

Report on small-scale mechanization opportunities for feed and forage production in Mali

- CGIAR Sapling initiative -



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Contents

1. Introduction	3
2. Public sector - Rural Economy Institute (IER) – Agricultural Mechanization Experimentation and Training Center (CEEMA).....	3
3. Private enterprises	4
3.1 Agricultural small-scale machines importing enterprises.....	Error! Bookmark not defined. 4
3.2 Agricultural small-scale machines manufacturing enterprises.....	5
3.2.1 Bamako.....	5
3.2.2 Sikasso.....	5
3.2.3 Segou.....	5
4. Farmer organizations and innovation platform.....	6
4.1 Sikasso.....	6
4.1.1 Innovation platform (IP) in Farakala / Sikasso.....	6
4.1.2 Women farmer group Wutango in Farakala.....	6
4.2. Segou.....	7
4.2.1 Union of Cooperative Societies of Tamani Breeders (USCET) & NGO Lutheran World Relief (LWR).....	7
4.2.2 Union of Farmer groups in Baroueli.....	8
4.2.3 Association of women pastoralists.....	8
5. Conclusion and recommendation.....	Error! Bookmark not defined. 8
Annexes.....	9

1. Introduction

Small scale mechanization offers large opportunities for small scale farmers in Mali to improve efficiency and effectiveness in different areas of agricultural production. The SAPLING initiative is particularly interested in the use of small-scale mechanization for livestock production. Improved utilization of feed and forages could reduce wastages, increase production and income of smallholders. It could also serve as a business opportunity for youth and farmer groups..

To investigate and identify opportunities regarding small-scale mechanization in SAPLING, a study was carried out from 05. - 18. July 2023 by Udo Rudiger (ICARDA – Tunisia), Zied Idoudi, (ICARDA – Tunisia,) Amadou Sow (ILRI – Mali) and Idrissa Sacko (IER – Mali). The specific objectives of the study are as follows:

- i) Identify role of Minister of Agriculture (MoA), public research institutions and partners in small scale mechanizations
- ii) Identify role of private sector in providing small scale mechanization solutions
- iii) Discuss business opportunities with farmer groups, NGO and innovation platforms

2. Public sector - Rural Economy Institute (IER¹) – Agricultural Mechanization Experimentation and Training Center (CEEMA²)

The agricultural mechanization experimentation and training center CEEMA was created in 1970 and has become part of IER in 2001. A mechanization program has started in 2004. Its mission is to promote agricultural mechanization all over Mali. The major objectives are : i) research and experimentation, ii) training of farmers and machine manufacturers, iii) technical support. Mechanization is mostly developed in the south of Mali, with about 40% of farmers using normal or two-wheel tractors in Sikasso region and 30% in Segou region.

According to Dr. Sala Guindo Sekou, the director of CEEMA, a national agricultural mechanization strategy has been developed but needs to be validated by the parliament. It includes the need for improving large- and small-scale mechanization to foster the different agricultural sectors. There is a public subsidy program for farm machinery like tractors and farm implements. Subsidy levels vary between 50 -80 % depending on the type of machine. The subsidy goes directly to the manufacturer or importer of the machine.

Although most machines are imported, there is a growing sector of locally produced farm machinery. Small feed pelletizers, choppers, grinders, solar dryers, straw press, etc are produced locally but do not always fulfill security and environmental standards. This applies not only for locally but also for some imported machines (mainly from China). CEEMA is often demanded by private machine importers to adjust machines to local conditions and improve quality standards.

¹ IER = Institut d'Economie Rurale

² CEEMA = Centre d'Expérimentation et d'Enseignement du Machinisme Agricole

CEEMA collaborates with a variety of donors like GIZ for tractor driver training and FAO for the development of an implement to smoke fish. Besides they developed a variety of machines, like grinders, choppers, pelletizers, seed cleaning units, silage maker and straw bail press.

CEEMA also collaborates with CRPA³. These are rural centers providing mechanization services like ploughing, sowing, or harvesting to farmers. Ten of them have been installed by the government and are equipped with the necessary machinery.



