliland.

### ***3.5. Experience of "Eden Field Agri-Seed Enterprise" on Forage Seed Production***

Yirsaw Wubete and Getahun Haile

Eden Field Agri-Seed Enterprise

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#### **Background**

Ethiopia is endowed with a huge livestock population and diverse livestock genetic resources. The sector accounts for a considerable part of the country's national income and supports the livelihoods of an estimated 80% of the rural population and shares 15 to 17% of overall GDP and 35 to 49% of agricultural GDP, and 37 to 87% of the household incomes. To date, the sector is not fully exploited because of low productivity, which is the result of several factors, among which feed shortage is the major one. It is a hard fact that, the pasture land is shrinking from time to time and loses useful pasture and forage species. Thus, it is becoming evident and focusing on development of forage seed source and strengthening the supply of seeds of forage crops is essential

Understanding the above mentioned need and constraint Eden Field Agri-Seed Enterprise was established in January 2008 mainly to produce and supply quality forage and forest tree seeds. The Enterprise is a pioneer development oriented firm currently working harmoniously with private farms, farming communities, non-governmental organizations, government and international offices. Eden field Agri-Seed Enterprise is engaged in the multiplication and supply of improved forage seed. It aspires to be the leading producer and supplier of certified forage and forest tree seeds in Ethiopia. By doing so, it is contributing its share towards the development of the livestock sector on one hand and to rehabilitation of the country's forest resources on the other. The enterprise is also involved in the production, processing, proper handling; packaging and selling of quality forage and forest tree seeds that are suitable for various agro-ecologies of

the country. This justifies attempts made by private and public actors to be strengthened for ensuring adequate production of livestock feed resources based on potentials available in the various regions of the country.

### **Objectives of the Enterprise**

The main objective of the Enterprise is to actively work in the production of improved forage and forest seeds and supply to the end users, and more specifically:

- To engage in production, processing, handling and supply of quality forest and forage seeds
- To help assist the rehabilitation of degraded lands and promotion of agro-forestry practices
- To promote forage seed out-growers and forest tree seed collectors to ensure availability of seeds both in quality and quantity throughout the country

### **Activities of Eden Field Agri-Seed Enterprise**

Since its establishment the Enterprise has been looking for suitable investment land. However, the attention given to forage seed business in the country appears to be low. As a result the Enterprise does not have adequate land for its activities although we hope that our request could be attended to in the near future. Currently, the Enterprise is operating by renting irrigable private land at Meki (Meki seed farm) and by engaging different out-growers (government & private organizations and farming communities).

The Enterprise gets basic/founder forage seeds from Ethiopian Institute of Agricultural Research (EIAR) and International Livestock Research Institute (ILRI). It multiplies the basic seeds in its rental owned forage multiplication land of 20 ha at Meki. The multiplied seeds are supplied to out-grower in different agro-ecological zones, who produce large quantities of commercial forage seeds. In order to work effectively with out-growers the following steps are taken. These include 1) promotion & awareness creation, 2) signing detailed contractual agreements, 3) providing technical support i.e. theoretical and practical training, 4) supplying the required inputs (seeds, bags, fertilizers, chemicals, which will be returned from produced seeds. Technical support provided by Agricultural Growth Program (AGP) and follow up and supervision is made by the Enterprise and by the Feed Resource Development Directorate of the Ministry of Livestock and Fishery Resources. The Enterprise buys the produced seeds, paying against prior agreed values and transports to Addis Ababa, main store.

Promotion/ Extension Services include demonstrations in the field and at Head Quarters, nationwide field days, field visitation by high government officials, NGOs, attachment students and foreign guests, as necessary. The services provided at the Head Quarter include processing

for quality assurance, seed testing (lab service), seed treatment (fumigation), storage and distribution.

Eden Field produces forage and forest seeds for domestic market. The market demand is high. The following table shows details of forage seed production and distribution.

Table 1. Forage seed production and distribution by Eden Field Agri-Seed Enterprise

S N	Prod'n Year	Area (ha)	Prod'n (q/ha)	Type of Irrigation	distribution (q)
					Forage
1	2008	11	87	rain –fed	60
2	2009	17	120	rain–fed	90
3	2010	25	200	both types	105
4	2011	32	192	both types	132
5	2012	40	240	both types	321
6	2013	50	325	both types	384
7	2014	50	303	both types	229
8	2015	60	360	both types	164
9	2016	60	420	both types	112
Total		60	2247	-----	1597

The major clients of the Enterprise who purchase the forage seeds include non-governmental organizations (NGOs), governmental organizations (GOs) and private farmers who buy 50%, 48% and 2% of the forage seed, respectively.

### **Government support**

The Ministry of Livestock and Fisheries Resources (feed resource development directorate) provides supervision and evaluation, technical follow-up, creating linkages with out-grower farmers, promoting activities through farmers open day or field days, training and workshops and training farmers, especially by the Seed multiplication case team.

### **Challenges**

The challenges faced by the Enterprise include:

- Unavailability of own land or forage seed multiplication
- Difficulty of accessing bank loan or credit facility to successfully carry out the activities, to acquire processing machineries such as mower, thresher, baler, seed cleaner etc and for establishment of better and well ventilated seed storage facility.
- Market uncertainty to sale produced seed due to inadequate promotion and market linkage as well as due to unaffordable price of forage seeds leading to unreliable demand for the products. Farmers have lack adequate awareness concerning the value of

improved forage development, seed production and utilization compared to other cereal crops (maize, wheat, teff etc.) as a means of income from the sale of seed and forage other than using the remaining by product for their livestock. Moreover, the price of forage seed is unaffordable to end users due to high production cost such as land rent, fuel for irrigation, low seed production/ ha, starter seed purchase, transport, labor, chemicals for disease control etc.

- Other challenges include:
  - ✓ Inadequate supply of desired basic/ foundation seed to multiply in bulk
  - ✓ Low effort rendered by national and international institutes to introduce new and more productive forage species
  - ✓ Lack/ inadequate forage seed control or regulatory mechanism
  - ✓ Lack of on job training and study tour to other countries to gain more experience and better vision

### **Recommendations or suggestions for improvement**

In order to encourage the engagement of private enterprises in forage and forage seed development the key challenges hampering progress of the sector need to be alleviated. In addition attention should be given to the following.

- Facilitation of access to land for forage seed production
- Facilitation of bank loan for forage seed business
- Vigorous awareness creation should be made to encourage farmers to grow and use improved forages as supplementary feeds to enhance productivity of their animals

## **3.6. Fodder and Fodder Seed Production Practices in Sudan**

Dr. Sawsan Khair Elsaid  
Range and Pasture, Sudan

### **Fodder demand and supply situation**

Fodder crops are grown primarily under irrigation to feed dairy cattle, small ruminants and draught animals, and a good part of the production is channeled to the local market where it is sold as green fodder. Total area is estimated at about 126,000 ha, with almost half in Khartoum State. This area is expanding with the increased attention given to dairy production, particularly around urban centers. Normally 80-90% of the area allocated to fodder crops is devoted to annuals, mainly forage sorghum, 'Abu Sabeen', with limited areas under maize and lablab. The remaining area is occupied by alfalfa, the major perennial fodder.

Buffel grass, Rhodes grass, elephant grass, para grass, *Panicum* and *Clitoria* have been utilized to establish irrigated pastures, especially in animal production schemes and on livestock research stations. Growing fodder crops between rows of fruit trees is practiced on a limited scale. Crops

grown are mainly alfalfa, but *Clitoria*, *Pillipesara* and lablab have also been tried with the aim of improving soil fertility, controlling weeds and producing good quality fodder.

Free grazing of rangelands is the most common feeding system for livestock. During the short wet season, grasses grow and mature rapidly producing abundant biomass. The body condition of the grazing animal is at its best during this period, but with the onset of the dry season both quantity and quality of the pasture herbage decline and fail to meet the maintenance requirement of grazing animals. In western Kordofan, where dry season grazing is composed mainly of *Cenchrus biflorus* and *Eragrostis tremula*, the crude protein content of the natural forage is about 3.4%, much below the minimum required for maintenance. The nutritional inadequacy of the dry season grazing imposes a major constraint on sustainable livestock production under traditional systems where grazing constitutes the only source of feed for livestock.

The non-availability of forage during the dry season affects sedentary livestock more, as they lack the advantage of mobility exercised in the transhumant and nomadic systems. The past few years have witnessed an increase in supplementation of natural forage grazing, by collection and storage of hay, utilization of crop residues and agro-industrial by-products and irrigated fodder. The role of fodder trees and shrubs (*Acacia*, *Cadaba*, *Maerua* etc) as a dry season source of feed (pods, leaves and twigs) should not be under-estimated. They are particularly valuable in the semi-desert and low rainfall savanna zones

The cut-and-carry feeding system is associated with small-scale irrigated farms (<1-5 ha) where fodder crops (sorghum and alfalfa) are harvested to feed farm animals. Surplus green fodder is sold in nearby towns and villages to other livestock owners. Weeds and crop residues may also contribute to livestock feed in these farms.

