

Goat Community-Based Breeding Program in Mali

Follow-up on the progress in Ségou and exploring the CBBP potential in Sikasso

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December 2024



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Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo: Tesfaye Getachew, ICARDA – July 2024

Citation: Getachew, T., Coulibaly, D., Sacko, I., Zannou, O., Sow, A., Haile, A., Rekik, M., Tebourbi, O., Dione, M., Rischkowsky, B., Marshall, K. 2024. "Goat Community-Based Breeding Program in Mali: Follow-up on the progress in Ségou and exploring the CBBP potential in Sikasso". Nairobi, Kenya: ILRI.

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Background

- From the 18th to 26th of July, 2024, a collaborative research team from the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Livestock Research Institute (ILRI), and the Institute of Rural Economics (IER) conducted a first field mission to follow up on the progress of the Goat Community-Based Breeding Program that was implemented in Mali in 2023.
- This mission had two main focuses: 1. To monitor the ongoing goat Community-Based Breeding Program in Ségou region, and 2. To assess the potential of implementing a second CBBP in Sikasso region.
- Between the 20th and 21st of July, the team explored small ruminant production capabilities and the potential of implementing another CBBP in Sikasso, while activities in Ségou focused on data collection evaluation, feedback to communities, and training enumerators on using the DTREO platform. This included recording newborn lambs, monitoring weight and milk production, and updating disposal records on the 23rd and 24th of July.
- In September 2024, a second follow-up visit to Siguidolo Wère and Noukoula was organized by IER and included monitoring data collection, verifying DTREO database entries, and assessing herd conditions. Additionally, courtesy visits were made in the same occasion to local authorities, village chiefs, and community members to discuss progress and ensure administrative alignment with CBBP goals.
- This report summarizes the key findings and outcomes of these visits to the CBBP villages in Mali.

I. Follow-up and evaluation of the progress of CBBP activities in Ségou region

1. Evaluation of the progress of the Goat CBBPs – July 2024

▪ Animal identification and data collection progress

- Newborn lamb identification and recording and disposal records were taking place perfectly in both villages. However, we noticed a drop in recording in the Noukoula CBBP, as the enumerator Yah Coulibaly fell ill during and after May 2024. Regarding the three- and six-month weight measurements, Madou Togola did not carry out any recording, claiming unawareness, while Yah Coulibaly in the second village handled this task effectively.
- Milk recording was scheduled to be collected at week 1, week 5, week 9, and week 13, a process that was well-documented in both sites. Nevertheless, in Siguidolo Were village, the data appeared unreliable due to repeated records showing a consistent value of 50 ml, which contradicts the expected variation. This pattern was consistent across different animal owners too. Furthermore, we observed that the milk measuring cylinder began at 50 ml, leading the second enumerator, Yah Coulibali, to categorize quantities below 50 ml as less than 50 ml.
- We visited several flocks in each village to check and confirm data collection progress and found encouraging records in identification and recording of newborn kids. However, animals entering the flock were not recorded on both sites.



Figure 1. Visiting goat flock at Siguidolo Were village (Enumerator Madou Togola holding a kid)



Figure 2. Visiting goat flock at Noukoula village (Yah Coulibaly recording data with DTREO app after the training)



Figure 3. Visiting goat flock at Siguidolo Were village (Idrissa Sacko from IER checking record book with Madou Togola)

▪ Presentation of the feedback to the community

- Feedback based on the analysis of the baseline data collected in December 2023 was presented to key farmers with the aim of providing feedback and get their agreement on the reports.
- Flock structure, breed composition, coat colour proportion observed in their flock, productivity measures like prolificacy, pre weaning kid survival, and ranking of traits were presented to the farmers. In the report, out of the total registered animals of 539 in Siguidolo Wéré and 698 in Noukoula, proportion of breeding does were in 56% and 53.7%, breeding buck 2.4% and 2% in the Siguidolo Were and Noukoula villages, respectively (Figure 4). All the breeds were Djallonke in both villages and red coat colour is dominant, reaching 84% and 69% for Siguidolo Were and Noukoula villages, respectively. Prolificacy is similar in both breeds which is 1.16 kids per kidding however, pre-weaning kid survival is better in village Siguidolo Were (86%) compared to Noukoula (82%).