Figure 1: Chopper at CEEMA (U.Rudiger, 2023)

3. Private enterprises

3.1 Agricultural small-scale machines importing enterprises



Figure 2: Imported pelletizer (U.Rudiger, 2023)

There are a variety of small-scale agricultural machinery importing enterprises. In general, they are not specialized and sell the machinery as a part of different equipment like construction materiel, etc. They are simple traders with little technical knowledge of the agricultural machines and do not provide after sale service like installation and training of machines. Even spare parts are not always available.

An example is The Ets Moustapha Cisse in Bamako who imports machines like a grass chopper (1.6 Mio FCFA), a combined grinder / mixer (3.5 Mio FCFA) with a capacity of 1 t / h and feed pelletizers, same model as the Tunisia Juhaina model, only with different energy source (Diesel engine) as Mali farmers have no access to electricity (220 V). Price of a 500 kg / h pelletizer is 1.6 Mio CFA (2,700 \$) including engine. He has spare parts, but he doesn't provide after sale service like repair, nor installation. There was no machine importer found in Sikasso.

³ CRPA = Centre Rural des Prestations Agricoles

3.2 Agricultural small-scale machine manufacturing enterprises

3.2.1 Bamako

The most experienced manufacturer in Bamako is the Ets Bamba. He manufactures combined grinders - choppers (1,500 \$), combined grinders / feed mixers with a capacity of 1 t / h (6,500 \$), pelletizers (3,000 \$), and straw bailing press machine (2,500 \$). He also can provide the whole feed processing chain composed of grinder – mixer – pelletizer for 9,000 US (capacity 500 kg / h) or for 12,000 \$ (capacity 1 t / h). Bamba can assure transport, install the machine at beneficiary's place and train the operators, but doesn't provide guarantee. The average delivery time is two months.



Opportunity: SAPLING could collaborate with BAMBA and order a complete feed producing chain for a farmer group

Figure 3: Locally produced straw bailer and pelletizer (U.Rudiger, 2023)

3.2.2 Sikasso

Three local manufacturers have been visited. The most promising one is Kena forage. He manufactures straw bailing machines, grinders (1,2 Mio FCFA), combined grinder - mixer (3,5 Mio FCFA), seeders, but no pelletizer. He gives one-year guarantee. Delivery takes one month. He provides after-sales service.

Two other manufacturers are MetalB.dia and Forge Metallique Kenedegou. They are not specialized on agricultural machinery. They only produce grass choppers and grinders (1.7 Mio FCFA).



Figure 4: Chopper manufactured by Kena (U.Rudiger 2023)

3.2.3 Segou region

The private enterprise SOCAFON, being based in Niono, Segou region is part of the newly created Innovation Platform (IP). They are very ambitious and can be considered as the most professional of all the private agricultural machine manufacturers we exchanged with. They are engaged in research and adaptation, training, and production of agricultural machines. They work on a large variety of machines like grinders, choppers, pelletizers, straw bailing press machine, seed treatment units, power tillers, mini tractors, mowers, silage machine. They have never worked on a pelleting machine but are interested in this technology. Unfortunately, SOFACON production site could not be visited due to security constraints.

4. Farmer organizations and innovation platform

4.1 Sikasso

4.1.1 Innovation platform (IP) in Farakala / Sikasso

Established in 2016 as part of the “feed the future” project – the IP, comprising 216 members (50% of whom are women), operates in the rural commune of Farakala, catering to 12 villages. Its core mission revolves around enhancing livestock production in the intervention areas, encompassing animal health, nutrition, commercialization, and market access, with a particular emphasis on forage seed production, notably, brachiaria, panicum and mucuna. This strategic focus stems from the recognition of livestock as a vital income source in this region.

They possess a clear vision for their future projects, which includes formalizing the platform as a GIE "Groupement d'Intérêt Economique" to facilitate economic activities around livestock and ensure the platform's long-term viability. They plan to establish a feed production unit, develop, and sell novel feed formulas, and explore the potential of mucuna as an ingredient for feed diets due to difficulties in selling their harvested production in the past few years. Another medium-term goal is to ensure the delivery of high-quality meat by establishing collective feedlots. SAPLING's research findings will be pivotal in achieving these objectives. The ongoing work of assessing available feed ingredients using G-FEAST to develop a database on feed resources in the project sites will play a crucial role in developing new feed formulas, including pellet composition, and validating/adjusting the existing IER ratios that can be locally produced by the platform.