In large scale dairy farms irrigated fodder crops such as sorghum, alfalfa and limited areas of maize, Rhodes grass, clitoria and lablab are produced. Mechanical harvesting (chopping) and hand cutting are both practiced and green fodder is fed to the dairy herd, while any surplus may be made into hay, which is baled and stored. Locally made concentrates or processed feeds are also fed to maintain high milk yield.

Crop residues are available from irrigated as well as dry land crops. They include cereal straws and stovers (wheat, sorghum, millet, maize), cereal stubble, legume haulms (groundnuts, cowpea, lablab) sugar cane tops and baggasse, and water melon residues. Agro-industrial by-products include molasses, oil seed cakes (cotton, groundnuts, sesame, sunflower), grains and by-products of cereal milling (bran). The crop residues are a strategic source of feed for livestock during the dry season, with a part grazed in situ and part transported and stored for subsequent use. However, transportation of these bulky materials of low nutritive value is a major constraint to their large scale utilization

### **Private sector actors engaged in fodder and fodder seed production and marketing**

1. Kenana Sugar Company Animal Feed Business Unit. The Unit was commissioned in 2004. The Unit uses sugar by-products, molasses and bagasse, as main ingredients. It is a fully computerized plant with high flexibility to cater for customized specs. The Plant

produces complete animal feed diet without the need for supplement, which is packed in 25 kg bags for easy use. The production capacity is about 100,000 MT /Annum. About 50% is used for domestic consumption and the remaining 50% for export.

2. There are so many investors in the area of forage production.
3. Arab Sudanese Seeds Company (ASSCO): ASSCO was established in January 1997. Since then, it has proceeded with its activities in order to produce and market about 14,500 tons/year of improved seeds of different field crops and some forage seed (alfalfa, beans and sorghum). Having accumulated vast experience in the production of improved seeds, ASSCO is now using integrated packages and modern production technologies, with its products being in high demand on the local market. ASSCO also looks forward to the expansion and diversification of such products.
4. Smallholder farmers produce and distribute sorghum seeds of different varieties.

### **Forage and forage seed markets**

**Market for forages and crop residues:** Forage crops are sold in the local market regardless of standards (quality, standards, packing etc). With regard to crop residues, livestock graze during the wet season in communal areas then after crop harvest they return to the scheme to utilize crop residues, chaff and other materials produced after screening of grains. Most owners have established their own water point (Hafir) to provide water during the dry season. This constructive step on the part of owners has not been supported by evaluation, research and extension and marketing efforts from the concerned institutions.

**Market for forage seeds:** Farmers, especially in Nahr En-Nil and Northern State, mainly undertake fodder crop seed production and farmers with smallholdings play a crucial role in the informal seed supply system. The National Seed Administration is involved in the production of seed of the major fodder crops alfalfa and ‘Abu Sabeen’ as well as Sudan grass, clitoria, lablab, pillipesara and maize. Following the re-organization of the Ministry of Agriculture and Forestry, this has been transferred to the recently established Arab Sudanese Seed Company.

There is no specific market for forage seed especially natural forage species that are collected from wild stand by communities ie range plants seed collection and cleaning. This is conducted in states having good potential for seed collection of important natural forage plant species by indigenous people and to sell to the Range and Pasture General Directorate (RPGD) so as to distribute to the local departments. RPGD has been engaged in program of upgrading value of crop residues aiming at providing easy handling, increase nutritional values and intake of crop residues and encourages private sector investment in pastoral sector. The seed of various native species are collected in several states to meet the requirements of local range re-seeding operations and to provide a surplus, which is challenged to other states.

**Market destinations:** There are two market outlets i.e. the local market (concerned government institutions, framers and projects) and export to the Arab countries and China.



## **Challenges affecting improved fodder and fodder seed production and marketing**

**Weak integration of production system:** Traditionally most farmers, whether in irrigated or dry land farming areas, keep some kind(s) of livestock; the animals benefit from crop residues, weeds and in a few cases grown fodder crops. Hence, the link between crops and livestock exists and can be developed further to increase the integration and efficiency of production systems. At present the problems that hinder larger scale integration are two-fold. Firstly, there is the inherent divorce between crops and animal production in the crop rotations of the mechanized farming areas and in the major irrigated schemes of Gezira, Rahad and New Halfa; and, secondly, integration of livestock into farming systems is not always viewed as a complete package of socio-economic and technical factors and supporting services that should be designed and implemented in close collaboration with the target producers.

**Policy related challenges:** Some government policies, particularly agricultural policies and those that encourage investment in the rain-fed sub-sector, pricing policies and different types of fees, have some negative effects on the forage and forage seed market.

### ***3.7. Experience of Fodder Production to Secure Consistent Feeding of Large Scale Dairy Farm Model (Integrated Dairy Farm)***

Mohamed Sayed BVSc - MVSc - PhD  
DAL Integrated Dairy Farm

#### **Background**

Ruminants need two types of feedstuffs i.e. forage and concentrate feeds. Forages are feeds that contain 18% or more fiber. It made up of the vegetative part of the fodder and is of low density. It fills the rumen of the animals makes the animal feel full. The forage diet should supply the animal with protein and energy for maintenance. It is important to differentiate between forages and crop residues. Concentrates are feeds with less than 18% fiber content, have high density. They are to be given as supplements to cover production (milk, meat).

#### **Importance of forage**

Forage makes the animal feel full and supplies the animals with protein and energy to maintenance plus limited production. It is usually cheaper if compared with concentrate feed. It supplies the fat content of milk. Forages have less content of toxins such as Aflatoxins. There is less incidents of bloat compared to concentrate feed, except when animals consume lush legume pastures such as clovers.

## **DAL Project for Production of Fresh Hygienic Milk at Competitive price**

There is a huge gap between demand for and supply of milk in Sudan. The gap is 3 million ton/year for Sudan and 400 ton/day Khartoum. The reasons for such large gap are poor production potential of the animals, availability of feed, quality of feed and management related problems. Thus this project aims at investment in milk production and processing, large scale forage production under center pivot irrigation system and improvement of dairy farm facilities.

### **Why Milk?**

The reason for focusing on milk is due to low per capita consumption and high price of milk in the country (Table 1). As a result the country imports substantial amount of milk powder from abroad, which demands high amount of foreign currency every year (Table 2).

Table 1. Comparative price of a litre of milk in Sudan and some other countries

<b>Country</b>	<b>Price/ liter (USD)</b>
Sudan (Processed)	1.06
Sudan (loose milk)	1.06
China	0.68
KSA	0.66
UAE	0.61
Scandinavia	0.40
USA	0.30
UK	0.28

Table 2. The pros and cons of importing milk powder and investing on improving local production of milk from cows

	<b>Imported powdered milk</b>	<b>Investment in cows</b>
Cost (Mill \$)	200	450
Annual expenditure of hard currency	Every year	once
Increase in future demand	No	Yes
Sustainable development	No	Yes
New Job Opportunity	No	Yes

## Sources of Forage Feed in Sudan

### 1. *Natural Pastures*

The area of natural pasture is 85 million ha and the annual production of forage is 64 million ton/year. Forage production from natural pasture is affected by quantity of rain each year, desert encroachment and encroachment of field crops plantation. Lack of water to be used by pastoralists and their animals also limits utilization of pasturelands. The nutritional value of pasture forage decreases with age. However, despite of the above indicated limitations, natural pasture is considered the backbone source for animal feed. The following improvements are needed to maximize usage of natural pastures.

- Availing drinking water in pasture area
- Harvest the forage after end of rainy season to keep the nutritional value, then transferred to consumption areas. This practice can, however, affect next productivity as harvest will be before seed formation.
- Over-sowing of natural pastures with improved forages to improve pasture by dispersal of good selected seeds using aircrafts, and regulation to organize grazing.

### 2. *Crop Residues*

The total estimated quantity is 25 million ton DM. Crop residues are available throughout the country but there is no data concerning percentage available for animals. Sorghum stover is the major crop residue produced in the country followed by millet straw (Table 3). Crop residues have poor nutritional value (protein<8%, ME<8%, high ADF). Nutrient content is not enough even for rumen bacteria. Moreover of their bulky nature and high fibre content, animals cannot consume the required quantity. It is low density and bulkiness causes high transportation cost if one needs to transport it from one place to another such as from areas of crop production to areas of livestock production. Because of the above indicated limitations, it is possible to rely on crop residues to improve animal production.

Table 3. Production of field crops and crop residues in Sudan in 2015

Type	Production (MT*1000)	Crop Residues (MT*1M)	Crop Residues %
Sorghum	6,169	17	69%
Millet	1,245	1.7	8%
Wheat	473	*	*
Peanuts	1,871	*	*
Sunflower	51	*	*
Sesame	721	*	*
Cotton	176	*	*

\* All 6.3 million Ton DM, represents 23%; Production data is from BOS Report 2015

### 3. *Irrigated Forage*

These are forages that are sown under controlled conditions to enable harvest of good quality forage. This practice will result in consistent availability of good quality roughage all through the year. It will also improve animal nutrition leading to good milk and meat production.