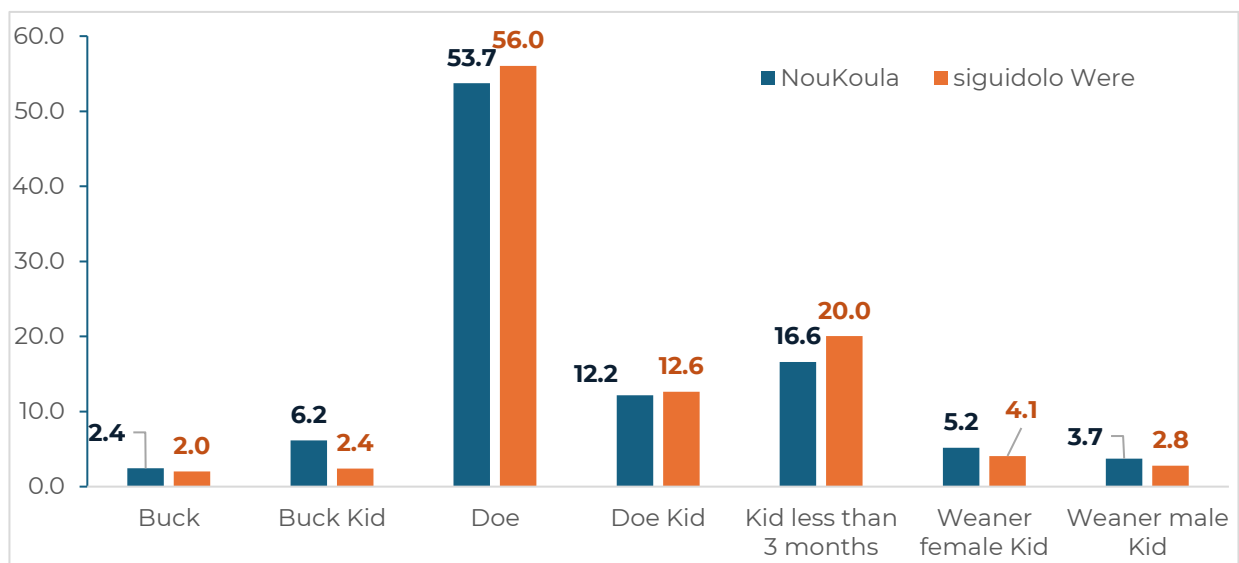


Figure 4. Flock structure in the two villages

- Flock ranking experiment results were also presented to the community (Table 1). The results of the flock ranking experiment were shared with the community.
- The majority of the traits and variables examined in the analysis, such as age at first kidding, kidding interval, litter size, doe performance in terms of kid growth, kid survival to weaning age, milk yield and lactation length, as well as breeding doe price and weight, significantly influenced ($P < 0.05$) the farmers' decisions on selecting the best breeding ewes, with the exception of pre-weaning kid survival. Based on the correlations and p-values, the ranked traits were as follows: dams' ability to promote fast kid growth ($r = 0.70$), price of does ($r = 0.64$), lactation length ($r = 0.62$), milk yield ($r = 0.61$), dam weight ($r = 0.60$), kidding interval ($r = 0.51$), number of kids born per kidding ($r = 0.42$), age at first kidding ($r = 0.30$), and pre-weaning survival ($r = 0.08$). Key farmers agreed with this ranking.

Table 1. Trait ranking and correlation among traits r - values below diagonal and p - values above diagonal

Traits	Trait Ranking	ER	AFK	KI	KG	MY	LL	WTP	BWT	DLS	PWS
Ewe ranking (ER)			**	***	***	***	***	***	***	***	***
Age at first kidding (AFK)	8	0.30		*	*	*	ns	ns	ns	ns	ns
Kidding Interval (KI)	6	0.51	0.25		***	***	***	**	**	**	ns
Kid growth score (KG)	1	0.70	0.25	0.59		***	***	***	***	**	ns
Milk Yield Score (MY)	4	0.61	0.27	0.39	0.67		***	***	***	**	ns
Lactation length score (LL)	3	0.62	0.09	0.40	0.70	0.68		***	***	**	ns
Willingness to pay (WTP)	2	0.64	0.20	0.30	0.47	0.57	0.42		***	**	ns
Doe body weight (BWT)	5	0.60	0.07	0.30	0.42	0.60	0.41	0.68		***	ns
Dam liter size (DLS)	7	0.42	-0.02	0.33	0.32	0.33	0.28	0.35	0.49		ns
Pre weaning kid survival (PWS)	9	0.08	0.03	0.12	0.04	-0.11	-0.05	0.06	-0.01	0.09	

*** significant at $p = 0.0001$, ** significant at $p = 0.001$, * significant at $p = 0.05$, ns = non-significant at $p = 0.05$.

- Farmers raised the point that dams showed a tendency to wean kids at an earlier age due to insufficient milk production and ask what type of feed interventions they need to increase doe milk production. Another point raised by them was that car accidents are killing most of their kids during grazing far from the villages. They also seek feeding and management interventions to keep kids around the home.