The president (maire) of the IP has expressed interest in providing warehouse space to facilitate the installation of the feed processing unit and streamline processing activities. The IP has earned a well-established and reputable position in the Sikasso region, with strong connections to key national and regional entities such as IER, LCV, DRSV, DRPIA, and DRA, along with local actors, NGOs, and private sectors. Notably, the platform has established a partnership with Agri-Sahel to market their production of forage seeds, primarily for brachiaria and panicum.

Additionally, the IP maintains a robust collaboration with local MFIs, particularly "Kafo Jiginew" to assist its members in obtaining loans."

4.1.2 Women farmer group Wutango in Farakala

The group has existed since 2016 and has 20 members. Their main activity is feed block and forage production and marketing. Feed block production only takes place between January and April. Total production in 2023 was only 3 tons. Demand for blocks is very limited after April. Major ingredients they use are: wheat bran, rice bran, cotton cake, Urea, DAP, salt, molasses and ciment. They have a grinder, but it is frequently broken as it is getting old (since 2017).



Figure 5: Feed block produced by women farmer group (Z.Idoudi, 2023)



Figure 6: Broken grinder of farmer group (Zied Idoudi, 2023)

The women group is very interested in the feed pelletizing technology as pellets have competitive advantages over blocks like easy drying, better portioning, easy transport, package, and storage, etc. The group collaborates with two MFI (take loans) and has a saving of 1,500 \$. But for a potential pellet business they need business support services (training, coaching, etc)

4.2 Segou

4.2.1 Union of Cooperative Societies of Tamani Breeders (USCET) & NGO Lutheran World Relief (LWR)

Established on November 09, 2012, and officially recorded in the directory of cooperative societies on November 19, 2012, the Union of Cooperative Societies of Tamani Breeders possesses a robust administrative, logistical, and technical infrastructure; reinforced by a skilled field support staff comprised of project coordinators and five (5) local agents holding university degrees. At its core, the union is dedicated to various domains, including: i) Livestock: Focused on sheep, cattle, and goat fattening, as well as the marketing of livestock feed and ensuring animal health, ii) Agriculture: Actively involved in forage seed production, enhancing agricultural productivity, cereal marketing, and implementing the SAP (System of Agro-pastoral Production), and iii) Gender-based activities: promoting gender equality and empowering women in both the agricultural and livestock sectors.

The Union showcases an impressive membership, with 2,902 livestock producers, among whom 1,902 are women. They operate across 42 cooperatives, spanning 59 villages within the Baroueli cercle, predominantly in rural communes such as Tamani, Baroueli, Konobougou, Boidie, Dougoufie, Somo, and others. Remarkably, USCET's reach extends to nearly all the targeted communes of SAPLING in Ségou Site. Under the support and collaboration of the "Lutheran World Relief (LWR)", USCET has successfully executed seven projects in Ségou since 2012, acting as the contracting-implementing organization. These projects have primarily revolved around livestock production, encompassing crucial aspects such as animal health, nutrition, and forage production.

Presently, the union is engaged in a development initiative managed by LWR and called "Sini – Nie – Sigui" through its RESILIENCE component, providing assistance to farmer cooperatives with a primary focus on enhancing livestock aspects, particularly animal feeding. Notably, in April 2023, USCET distributed four grinders to farmer groups situated in the rural communes of Tamani, Boidie, Dougoufie, and Somo. The distribution of these grinders aims to create income-generating opportunities for the farmers while simultaneously improving the quality of feed produced. Interestingly, there is a geographical overlap with the SAPLING intervention area, presenting a potential opportunity for collaboration in feed processing support. However, it's worth noting that the INGO's project is scheduled to conclude in September 2023.