Table 4. Irrigated fodder production in Sudan

Type	Area Fed *1000	Production *1000 MT
Alfalfa	150	900
Abu 70	168	420
Lubia Afin	31	8
Total		1,328

### 4. *Concentrate Feed*

The concentrate feeds in Sudan mainly include oilseed cakes, sorghum, wheat bran and molasses. Table 5 shows the quantity of the different concentrate feed ingredients annually produced in the country.

Table 5. Types of Concentrate feed available in Sudan

Type	Production*1000 MT
Sorghum	6,169
Groundnut Cake	325
Cotton seed Cake	135
Sesame Cake	74
Sun Flower Cake	8
Total Cake	542
Others	
Wheat Bran	750
Molasses	284

### **Feed Budget**

The livestock population of Sudan is estimated to be 147 heads (Table 6). Availability of feed during the year in Sudan is 60 million tons whereas the DM requirement for livestock (147 million head) is estimated to be 88 million tons. Hence the gap between demand and supply of

feed DM is 28 million tons. The gap in Protein and energy is huge. The solution would be expansion in cultivation of irrigated or rain fed good forages.

Table 6. Estimates of livestock population of Sudan in 2015

Type	Number (Million Head)
Cattle	40.2
Sheep	50.7
Goat	43.5
Camel	4.2
Equine	8.3
Total	147

### Large scale forage production under center pivot irrigation system



Alfalfa field under pivot irrigation



Mechanized harvesting of alfalfa



Baled alfalfa hay ready for storage and transport



Ailafoun Integrated Dairy farm

Fodder production gave excellent results. The company moved to the next step, cow sheds building and installation of the necessary facilities. The company still plans expansion in large scale fodder production and dairy farm as a next phase. The plan includes installation of additional 105 pivots (6,510 ha), of which 80% would be used for alfalfa production (85,000 ton), Rhodes Grass (25,000 ton) as well as corn and wheat.

### **Key points discussed and highlighted**

What happened to pastoralists who keep livestock around the scheme? Are they involved and how do they benefit? Is land tenure system a problem?

The activities are being implemented in desert areas where land is not being utilized by the pastoralists. Apart from the fodder exported some are sold at the local markets in order to offset feed livestock feed deficits in the country. The government encourages investors by offering waiver on various taxes. The government is embarking on pivot centre irrigation system to create foreign exchange

### **3.8. Alarak International Enterprise Fodder Production**

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#### **Introduction**

Three sites with different management systems were used.

- 1) The first one is in Central Sudan, Butana area. Here forage is produced under rain fed condition. The feed resources for livestock include natural pastoral resources + grown sorghum.
- 2) The second site is at Rahad Agricultural Scheme where surface irrigation is used on 10,000 fedan of land.



- 3) The third site is in Khartoum State, North West of Khartoum that uses Centre pivot irrigation on total area of 4000 fedan.

The rain fed activities cover vast areas of land in the savannah climate and lush green mixed organic pasture. The rainy season extends from July to September. Normally grazing is practiced in this area. The area is free of diseases. Only partial usage of the pastoral resources can be made since drinking water is limiting factor. Sorghum is the main cultivated crop.



The mechanisms for maximization of the use of available feed resources are through baling of natural pasture and baling and silage making of sorghum crop. These can be used during the dry season and in areas where drinking water is available.

Seasonal variation in feed availability and quality is the main problem. The best quality of both natural pasture and sorghum for fodder is during the rainy season. After the rainy season both types deteriorate in quality. During rainy season mechanical harvesting and baling is very difficult. Thus appropriate technology is needed to address these challenges.

Irrigated fodder production is carried out in Rahad Agricultural Scheme and in North West of Khartoum in the Khartoum State. The area of land in the Rahad Agricultural Scheme is 10000 fedan where the crops grown are Clitorea and Philipesara. The total area of land in the North West Khartoum is 4000 fedan, out of which alfalfa is grown on 480 fedan.



Surface irrigation



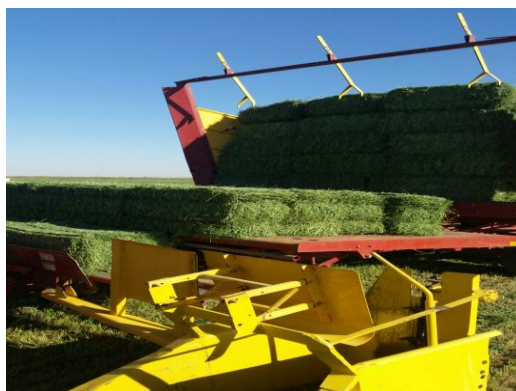
Alfalfa production with center pivot irrigation

## Centre Pivot for Fodder Production

This scheme is owned by a private company and it is located in North West of Khartoum 60 km from Umdurman. The total area is 4000 fedan ( app. 17 million square meter) and the utilized area is 480 fedan with 4 pivots (1 pivot for each 120 fedan).

The scheme is based on the notion that investment in agricultural and animal production is a promising area of investment in Sudan. Emphasis is given to fodder production for export and value addition through industrialization. It also aims at contribution to social responsibility (availing drinking water and education to local people).

Rationale of the scheme include increasing knowhow in forage production in Sudan, increasing local consumption of fodder, tapping into the nearby huge Gulf markets for fodder and meeting the increasing demand for animal products for export and local consumption.



Baling



Baled alfalfa hay

## Infrastructure and facilities

The available infrastructure include 4 wells (270m deep, 14” diameter), 4 center pivots (one Rainfine (China) and 3 Valley (USA)), 4 National pumps, 4 Iveco machines (310 HP), a trench fencing all around the project (16 km long, 2m deep ,1.5 m earth embankment height above ground level).

The available vehicles and implements include 3 Pickup cars, 6 Tractors, 3 trailers, 2 Claas 250 mowers, 2 Claas rakes, 2 Claas Markant 55 balers, 1 boom sprayer and 1 Fertilizer broadcaster

## Workforce

The work force of the company includes a general manager, agricultural manager, financial manager (having 2 assistants and 2 accountants) and executive manager. In addition there are 3+ technicians, 4 pivot operators, 6 drivers and 10 unskilled labors.

## Challenges

The main problems faced by the company are related to land ownership, high initial investment costs and operational costs.

- Land ownership – The increasing price of land and legislations = cost +procedure



- High investment cost of bore wells (+casings, Filters...etc.), pivots, pumps & machines as well as machineries and implements (tractors, mowers, rakes, balers,... etc.)
- Operational cost. This includes the costs of diesel (almost 75% of operational cost), transportation (sandy area, rainy season), electricity connection, spare parts & maintenance, fluctuation in markets demand and prices, deficiency in skilled labor and difficulties posed by the rainy season

### **Developmental Plans**

The company plans to expand the operation using different strategies including expansion of fodder production, inter-pivot horticultural production, and introduction of animal production (lambs & calves) to graze left over fodder and for feeding on bales that are not suitable for export. In addition, continuous land reformation and expanding electricity supply and connections are among the development plans of the company.

**Expected sources of finance:** These include self finance, the National Fund for Animal and Horticultural Production, Agricultural Bank, Partnership with foreign investors and Partnership with local investors.

### **Recommendations**

#### **Rain fed fodder production**

- Conservation of pastoral resources (prevention of overgrazing, prevention of fires, prevention of crop encroachment into grazing lands)
- Maximizing utility of pastoral resources (provision of drinking water, conserving forage as hay or silage)
- Improving pastoral resources through introduction of better seeds

#### **Surface Irrigation**

- Shifting towards animal production instead of low income crop production
- Mechanization
- Processing of fodder
- Proper research in animal and fodder production
- Developing seed industry

#### **Centre Pivot**

- Electrification of fodder production schemes
- Manufacturing of fodder (eg. pelleting & silage making)
- Extending service roads to areas of production
- Inclusion of animal production
- Facilitating long term finance
- Introducing appropriate technologies for fodder/seed production
- Encouraging local fodder seed production

## **Key points discussed and highlighted**

1. The basic interest is to draw lesson from your experience. Can you give us the average weight of a bale alfalfa hay and unit price of a bale? The expansion is important but don't you think that it is at the expense of pastoralist?

This is associated with increasing alfalfa market price. The center pivot system is in the desert and does not compete with the pastoralists. Actually it creates an additional opportunity for feed production and income generation for the country.

2. How is the incentive package for expansion of forage production considering the high investment cost indicated as problem?

There is no tax or customs duty for agriculture production and Agriculture Bank is giving loan.

3. You have focused on the export market. How about the local market?
4. Local demand is poor but there is increasing trend. There is product that does not meet the export market supplied to local market.
5. How the drought is affecting Sudan? Is there any death of animals due to the current drought? What kind of value addition does of your company make to the pastoral community?
6. There is significant shift in fodder production in the Sudan. There is also increasing underground water development. This intervention added the value to the Sudan production. The local people get quality fodder year around if they need it buy. There is continuous supply of fodder. It is also one of the sources of hard currency to Sudan by sending the product to Gulf countries. The alfalfa production also encouraged startup of export oriented animal fattening using quality alfalfa produced by the company.