Figure 5. Feedback to key informant farmers and discussion

Way forward and tasks

- Both enumerators were trained on how to use DTREO app for data capture using training and we confirmed that they both demonstrate their ability to use app. Few animals from each add animal, add weight, disposal and weight record were sent to the cloud.
- Enumerators are required to upload all data on adding animals, weight, disposal, and milk to DTREO within one month for enumerator Madou Togola and within two months for Yah Coulibaly to complete the task.
- Madou Togola is tasked with conducting weight measurements for all lambs currently over three months old. Animals born before March will be weighed and recorded as six months old, with the actual measurement date noted. However, animals born from March to April 24th will be weighed and considered as three months old. Animals born after April 24th will follow the standard weighing schedule.
- Milk measurement, recording, and proper documentation of drying dates must be carried out carefully to capture the variability across all villages. Ensuring accurate drying date records requires consistent follow-up with owners, ideally by monitoring when kids stop suckling their dams.
- The identification and recording of new animals will be completed within a two-week timeframe in both villages.
- Procurement of breeding sires needs to be carried out as soon as possible. With the contract already signed between ICARDA and IER, Idrissa from IER has taken on the responsibility to discuss this matter with his boss and formulate a plan. It is mandatory to include a farmers' representative in the procurement committee.
- The predominant breed in both locations is Djallonke, with the team suggesting the introduction of the new breed Sahelian. However, further discussions with the community and scientists are necessary to evaluate the potential adaptability of the crossbreeds.
- Overall, the animal identification, performance tracking, and disposal recording processes in both villages are progressing well. Ahmadou Sow and the CBBP team in Mali deserve significant recognition for their efforts. Nonetheless, consistent follow-up through on-site visits and phone calls is crucial to upholding the quality of the data.
- Feed development and feeding intervention is crucial, particularly linking the community with the feed processing mill launched in the Baroueli commune is important to enhance productivity of goats.
- Following discussions on the flock ranking experiment with key informant farmers, the selection index will prioritize kid weight, dam milk yield, and reproductive performance metrics such as kidding interval and litter size.
- Training the farmers on the integrated package could improve their management of their herd in all the components.

2. Evaluation of the progress of the Goat CBBPs – September 2024

▪ Observations in Siguidolo Wéré village

In this village, the following activities were carried out:

- Visiting the animals: during this visit, it was noted that the goats were kept in two different ways. Some farmers grazed their goats, while others kept them in stalls on stakes, feeding them green fodder and grass. Goats kept in stalls were more overweight than those grazing. All the births were identified with rings, except for those during the week. During the visit, farmers reported a high incidence of diarrhoea and scabies. Farmers were advised to contact the veterinary service to identify the possible causes of diarrhoea. The animals have no shelter during the rainy season. Farmers say that the rain is a cause of skin diseases and mortality among kids.

- The mission then met with the goat data collector to check that the register was being kept correctly and that the data was being recorded in the DTREO database. Checking the register revealed a number of shortcomings in the updating of weights at standard age and milk measurements. Suggestions were made to the collector as to how to update the weights at standard age and how to read the milk measuring jug correctly (proper planning and organisation of weighing the goats). The outgoing situation is as follows: 12 head sold; 2 cases of accident, 3 cases of illness and 1 case of loss. The level of registration in the DTREO database is very low.

▪ **Observations in Noukoula village**

- The mission visited a number of goat herds and held discussions with the data collector. In this village, all the goat herds have been kept indoors since the start of the rainy season. The goats are plump, and only one woman has built a covered shed for her goats. All the other goats are exposed to the rains and other bad weather conditions. There are no health problems among the herds in the village.
- Discussions with the data collector focused on the overall data collection progress, recording in the register and entry in the DTREO database. The data collector updated the data on the weight, milk collection and exit of the animals. She improved her working method, but some difficulties were noted with the weight data, such as omission of weighing dates. However, she mentioned some of the difficulties that she encounters when collecting data, such as the delay in providing information and the refusal by some to ring kids before one month.
- During the feedback session, the village chief and the other participants were informed of these deficiencies and that the whole community should be mobilised as one to ensure the project's success. The village chief and the participants reassured the mission by reiterating their commitment to raise beneficiaries and support in data collection.
- Thirteen births were recorded between 24 July and 10 September 2024. The situation regarding goat disposal (total of 13 goats) is as follows: 6 goats sold, 3 cases of mortality, 2 cases of donation, 1 goat lost, and 1 goat slaughtered.
- Registration in the DTREO database continues. During the mission, 100 data entries were made and sent, and 32 entries were made but not sent due to network connection problems. Collectors have been instructed to make regular entries to make it easier to check and update the database.

Way forward and tasks

- Train livestock farmers in these two villages on the integrated package;
- Diligent provision of tablets to data collectors;
- Replace the milk measuring pots with precision ones;
- Reinforce the data collection team with two per village;
- Build animal shelters;
- Raise beneficiaries' awareness of the need to participate in collecting data on animal weighing and milk control by milking goats.