4.2.2 Union of Farmer groups in Baroueli

The union of 13 livestock farmer cooperatives is mainly engaged in collecting data of member cooperatives and sale of animal feed. In 2022 they sold 80 tons of feed to their members. Their future vision is to sell mineral fertilizer and produce and sell feed. The union has a common selling point (shop) and warehouse. They could use maize bran, cotton cake, Acacia albida grains, groundnut and niebe crop residues to grind and produce compound feed for their members. The union could be an interesting actor to collaborate with regard to feed processing and commercialization.

4.2.3 Association of women pastoralists

This association has no common business activity. Members are producing their small ruminants (mainly goats) and sell individually. Role of the association is mainly social (exchange and support of members in need). They are not using feed concentrates. That's mainly used for large ruminants (by men). Agricultural mechanization is unknown.

5. Conclusion and recommendations

- i) Carry out a market survey to evaluate the opportunities for locally produced compound feed (e.g feed pellets and concentrates) in the SAPLING intervention zone (Segou and Sikasso). This could be done by an Agro-economists of IER
- ii) Develop a business plan for feed pellet production by women farmer group in Farakala. This can also be done by an Agro-economist of IER, if necessary being supported by ICARDA (Udo)
- iii) Consider the complete feed producing chain composed of grinder – mixer – pelletizer, manufactured by Bamba in Bamako as the most suitable machine (ca. 9,000 \$) for the women group in Farakala if market survey and business plan are promising.
- iv) Use the developed feed ratio (by Tunde, ILRI) and organize feed processing trainings and marketing training for the women group once the machine is installed.
- v) Collaborate with IP Farakala for access to production place, warehouse, credit and markets for the produced feed pellets
- vi) Collaborate with both SOCAFON and IER/CEEMA to scale local feed pellet production technology using local pelletizers. A potential PPP could be developed
- vii) Select and install three IPs (out of six sites) in Segou region
- viii) There is a geographical overlap between SAPLING's intervention area and that of USCET/LWR in Ségou, presenting a potential opportunity for collaboration in feed processing support.
- ix) Consider the union of farmer cooperatives in Baroueli as a potential feed producing partner, which could be supported with a feed processing unit as there is a clear feed demand (80 t / year). The union has facilities and experience in feed marketing.
- x) If SAPLING budget or co-financing allows, other machinery like a small seed cleaning unit, a power tiller driven grass or legume mower and/or a straw bailer could be purchased to strengthen farmer organizations, increase production and income and reduce workload.

Acknowledgment

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Annex 1: Mission program

Date & Lieu	Activités	Temps	Equipe/Responsable	Groupe Cible
Mardi 04/07/23 Bamako	Arrivée à Bamako (Hôtel Villa Soudan)		Udo Rudiger (ICARDA) Zied Idoudi (ICARDA)	
Mercredi 05/07/23 Bamako	<p>i) Visites & rencontres avec les structures étatiques du MINAGRI (IER, etc) qui travaillent sur la mécanisation agricole principalement les machines à petites échelles pour l'alimentation du bétail et la production du fourrage.</p> <p>ii) Visite des agences de développement et des initiatives (GIZ, etc) qui travaillent sur la promotion de la petite mécanisation agricole : Retours d'expériences & voies de collaboration</p>		Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	Structures de MINAGRI IER Projets & Initiatives de développement
Jeudi 06/07/23 Bamako	Réunion avec la Directrice de l'ONG Lutheran World Relier & exploration des voies de collaboration dans le domaine de la petite mécanisation agricole dans les sites de SAPLING		Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	Mme. Hazara Ouedraogo
	Visites d'exploration des fabricants et importateurs des petites machines agricoles			Fabricants locaux Entreprises Importateurs de machines agricoles
Vendredi 07/07/23 Bamako	Workshop Multiacteurs: Cartographie des parties prenantes (STH), analyse des réseaux sociaux et analyse multiacteurs/multi-objectifs des stratégies des parties prenantes au niveau national	9:00 a.m. – 1:00 p.m. (4 heures)	Zied Idoudi (ICARDA) Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	Tous les acteurs de la chaîne de valeur petits ruminants à l' Echelle Nationale
Samedi 08/07/23 Bamako	Suite Visites d'exploration des fabricants et importateurs des petites machines agricoles		Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	Fabricants locaux Entreprises Importateurs de machines agricoles
Dimanche 09/07/23 Bamako-Sikasso	Déplacement Bamako – Sikasso (Hôtel du CINQUANTAIRE)	7:00 a.m. – 00:30 p.m. (05h:30)	Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	-
Lundi 10/07/23 Sikasso/Farakala	<p>Visite de la plateforme d'Innovation de Farakala et exploration du potentiel de la petite mécanisation chez les différentes associations des producteurs y compris une visite de l'unité de fabrication d'aliments pour animaux (broyeurs, blocs multi-nutriments) à Farakala</p> <p>Visites d'exploration des fabricants locaux des petites machines agricoles à Sikasso</p>	09:00 a.m. – 05:00 p.m. (08h00)	Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER) Diakaridia Diabate (PI Farakala)	Les membres de la PI & associations des producteurs Fabricants locaux de petites machines agricoles
Mardi 11/07/23 Sikasso	Workshop Multiacteurs: <ol style="list-style-type: none"> 1- Cartographie des parties prenantes (STH), analyse des réseaux sociaux et analyse multiacteurs/multi-objectifs des stratégies des parties prenantes au niveau national 2- Potentiel de la petite mécanisation dans la chaîne de valeur petits ruminants : retour d'expérience de la Tunisie et l'Éthiopie 	9:00 a.m. – 2:00 p.m. (05h :00)	Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	Tous les acteurs de la chaîne de valeur petits ruminants à Sikasso