### ***3.9. Fodder and Pasture Seed Production Status in Uganda***

Denis Maholo Mulongo  
Component Manager, Natural Resources Management, Uganda

#### **Introduction**

The Commercial fodder and seed value chain in Uganda is still at its infancy but growing very fast in the 21<sup>st</sup> century following national adoption of robust and aggressive strategies to increase

the share of livestock to the national exports and GDP. Strategic investments into commercial fodder and seed production was first registered in districts with the cattle corridor in early 2000s but in recent years promotion programs have been registered throughout all ten milk sheds and 5 meat export zones.

### **Good practices on fodder production and marketing or fodder value chain**

1. In 2003, Uganda officially introduced an out grower model for pasture seed under the Strategic Intervention Program (SIP). Government provided incentives in the form of startup seed, fertilizers and pesticides on top of extension and advisory services to farmers and advisory services, import business and free certification services to the seed company. By the end of 2005 at the end of the SIP, there were close to 5 known out grower schemes purely marketing pasture seeds (true seed).
2. By that time fodder production and marketing of vegetative seed especially along the Lake Victoria crescent and urban centers within the national milk sheds was vibrant and lucrative because of incentives provided by NARO and International NGOs agencies, notably Heifer International, Send a Cow Uganda and FAO.
3. In 2007, government revamped commercial pasture seed by attracting and engaging other seed companies. However, the seed companies were to compete for the market and available out growers schemes in line with the national trade policy. This resulted in over production at farm level but uptake of improved seed was still very low due to knowledge inadequacies.
4. By 2010, a number of private sector driven programs with a focus on commercial fodder and seed production were registered and to date many players are supporting this important value chain of the livestock industry. The table below gives the list of major development partners supporting actors engaged in the fodder and seed production and marketing.

<b>Agency/Organization</b>	<b>Stage of the value chain</b>	<b>Evidence</b>
1. Heifer International	Fodder production value chain	<ul style="list-style-type: none"> <li>• Provide in calf heifers, veterinary drugs, fodder seed, fertilizer, pesticides and extension services as incentives to encourage farmers to grow fodder.</li> <li>• Farmer to farmer marketing of fodder is encouraged</li> <li>• In recent years, the scope of operations has increased from production to cover processing, value addition, increasing market networks under the East Africa Dairy Development Program</li> </ul>
2. CARITAS (Kotido, Mukono)	Fodder production value chain	<ul style="list-style-type: none"> <li>• Provide in calf heifers, veterinary drugs, fodder seed, fertilizer, pesticides and extension services as incentives to encourage farmers to grow fodder.</li> <li>• Providing free materials and training to farmers and women groups in pastoral areas for production of fodder and seed</li> </ul>
3. Send a Cow	Fodder production	<ul style="list-style-type: none"> <li>• Provide in calf heifers, veterinary drugs,</li> </ul>

Agency/Organization	Stage of the value chain	Evidence
	value chain	fodder seed, fertilizer, pesticides and extension services as incentives to encourage farmers to grow fodder. <ul style="list-style-type: none"> <li>Farmer to farmer marketing of fodder is encouraged</li> </ul>
4. Integrated Seed Sector Development (ISSD), Wageningen University	Entire pasture seed production value chain. “Securing startup seed, production, value addition and packaging and marketing”	<ul style="list-style-type: none"> <li>Has mobilized farmers into large viable marketing groups.</li> <li>Initiated on farm seed certification and packaging.</li> </ul>
5. The Netherlands Development Program (SNV)	On farm own seed production for dairy farmers	<ul style="list-style-type: none"> <li>The major incentive is to support research and training of farmers</li> </ul>
6. Grow More Ltd	Conserved forage production value chain	<ul style="list-style-type: none"> <li>Promoting commercial hay and silage production by providing incentives in the form of good quality fodder seed, materials and equipment for small and medium scale production.</li> </ul>
7. ABI-Trust	Conserved forage production value chain	<ul style="list-style-type: none"> <li>Promoting commercial hay and silage production by providing incentives in the form of good quality fodder seed, materials and equipment for small and medium scale production.</li> </ul>
8. NARO (NaLiRRI)	Pasture seed and fodder production value chain. “From input supplies to marketing”	<ul style="list-style-type: none"> <li>Established out grower schemes around associated farmers.</li> <li>The major incentives to farmers include; providing equipment for land opening, planting, chopping, processing, conserving, packaging.</li> <li>Other incentives include mobilizing resources for developing enterprise incubation centers for fodder and pasture seed farmers, farmer training in value chain processes</li> </ul>
9. NAADs	Pasture seed and fodder production value chain. “From input supplies to marketing”	<ul style="list-style-type: none"> <li>Continuously changed farmers from own seed production to commercial oriented farmers.</li> <li>Incentives provided to farmers include free inputs, machinery (including tractor) and modern tools, financial support and training.</li> <li>Recently 42 farmer groups and associations</li> </ul>

Agency/Organization	Stage of the value chain	Evidence
		received tractors for fodder production. One hundred more farmers are yet to receive more.
10. Makerere University/CURAD	Pasture seed and Fodder production value chain. “From Input supplies to Marketing”	<ul style="list-style-type: none"> <li>• Have developed incubation centers across the country for promoting entrepreneurship and fodder associations have benefited.</li> <li>• The major incentives to farmers include; providing finances, training and markets or free market promotion services.</li> </ul>

5. From 2014, MAAIF together with its partners notably NARO and Makerere University (through the fodder and feed technical platform) embarked on commercializing all generated technologies in fodder production and value addition as a means to widen the market for fodder products.

### Summary and conclusion

1. The fodder and seed industry in Uganda is still young but promising.
2. The national strategy to invest in fodder production to sustain meat and milk exports is a great incentive to the national economy.
3. Any innovation to enhance value addition and marketability of fodder is a great incentive to promoting fodder and seed production.

### ***3.10. Experience Sharing on Fodder/ Fodder Seed Production: The Experience of the Private Sector in Uganda***

Erison Tumusiime

Fodder/Fodder Seed producer-Uganda and Chairperson of  
Kazo Dryland Husbandry Agro Pastoralists Association (KADHAPA)  
Email: [erisontumusiime@gmail.com](mailto:erisontumusiime@gmail.com)

Kazo Dryland Husbandry Agro Pastoralists Association is a community based organization registered in Uganda, which has been concentrating on Fodder/Fodder Seed Production as a local seed business under a value chain model since year 2000. We are recognized by Uganda government as producers of high quality fodder and fodder seed producers under the national Seed Act of 2016. Our long experience in seed and fodder production has made our products quite competitive, marketable, and affordable (good quality, affordable and guaranteed). The quality and quantity of our fodder and fodder seeds on Uganda market and beyond is guaranteed.

We produce fodder and fodder seed under rain fed condition. We started with one acre but currently we have 70 acres.

**Forage types:** The forage types produced by the Association include different grasses, legumes and fodder trees as shown below.

**Grasses:** *Panicum maximum* (Guinea grass), *Chloris gayana* (Rhodes grass), *Bracharia mulato*, *Bracharia ruzinziensis* (Congo signal grass) and *Hypertheca rufa*

**Legumes:** *Centrocema pubescens*, Lablab, Green leaf and silver leaf desmodium, Glycine and Siratro

**Fodder trees:** *Caliandra* and *Gliricidia sepium*



Demonstration of fodder production



Women collecting Rhodes grass seeds



Packed and labeled forage seeds ready for sale



**Volume of production:** The Association started production with 400 kg in year 2000 on less than 1 acre of land. The current production capacity is 450 MT/year of fodder (hay), 48 MT/year of fodder grass seed and 1 MT/year of fodder legume seed.

**Market destination:** One of the market outlets in the local markets in Uganda. The local customers include livestock farmers/groups, seed companies, research stations (NARO, Makerere University), UN-Millennium Promise Project/KOICA (Supplying to Karamoja among others) and the President's farm (Rwakitura). In addition, the Association has been exporting to a regional market in South Sudan. However, the latter has been stopped recently as the current situation in South Sudan is not conducive for any business transaction.

**Government support:** Trade in Uganda has been liberalized without any government participation. However, the government maintains a high hand by providing regulatory services. The following are among the services provided by the government.

- Provision of heavily subsidized machinery (e.g. 42 tractors were recently supplied to fodder producing farmer groups). In general, the government imports heavy equipment such as tractors to promote fodder/fodder seed production.
- Credibility loans through Post bank. The government extends agricultural credit facility to farmers who are involved in fodder and fodder seed production through government owned Posta Bank, which manages government funds through individual farmer credibility system. This serves as an incentive to produce more and as a system for climatic change adaptation mechanism.
- Adaptive research with farmers at local level on seed production and value addition through National Agricultural Research Organization (NARO), Integrated Seed Sector Development (ISSD) and Makerere University/CURAD.
- Enabling and conducive environment to favor production and marketing (Policy guidance, MoUs with relevant service providers, market promotions).
- Extension/advisory and certification services (NAADs & DLG)
- Provides foundation seeds for fodder seed multiplication under zoning system.
- Carrying out of seed verification and certification services..



One of the 42 tractors imported by government and distributed to fodder/fodder seed producers

## **Challenges**

Despite the above indicated government support systems, there still several challenges affecting the business. These include:

- Difficulty in accessing credit (long processes and high interest rates)
- Seed production is an expensive venture yet the market is unreliable.
- Climate change impacts (prolonged dry spells/drought, recurrence of pests and diseases e.g. stunt disease, army worm)
- Accessing foundation seed is difficult
- Poor access to appropriate machinery for efficient production
- Lack of seed processing machines
- Lack of a regional market information system/network

## **Recommendation**

- Farmers should be trained in managing financial records
- Banks should quickly disburse loans to farmers
- Provision of subsidized machinery to fodder farmers.
- Government should import affordable irrigation systems for farmers.
- Government should invest in infrastructure that supports fodder/seed production, value addition, storage and marketing.
- Farmers should be sensitized more on the benefits of improved pasture production so as to create market for fodder.

## **Partners**

1. MAAIF
2. NARO
3. ISSD (Netherlands Integrated Seed Sector Development)
4. College of Agriculture and environmental Sciences, Makerere University
5. UN Millenium Promise/KOICA
6. French CIRAD
7. AGDI-Dairy Practical Training Farm
8. IGAD Center for Pastoral Areas and Livestock Development (ICPALD).

**Comment from one of the participants:** Where fodder production is undertaken in Uganda is a high potential area. I would suggest you emphasize on leguminous fodder which has got a high demand due to the protein needs and you can also get more income. It looks there is limited attention given for the protein content/quality of forage.



### ***3.11. Fodder and Fodder Seed Production by Kavatini Pasture and Livestock Improvement Group in Kenya***

Mr Jeremiah M Ngaya

Chairman of Kavatini Pasture and Livestock Improvement Group,  
Makueni County, Kenya

#### **Introduction**

Kavatini Pasture and Livestock Improvement Group (KAPALIG) is a Community Based Organization (CBO) and I am a chairperson of the organization. When I left school in 1984, I started growing crops like maize, beans, cowpeas, pigeon peas and fruits like pawpaws, mangoes and guavas. I used to practice agricultural farming technologies like early land preparation, water and soil conservation by making terracing, furrows and water harvesting. I keep livestock like cattle, goats, sheep, poultry and bees for honey.

#### **Formation of Kavatini Pasture and Livestock Improvement Group**

Increase of livestock numbers led to overgrazing that was enhanced by a severe drought in 1998. All grasses got finished. In the same year, I attended a field day organised by KARI Kiboko at Simba in Kajiado County. It is there where I learnt about pasture improvement. I later requested the KARI, for seed to plant, and I was given 12 kg of pasture seeds which were enough for 4 acres. I planted the seeds and establishment was not bad. The following year, KARI officers requested land from me to set up demonstration plots to educate other farmers within my locality about pasture improvement. I did so and they planted using different technologies. Establishment of pasture in the two areas, theirs and mine, was about 60% in the first two years because of the drought which was there.



The types of livestock species by Mr Jeremiah



Overgrazed pasture land (left) and better managed pasture (right)

In the year 2001 pasture was good because of good rains. I then increased the acreage from 4 to 10 acres. We also formed a Self-help group which later became a CBO after training of pasture improvement. Members of the CBO are 35; 25 men and 10 women. Later, University of Nairobi joined us with a project on climate change. They bought seeds for all group members and other farmer groups which were trained in the area. Officers from different departments visited our farms to see our work at that time. Some of them were KARI Director that time, EU Project Coordinator at that time, EU Parliament President that time and other senior officials from outside Kenya e.g. Tanzania, Uganda, Ethiopia, Somaliland, South Sudan, Rwanda, Republic of Djibouti, Malawi, Zimbabwe, Namibia, Botswana and Eretria. The COP 7 conference participants also toured my farm.



Mr Jeremiah explaining about activities of KAPALIG to the high level visitors

Due to the impact of climate change the rains we receive are not enough for the food crops to reach maturity. Mostly we receive 200-250 mm per season, which is enough for pasture production. I stopped planting crops in large scale and instead increased the area under pasture. Between the years 2001-2009 we changed the colour of our area from brown to green because of increased pastures.

The cost of one acre of land increased from 40,000 to 100,000 Kenyan Shilling. Milk increased 100% e.g. goats producing ½ litre of milk increased to 1 litre. Cows producing 2 litres of milk increased to 4 litres; others from 10 litres of milk to 20 litres. Body weight change - goats from 10 kg to 20 kg; cows from 200 kg to 400 kg and bulls from 250 kg to 500 kg. Then prices went up by 50%. We could not satisfy the demand of pasture; other farmers started coming to buy hay for their animals and seeds for planting.



### **Type of production fodder/seeds**

We produce fodder for our own use and we sale the surplus to other farmers. Our pastures are rain-fed, we have never done irrigation because water is scarce. The grass species we commonly produce include *Chloris roxburghiana* (Horse tail grass), *Eragrostis superba* (Maasai love grass), *Cenchrus ciliaris* (African fox tail) and *Enteropogon macrostachyus* (Bush Rye). Hay production is using the hay box. There is quality based marketing of hay based on the stage of maturity. Hay produced after seed collection price lower than those harvested at the right stage of harvest.

### **General Production**

- **Coverage (Hectare):** We've not less than 200 acres but in different areas ranging from 15 to 85 acres.
- **Volume of production:** The amount of production in both fodder and seeds per acre depends on amount of rain in that season and type of grass. In most time we get 200 bales of fodder 16- 17 kg in one acre and 150-200 kg of seeds.
- **Market destination:** We sell our fodder and seeds to other farmers, groups and NGOs. So destination is domestic.
- **Market demand:** The demand of fodder and fodder seeds is high; estimated at 5 tons per year. People are asking for them always and we never have enough.

### **Challenges faced in terms of fodder and fodder seed production**

- Overstocking - Keeping a large number of cattle in one particular piece of land for a long time leads to overgrazing and land degradation.
- Drought - Due to inadequate rains we get very little or no fodder and pasture seeds do not reach maturity.
- Many farmers do not know about pasture improvement.
- Termites - During dry seasons, termites eat and destroy standing hay.
- Certified seeds -we are promoting indigenous grasses for fodder whose seeds are not yet certified by KEPHIS. As such we cannot produce on commercial basis.

### **Suggestions for improvement**

- Farmers should be educated on better ways of keeping livestock
- Researchers should find seed which are tolerant to drought and Government should support and build capacity of the community to harvest rain waters for irrigation.
- More training is needed on pasture improvement.
- Termites should not be done away with; instead farmers should produce more fodder for their livestock and termites. This is because termites play an important role in our environment.
- KALRO and KEHPIS should work on these indigenous grasses and release them for market so that farmers can produce their seeds commercially.

I take this opportunity to thank all those who made it possible for me to come and make this presentation. I also thank my trainer who trained me on natural pasture improvement. Thank you for listening and God Bless you all.

### **Key points discussed and highlighted**

1. What is your recommendation for increasing the number of smallholder farmers who can participate in the group?

If the more farmers could be trained, there will be more likelihood of participation. The other is releasing of more seed from research centers.

2. What recommendation do you give to influence the policy makers?

Organize field days and invite them to visit the progresses and challenges on the ground.

3. Which one of the listed forage seed that you have presented gets the highest priority?

*Cenchrus ciliaris* is the most preferred seed.

4. How is it possible for you to increase productivity of animal using the indigenous grasses?

It is because of better way of nutrient recycling system. The intervention was also focused on the quality and better palatable grass that support the increase in the productivity of animal. The indigenous perennials are well adapted to the area and can withstand droughts hence making fodder available throughout the year.

5. How do you improve on nutrients in the soil by planting grasses continuously without adding fertilizers or over sowing with legumes?

There are termites that add nutrients to the soils when they harvest the dry grasses we have also been trying with indigenous legumes like *Stylosanthes* and *Glycine*. Animals also graze on the fodder fields releasing their wastes that act as nutrients to the soils



### ***3.12. Pasture Production Activities of Kerio Valley Development Authority***

David .K. Biwott  
Officer in Charge, Livestock and Pasture Production  
Kerio Valley Development Authority (KVDA), Kenya



Land preparation-Marigat,kenya



Bush clearing to remove the invasive Prosopis spp. at KVDA farm –Chemeron, Kenya



Semi circular bunds-Ngambo in Marigat, Baringo county,Kenya



Contours to prevent runoff-Water harvesting structures at a farm in Baringo, Kenya



Weeding of *Cenchrus Ciliaris* pasture field at Lobo, Baringo county-Kenya





Farmers pasture plot-*Cenchrus Ciliaris* grass at Meissoiri-Marigat, Kenya



Healthy crop of *Cenchrus Ciliaris* pasture field-Free of weeds





Bales of hay from *Cenchrus Ciliaris* grass at KVDA Farm-Marigat,Kenya



*Cenchrus Ciliaris* Grass Seed harvesting-At Lamalok pasture plot in Ngambo-Marigat,Kenya





Pure stand field of Cenhrus Ciliaris grass at flowering stage-At Lake Bogoria conservancy area, Baringo county -Kenya