Mercredi 12/07/23 Sikasso-Ségou	Déplacement Sikasso-Ségou (Hôtel Vue de l'Esplanade ou Hôtel Djoliba)	8:00 p.m. – 1:00 p.m. 05h:00	Zied Idoudi (ICARDA) Udo Rudiger (ICARDA) Ahmadou Sow (ILRI) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	-
Jeudi 13/07/23 Ségou	Workshop Multiacteurs: 1- Cartographie des parties prenantes (STH), analyse des réseaux sociaux et analyse multiacteurs/multi-objectifs des stratégies des parties prenantes au niveau national 2- Plateforme d'Innovation Multiacteurs : Considérations générales & points de débat 3- Potentiel de la petite mécanisation dans la chaîne de valeur petits ruminants : retour d'expérience de la Tunisie et l'Éthiopie	9:00 a.m. – 2:00 p.m. (05h :00)	Zied Idoudi (ICARDA) Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	Tous les acteurs de la chaîne de valeur petits ruminants à Ségou
Vendredi 14/07/23 Ségou/Niono	Visite d'exploration de la Société Coopérative Artisanale des Forgerons de l'Office du Niger SOCAFON à Niono – Retour d'expérience sur le volet de développement des capacités des producteurs en matière de transformation des aliments pour animaux et de promouvoir les petits fabricants privés d'aliments du bétail/Projet Feed the Future Mali Livestock Technology Scaling Program (FTF-MLTSP)		Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER)	SOCAFON-Niono
Samedi 15/07/23 Ségou- Tamani/Bamako	Visites des sociétés/de coopératives des éleveurs à Baroueli/Tamani/Site SAPLING Retour à Bamako (Hôtel Villa Soudan) 1:00 p.m. – 6:00 p.m. (05h:00)		Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) Olivier Zannou (ILRI) XX (IER) Ibrahim Traore (USCET)	Coopératives des Éleveurs
Dimanche 16/07/23 Bamako	Pause et travail à l'hôtel		Udo Rudiger (ICARDA) Zied Idoudi (ICARDA)	-
Lundi 17/07/23 Bamako	Une réunion de restitution finale de la mission & Points d'action à entreprendre		Michel Dione (ILRI) – en ligne ? Mourad Rekik (ICARDA) – en ligne ? Abdou Fall (ILRI) – en ligne ? Ahmadou Sow (ILRI) Udo Rudiger (ICARDA) Zied Idoudi (ICARDA) Rein van der Hoek (CIAT) en ligne ? Olivier Zannou (ILRI) XX (IER) Hazara Ouedraogo (LWR) Autres à suggérer	
Mardi 18/07/23 Bamako	Retour en Tunisie		Udo Rudiger (ICARDA) Zied Idoudi (ICARDA)	