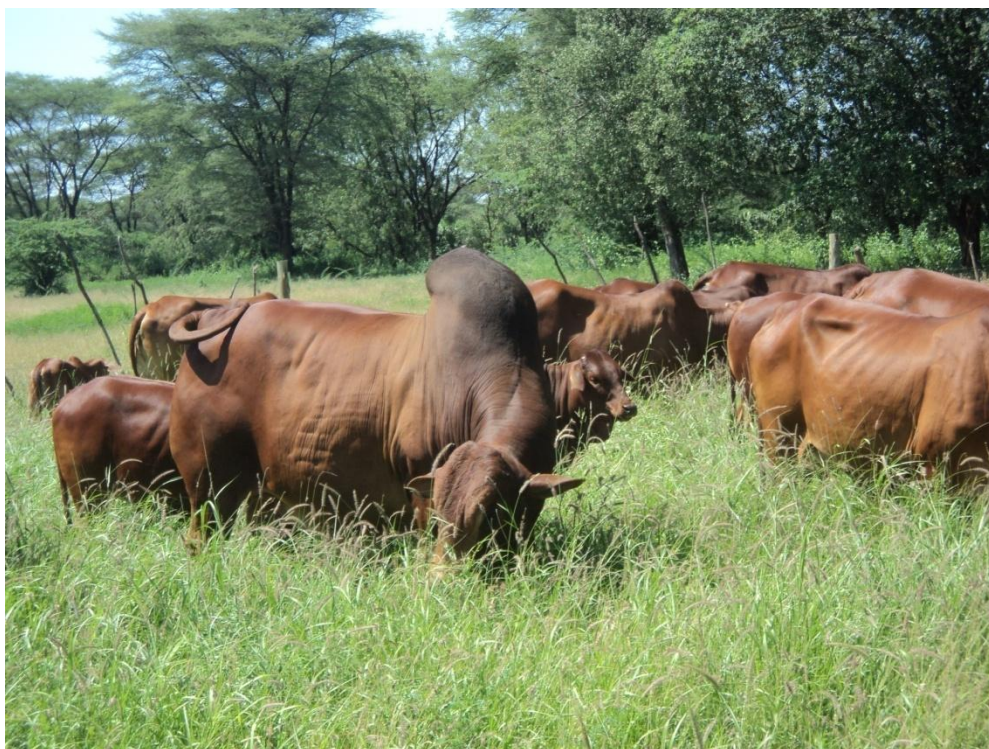


Maasai love grass (*Eragrostis Superba*) in one of the pasture fields - Baringo county,Kenya.





Champion Sahiwal breed bull raised on *Cenchrus Ciliaris* grass at KVDA Farm-Chemeron, Baringo -Kenya



Chemeron farm-Sahiwal breeding stock feeding on *Cenchrus Ciliaris* grass-Baringo, Kenya

## Current Status

- ▶ Grass seed sales are generally low in ASAL parts of Kenya
- ▶ Limited to only one grass species-Rhodes grass. (Only one grass species is available at stockists outlets)
- ▶ Rhode grass is not well adapted to semi arid conditions that receive low rainfall(-800mm/yr and long dry season
- ▶ There is lack of information on performance of the various forage species
- ▶ Livestock in ASAL areas generally depend on indigenous pastures.

## Way Forward

- ▶ Identify and develop other grass species that are more drought tolerant and productive
- ▶ Officially release for commercial production grass species identified for ASAL areas such ;*Cenchrus ciliaris*, *Eragrostis* and *Panicum* spp.
- ▶ Establish grass seed processing centre to process seed for ASAL areas.
- ▶ Encourage pastoralist to expand land under pastures
- ▶ Encourage and promote construction of hay storage facilities at farm level.
  - ✓ Don't let the dry season dry up your profits
  - ✓ Invest in pasture production for in grass too there is gold.

### 3.13. Fodder Markets in Kenya

Fridah Gacheri  
SNV, Kenya

## Importance of Livestock and Fodder Production in Kenya

Agriculture employs 40 percent of the total population and 80 percent of the rural population (World Bank, 2016; UNEP, 2015; GOK, 2010). Smallholder agriculture contributes to 70 percent of marketed production. Livestock contribute 17% to national GDP and 43% of agricultural GDP. About 70% of livestock contribution is from milk. On the other hand, Kenya imports 22% of its beef from neighboring countries.

Year-round access to quality fodder is key to addressing the seasonality in fodder supply to meet year round market demand, cost reduction in milk production and to unlock the production potential of high genetic stock. Fodder conserved as hay is important in drought mitigation strategies, improving milk production, supporting fattening enterprises and it is a tradeable commodity-commercial production.

## Fodder Production as a Commercial Activity

Large-scale fodder producers have been existent for many years in areas such as Nakuru, Naivasha and Eldoret. In recent years there is an emerging trend among progressive smallholders and medium-sized dairy farmers to plant and preserve more fodder. In 2014-2015, over 1250

acres of land were put under Boma Rhodes grass for commercial hay production. Currently an estimated 2500 acres is produced in Narok alone.

The fodder market system doesn't meet the needs of farmers owing to the inability of businesses to recognize the market opportunity for innovations that would address the needs of small-scale dairy farmers. Larger commercial dairy farmers grow hay for own dairy or beef enterprises, (sporadically sell their excess production to cooperatives, and other individual dairy farmers). There is a misconception that small scale farmers are not knowledgeable and are not willing to pay. Commercial hay production is deterred by high start-up, expensive hay baling equipment, large amount of seed needed at the start, high amounts of fertilizer needed every seasons and transportation and logistics required to deliver the bulky product to smallholders. Commercialisation of hay as a commodity by private hay producers and by dairy societies on leased land is becoming a growing business activity in Kenya.

### **Supply Chains**

Medium and large scale farms mainly cultivate fodder for own use whereas commercial grass hay producers sell either directly to individual farmers, or to dairy societies. Dairy societies collect, bulk, and sell milk for their members and buy inputs including hay and lucerne in bulk and resale to their members mostly through check-off on their monthly pay. In general, quality of hay is on average poor as it is low in protein and high in non-digestible elements, the size and weight of the bales are not standardized which remain a major constraint, and logistics, and storage need improvement to reduce losses.

### **Operational Gaps**

Large scale commercial fodder producers are well-equipped and skilled, albeit with operational gaps such as fodder quality is inconsistent due to gaps in fodder management. Products have no guaranteed minimum nutritional level. Formal contractual agreements between the buyers and producers are limited. In general, the supply chain is characterised by informal linkages between the producers and the buyers with almost no forward planning. Other operational gaps in the system include:

- Sub-standard quality/variety of seeds, soil analysis, fertilization, harvesting and preservation techniques, which affect productivity, nutritional content and market value.
- Lack of skilled personnel to carry out different processes on the farm or to advise production schedules.
- Lack of adequate farm machinery and skills for operation and maintenance.
- Lack of equipment for testing products to establish the nutritional values ahead of selling.
- Minimal or general lack of innovation across the chain

Despite the above listed operational gaps and limitations, commercial fodder production has been growing – and it has potential to grow further with enhanced management skills and proper mechanisation

## Hay Demand and Markets

Intensified livestock production systems are leading to a shift towards greater off-farm feed resources hence growing feed and fodder markets as response to growing demand from smallholder livestock producers. Progressive smallholders and medium scale commercial dairy producers have a large demand for forages as they can't grow and preserve sufficient quantities on-farm due to lack of adequate land, skills and/or capital for mechanisation. In addition, the lucrative dairy farming in peri-urban areas where market is assured but no land for fodder production and preservation and the high costs of dairy meals and raw materials/feed ingredients imported from neighbouring countries also increase the demand for good quality forages. High sales prices of preserved forages despite the low quality are indicative of a high unmet demand.

## Fodder Policies, Regulation and Standards

The Importation and distribution of new fodder varieties into the Kenyan market is regulated by Kenya Plant Health Inspectorate Service (KEPHIS). A proper investigation and certification by KEPHIS is a prerequisite for penetration of Kenyan market with new fodder seed varieties. The investigation and certification involves:

- Certification of the quality of seeds and fertilizers.
- Testing and monitoring the presence of harmful residual agro-chemicals on agricultural produce, soils and water systems.
- Co-ordination of the release of superior and well-adapted varieties/cultivars to the farming community.
- Protecting the rights of the breeders/discoverers of new plant varieties through grant of rights to the owners of such varieties and registering them.
- Preventing introduction into the country of harmful foreign weeds, pests and diseases through adherence to strict quarantine regulations and procedures.
- Inspecting and grading agricultural produce for import and export to ensure that they are of high and acceptable quality.
- Implementing the national policy on the introduction and use of genetically modified plant species, insects and microorganisms in Kenya.

Efforts have been exerted to introduce labelling requirements for hay regulated by the Kenya Bureau of standards (KEBS). However, given the developing fodder market, priority should be on establishing good practices rather than on regulation.

### ***3.14. Potential for Fodder Production in Somalia***

Hussein Haji<sup>1</sup> and Abdullahi Araye<sup>2</sup>

<sup>1</sup>Somali Agricultural Technical Group (SATG), Somalia

<sup>2</sup>Director Animal Production, Ministry of Agriculture, Somalia

## Introduction

An estimate made in 2015 shows that Somalia has a livestock population of 40 million head including 13.9 million sheep, 13.2 million goats, 7.1 million camels and 4.8 million cattle. In the

same year, Somalia exported to the Middle East a record of 4.9 million goats and sheep, 295,000 cattle and 72,000 camels generating revenue of 380 million USD.

Available feed resources include maize and sorghum stover, natural pasture (grasses and browses), sesame cake and feed additives mainly minerals (salt) and imported vitamins.

### Indigenous grasses

The following table shows the major indigenous grasses in Somalia and their descriptions.

Table 1. Common indigenous grasses of Somalia

Scientific name	Description
<i>Chloris gayana</i> (caws gaduud)	The variety is identical to the domesticated Rhodes grass. At open grazing, the grass attracts cattle/goat/sheep/camel than other grasses due to its palatability. The grass is predominantly found on the upper side of irrigated canals or the periphery of flooded areas.
<i>Sorghum halepense</i> (makadeey)	Is identical to the domesticated Sudan grass. The grass is annual and produces huge fresh herbage for livestock feed. The bulky forage is predominantly transported to urban cities than other grasses. The grass produces too much shattering seeds. Seed viability and self-regeneration capacity is very high.
<i>Panicum</i> spp. (caws geereed)	Has huge rhizomes. It is resistant to drought condition. It is perennial grass.
<i>Cynodon</i> spp. (kurdo)	Stoloniferous perennial grass predominantly found in irrigated farms.

### Seed and Fodder Production

There is no forage seed production in Somalia. Seed for various species is generally introduced from Kenya for testing its adaptation. Napier Grass is among the species highly adapted to the condition. Filsan, the private arm of SATG is now introducing a seed multiplication system of various crop species.

There is no company that produces fodder in Somalia for commercial purposes. In addition to the natural grasses, there is about 200,000 ha planted to maize and sorghum. All the stalk is sold in the market as animal feed and some are left in the field for grazing

### Challenges

- Poor functional government and security issues in the agriculture sector
- No seed production system in place neither for local nor for imported grasses
- Nor research and extension services
- No seed policy and regulations
- Financial institution are just emerging
- Donor support-only on emergencies

### Opportunities

- Three years development plan by government institutions

- Increasing demand for fodder production-40 million animal heads to be fed.
- Diaspora interest to invest in Somalia
- Donor interest on long term development programs
- A wake up call from the current (2016/17) drought

### **The Way Forward**

- Research and extension services
- Encouraging the establishment of private fodder seed production system
- Encouraging the establishment of private fodder production farms both small scale and commercial farms
- Government seed policy and regulation
- Supporting the market system

### **Key points discussed and highlighted**

1. Is your organization private commercial enterprise or part of government system?

We were working as NGO previously but now working in the private business.

2. How is the production objective and modality of sorghum production?

The main objective of sorghum production is for food and byproduct/crop residue as feed.

3. How do you finance your activity?

For commercial business, own fund through selling of share but in the case of other development interventions through accessing fund from donors.

## **4. Field Visit**

On 07 April 2017, the workshop participants visited a dairy and fodder farm very close to Nakuru town. Mary and her husband are the owners of the farm, which has been inherited from Mary's parents. The farm produces Boma Rhodes grass hay for own use at the dairy farm as well as for sale to other livestock keepers in the area. There are seven fields of 14 acres each designated Rhodes grass forage and seed production. The forage is produced under rain-fed conditions and can be harvested twice or thrice a year. The rainfall in the area is bi-modal. The long rainy season is from March to May whereas the short rainy season extends from October to December. Rhodes grass can stay productive only for four years. But after four years it has to be replaced.

The farm also has two silage pits for making silage from maize and sorghum. The sorghum produced is dual purpose type. Mary, the owner and manager of the farm, indicated that silage



can save a lot. Kikuyu grass (*Pennisetum clandestinum*) also grows in the area and can be used for making good silage.

The farm has the necessary machinery and implements for every activity of the farm including tractors and implements for land preparation (plowing, harrowing, disking, planting, harvesting, baling. During planting of forage seeds, saw dust is added to the seeds to protect the seed from being taken away by wind. The hay is stored in hay shed until disposed either for own use or by selling.

## 5. General Discussion

### ***5.1. Reflections from the field trip to fodder and dairy farm in Nakuru area***

The following suggestions and comments were given concerning the field in a discussion held after the visit.

**Hay storage condition:** The participants commented that storing the grass hay on the ground could predispose the hay to contamination with aflatoxin and suggested building a raised structure (about 3 ft high from the ground) for safe storage of the hay.

**Species of forage crops:** Some participants asked if the farmer can diversify the forage species used for hay production i.e. if they can include other forage species in addition to the currently grown Boma Rhodes grass. They further asked whether the farmer can assess the potential of using forages such as *Bracharia* or *Panicum* spp. and even legumes such as alfalfa. The owner and manager of the farm, Mary, indicated that they are in the process of introducing *Bracharia* in collaboration with Kenya Agricultural and Livestock Research Organization (KALRO).

**Separating forage production from the dairy:** It was suggested to separate milk production from the forage production enterprise. Separately recording the inputs and outputs of each enterprise separately will clearly understand which enterprise is more profitable. This is particularly important to identify the potential of fodder production as a source of income. It was also suggested to link up the farm with Egerton University and Research station in order to assess forage and milk production levels in the farm and identify possible interventions.

**Advice of another Kenyan farmer:** The chairman of Kavatini Pasture and Livestock Improvement Group, Mr Jeremiah M Ngaya, advised the commercial farmer to share modern technologies with the surrounding smallholders farmers and to grow together to create a positive attitude about the farm.

The following are other issues discussed during the final plenary discussion.

### ***5.2. Incentive mechanisms for fodder and fodder seed production***



The incentive mechanism and support system to facilitate private sector investment in fodder and fodder seed production and marketing in the different member countries was highlighted by participants from the respective countries as follows.

**Ethiopia:** It was indicated that the Ethiopian Development Bank could provide financial loan up to 70% of the investment cost if there is good feasibility study and after appraisal of the project. However, the private sector actors engaged in fodder and fodder seed production indicated that it is difficult to get access to land for their operation. As a result they depend on land rented from other investors for basic seed production and they use contractual out-growers scheme for certified seed production that can be sold to the end users. Other problems raised in the Ethiopian case were the value added tax (VAT) imposed on all feed items, except compound feed for poultry, the high import tax levied on feed supplements and additives imported from abroad. In addition, the probation of export of feed or fodder from Ethiopia could serve as disincentive for vibrant private sector engagement in the business.

**Djibouti:** The participants from Djibouti indicated that there is no problem of taxation within the country and the overall condition is conducive for investment. It was indicated that there is no tax on feed and livestock production activities.

**Kenya:** The feed commodities are taxed in the country. The increase in the price of feed due to taxation forced farmers to move to the cheap feed like production of fodder maize. The search for cheap feed is exposing the livestock industry to poor quality feed and feed safety problems such as exposure to aflatoxin contamination. There is subsidy for fertilizer for crop production but no such emphases for livestock inputs. Thus, forage seed becoming unaffordable to farmers. There is no system in place for grazing management that supports cross-boundary mobility of animals. The potential of the pastoral system is misrepresented and the pastoral system is labeled as having low potential.

**Somalia:** Appropriate policies and banking are not currently in place in Somalia because the country did not have a central government for about two decades. However, the Government of Somalia is working towards putting the necessary policies in place. Currently there is no taxation on agricultural machineries and fertilizers..

**South Sudan:** Forage production at the commercial level has not started yet. Currently the country is more focused on the conservation of excess feed that is naturally available during the rainy season. Political will and conducive investment environment is needed to promote investment. South Sudan has developed a 25 years comprehensive agriculture development program to guide the agricultural and livestock development efforts of the country. Allotment of grazing land, provision of water, forage development and early warning system are the issues have been focused

**Sudan:** Sudan is providing different incentive mechanisms for investment in livestock and fodder production activities as stipulated in Investment Encouragement Act. One of such incentive measures is the exemption of any kind of tax in agricultural investment corridor. There is also specialized bank that provides loan for investment in livestock and fodder production. The Animal Resources Bank provides loan to support small agribusinesses (microfinance) for

investment in the livestock sector encourages the private sector through partnership and supports export of livestock and livestock products. Investors can also lease land with nominal fee. Its objective is to encourage private sector to participate in the animal business. Government also encourages export of feeds

**Uganda:** The government provides stimulus for enhancing agricultural production and marketing through networking and market linkage between producers and buyers. There is no financial support/incentive in place. The government recently provided 42 tractors with implements to support fodder and fodder seed producers and distributed to various farmers organizations in the country to ease their workload in fodder and fodder seed production. The government extends agricultural credit facility to farmers who are involved in fodder and fodder seed production as an incentive to produce much more and as a system for climatic change adaptation mechanism. The government owned Posta Bank manages government funds through individual farmer credibility system. However, it was indicated the process to get credit is very slow and cumbersome. The government also issues land titles to enable fodder/fodder seed producers to have a secure collateral material for securing soft loans for agricultural production.

### ***5.3. Key summary of good practices and lessons***

There is increased private sector (including private entrepreneurs, farmers or pastoral cooperatives, youth groups, and individual smallholder farmers or pastoralists) interest and engagement in forage and forage seed production and marketing. At the same time, there is increasing engagement of research and development organizations in providing technical support and conducting adoption studies.

Recent comparative net benefit studies of cultivated forages versus other crops, although limited, showed that production improved forage crops compares very well with crop production both under rain-fed and irrigated conditions. For example, irrigated Rhodes grass was found to be comparable with other irrigated crops at Koga irrigation scheme in north western Ethiopia.

In recent years there is increasing commitments by governments and exemplary practices of irrigated fodder production along river basins in the pastoral areas.

There are good examples fodder conservation as hay or silage from Kenya, Sudan, Ethiopia and Uganda. Production of fodder tree leaf meal such as *Leucaena leucocephala* leaf meal is another possibility of conserving forage for dry season. Forage legumes leaf meals are rich in protein and could be used as a component of concentrate mixture, fully or partly replacing oilseed meals.

Forage and livestock development interventions Sudan was based on prior assessment of the livestock and feed resources base and identification of gaps in feed supply. In order to address the feed gap, Sudan encouraged engagement of large scale private companies in irrigated high quality fodder production such as sorghum and alfalfa using both surface and center pivot irrigation. Moreover, the irrigated fodder production schemes are undertaken in the desert part of the country without affecting the land used by the pastoral communities.

The irrigated commercial fodder production scheme in Sudan is based on the notion that agriculture and animal production are promising areas of investment and fodder is produced both for export and local supply augmented with value addition through processing (drying, baling, pelleting etc.).

Some member countries, notably Sudan and Uganda are providing incentives to small and large scale private sector actors engaged in forage and forage seed production in the form of tax waivers and subsidies and duty free import the necessary machineries.

#### ***5.4. Workshop Recommendations***

The workshop recommendations have been categorized under three major categories viz. scaling up of the good practices, capacity building and strengthening the regional range and forage platform that was initiated some time back.

##### **Scaling up**

- Good practices and experience sharing visits have to be documented so that others can learn the good practices being practiced elsewhere in the region.
- Efforts should be made to convince the African Development Bank to support developments efforts in fodder sector in the region.
- Overreliance on single fodder species (e.g. Rhodes grass) should be avoided by expanding the species base to be used.
- The impact of taxation on the development of the livestock and fodder sector in the region should be assessed very critically and should be addressed at policy level in each member state.
- It is important to engage the policy makers for the purposes of enhancing sound policy formulation and implementation.

##### **Capacity building**

- Capacity building gaps varies from country to country and needs to context specific.
- Appropriate awareness creation and/or training should be given to the actors involved in the fodder and fodder seed sector including the government extension and regulatory bodies as well as smallholders, cooperatives and the private sector actors engaged in livestock and/or fodder/fodder seed production and marketing.
- The extension system should be strengthened in terms of human (number, experience and technical knowledge and skills) and physical resources (facilities) to be in a position to effectively support smallholders as well as the private sector. Strengthen capacity of the extension system for supporting the private sector
- The private sector should consider building own extension capacity and should work closely the public research and extension system.
- In the face of recurrent droughts affecting the region with huge negative impacts, it is imperative all member states consider enhancing development of capacity for establishing feed reserves at strategic locations.

- The private sector actors should consider engaging and capacitating out grower to increase seed availability and forage production.

#### Strengthening regional platform

- The Regional range and fodder platform is necessary for sharing lessons, experiences and challenges; and for advocating for change of unfavorable policies that may hamper development of the livestock and fodder sector in the region.
- Proposals should be prepared by a selected group of experts drawn from the region to mobilize resources to support activities of the platform.
- The experts, responsible government agencies and development partners in each member state should look for funds to support establishment of a national platform in each member state.
- It is necessary to harmonize policies so that countries can collaborate in cross border trade and livestock movement.
- The country platforms should be linked to the regional platform.

## 6. Closing remarks

### **Closing remark by Dr Ameha Sebsibe, Head of Livestock, ICPALD/IGAD**

In his closing remark, Dr Ameha appreciated all the participants for their active participation. He also highlighted what the regional body, ICPALD/IGAD, can do or facilitate and reaffirmed the commitment of ICPALD to work closely with the member states and partners. He also emphasized the need for the member countries to work together to better utilize the huge livestock resources potential of the region. Finally Dr Ameha stressed the potential for export of livestock, livestock products (meat) and animal feed as there is a huge demand in the Middle East and North Africa (MENA) countries. He also emphasized that the IGAD member countries individually and in some respects collectively as a region (such as on issues of trans-boundary animal diseases) should meet the requirements of the importing countries to make use of the opportunities.

### **Closing remark by Mr Jeremiah M Ngaya, a farmer from Kenya**

Mr Jeremiah M Ngaya made the final closing remark. In his remark, Mr Jeremiah M Ngaya thanked the participants on behalf of Kenyan farmers and on his own behalf. He said “Being together we have strength”. He also further added “As a farmer, I am happy seeing you recognizing us, farmers and giving us a voice”. He also thanked ICPALD/IGAD for the recognition and for inviting him as a presenter to share his experiences to other and learn from the experiences of other. Mr Ngaya finally said expressed that the participants might have seen good and bad practices and he advised them to pick and use the good ones and leave behind those that are not good.

## 7. Annexes

### Annex 1. Regional Workshop to Promote Good Practices on Improved Fodder and Fodder Seed to Private Sector for Increased Investment

**Tentative agenda**  
**Naivasha, Kenya April 6<sup>th</sup> - 7<sup>th</sup>, 2017**

<b>April 6, 2016</b>		<b>Responsible</b>
<b>Time/Session</b>	<b>Activity</b>	
<b>08:30-09:00</b>	<b>Registration</b>	
<b>9:00-9:15</b>	Introduction of Workshop Participants	All
<b>9:15 - 9:25</b>	Welcoming Remarks , Director, ICPALD	ICPALD Director
<b>9:25 - 9:35</b>	Official Opening, Kenya Ministry of Agriculture, Livestock	Representative of Kenya
<b>9:35 - 9:40</b>	Adoption of the agenda	ICPALD Director
<b>9:40 - 9:50</b>	Objectives of the Workshop	Dr Osman Babikir
<b>9:50 - 11:20</b>	Presentation on Good Practices On Fodder and Fodder Seed: regional and Global Experiences	Consultant
<b>11.20 - 11.30</b>	<b>Health and Tea Break</b>	All
<b>11:30 - 12:05</b>	Plenary Discussion	All
<b>12:05 - 12:35</b>	Experiences On Fodder/Fodder Seed Production and Marketing: A Cooperative Approach from Ethiopia	Mr Ismail Handule Kulmiye Agric. Cooperative
<b>12:35 - 1:05</b>	Experiences of the Private Sector On Fodder/Fodder Seed Production and Marketing: A Case of DAL Agric. Group, Sudan	Dr Mohammed Sayed DAL Agric. Group, Sudan
<b>1:05 - 2:00</b>	<b>Lunch Break</b>	All
<b>2:00 - 2:25</b>	Plenary Discussion	All
<b>2:25 - 2:50</b>	Experiences On Alfa Alfa Production and Marketing Under Centre Pivot Irrigation In Sudan	Prof Ahmed Eltayeb Alarak International Company, Sudan
<b>2.50 - 3:20</b>	Experiences of the Private Sector On Fodder/Fodder Seed Production and Marketing: A Case of Community Based Organization from Kenya	Dr William N. Mnene
<b>3:20 - 3:40</b>	Plenary Discussion	All
<b>3:40 - 4:10</b>	Linking Forage/Fodder Producers To research and Technical Advisory Through Testing of Good Varieties: The Experience of Somali Agricultural Technical Group (SATG)	Dr Hussein Haji
<b>4:10 - 4:35</b>	Experiences of the Private Sector On Fodder Seed Production and Marketing: A Case of Pasture Seeds Producer from Uganda	Mr Elison Tumusiime

<b>4:35 - 4:50</b>	Plenary Discussion	All
<b>4:50 - 5:10</b>	<b>Health and Tea Break - End of Day One</b>	All
	<b>DAY 2 (April 7, 2017 )</b>	
<b>8:30-11:30</b>	Field Visit to a Fodder Farm in Nakuru	All
<b>12:30 - 1:00</b>	Back to Workshop Venue	All
<b>1:00 - 2:00</b>	<b>Lunch Break</b>	<b>All</b>
<b>2:00 - 3:30</b>	Reflections on the field trips, Recommendations and Way forward	All/Facilitator
<b>3:30 - 4:00</b>	Closing remarks and end of day two	ICPALD
<b>4:00 - 4:30</b>	<b>Health and Tea Break</b>	<b>All</b>

Annex 2. Regional Workshop on Promotion of Good Practices on Fodder/Fodder Seed,  
Elementiata, Kenya, 6- 7<sup>th</sup> April, 2016

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