II. Exploring CBBP potential in Sikasso region – July 2024

1. Discussion with key farmers

- In this region, while goats are known for their multiple births and adaptability to the environment, sheep are favored due to their significantly higher market value, fetching prices three times greater than goats. As a result, our attention in this specific area was directed towards sheep. During our exploration, we investigated various aspects of sheep production, including flock sizes, available breeds in the area, sources of breeding rams, practices of ram sharing, market potential, and the availability of essential services like animal health, feed, and extension services.
- Through discussions with key farmers in the villages Farakala 1, Farakala 2 and Ifola, we understood that the average flock size per household is approximately 40, with some farmers even managing close to 100 sheep. Djallonke is the native breed in the area; however, most sheep are crossbreeds between Djallonke and Balibali (Figure 6). Low prolificacy and accelerated lambing are common for both breeds. Balibali sheep are known for their large size, rapid growth, early market readiness, and higher market prices compared to Djallonke. Despite these advantages, Balibali sheep require more feed, are more susceptible to diseases like trypanosomiasis, and face feed shortages. Djallonke sheep, on the other hand, are smaller in size and highly adaptable to the environment. Farmers prefer crossbred sheep to leverage the benefits of breed complementarity. Farmers typically use purchased Balibali breeding rams from markets, sometimes traveling to distant regions like northern Mali or even outside the country (Niger and Chad). Following this, they use these breeding rams to mate with their flocks, with the goal of enhancing the genetic potential of their stock in terms of growth and adaptability. This is achieved by combining a diverse range of characteristics from both breeds. Ram sharing for mating purposes is a common practice in the area to ensure effective breeding. The preferred method involves bringing breeding females to the ram for mating. Feeding practices vary seasonally, with animals grazing freely during the dry season and being kept closer to home during the wet season. Previously stored crop residues are used to feed the animals towards the end of the dry season and the beginning of the rainy season, when grazing becomes very scarce. The primary breeding objective in sheep production is to generate income through the sale of animals, particularly lambs at around 1 year of age. Keeping male animals for fattening until about 3 years of age is also common to fetch better prices. Milking sheep is not a common practice in the area.
- High pre-weaning lamb mortality rates, reaching up to 30% and even 50% during the dry season, raise as major challenge. Addressing this critical concern by implementing specific health, genetics and husbandry, and feeding interventions (for example integrated package developed by SAPLING) is important to enhance the survival rates of young lambs and ensure the sustainability of livestock operations.
- Farmers sometimes need to travel long distances to find better markets due to the unattractive local market conditions. Despite these challenges, there have been instances where groups of farmers have transported sheep over long distances in search of better market opportunities. Market demand peaks during the Eid festival in local and regional markets and presents an opportunity to strategically target this peak period.
- Following brief explanation about the overview, approach and benefits of community-based breeding program (CBBP), key informants confirmed that communities in the area will likely participate in the sheep CBBP to enhance the genetic potential of the breed and improve management practices, thereby seeking better market options.



Figure 6. Djallonke x Balibali crossbred populations from different farmers in Ifola village, Sikasso region

2. Field visit

- On the second day, we visited five sheep flocks around Farakala commune.
- Flock sizes per household ranged from 42 to 105, with Balibali rams being common in all visited flocks. We also confirmed that the predominant breeds were crossbreds between Djallonke and Balibali.
- Visited farmers expressed interest in upgrading their Djallonke breed towards higher Balibali breed composition and some even aimed to maintain pure Balibali flocks with better management. Notably, one farmer, Mamadou Bengaly had a crossbred population under an extensive management system and about 30 pure Balibali stock managed separately around his homestead (Figure 7).



Figure 7. Pure Balibali flock under semi-intensive management at Farkala village, Mamadou Bengaly's flock

3. Summary

- A team from ICARDA and ILRI will discuss the results and see the possibility of initiating sheep CBBP in Sikasso Region if Mali is maintained as a priority country under the new Science Programs.
- We observed variability both among and within flocks in terms of size and lamb growth providing a diverse pool of basic material to kickstart a breeding program. Through a flock ranking exercise, characteristics such as large size, fast growth of lambs, and good milking ability were considered favorable qualities of breeding ewes, while attributes like small size, weak lamb raising, disease susceptibility and poor milking capacity were deemed less desirable. The frequency of multiple births and accelerated lambing is consistent across the breeds. Although high prolificacy is not common, farmers express a desire for ewes with prolific breeding histories. For instance, in Bengaly's flock, the top-ranked ewe exhibited good prolificacy alongside qualities of size and lamb growth.
- Considering the farmers' interest and sheep production potential of the area, the visited site shows promising potential for launching sheep Community-Based Breeding Programs (CBBPs). Villages such as Ifola and Farkala are well-suited for this initiative, with over 30 households residing within a radius of less than a kilometer. Each household maintains a flock of sheep ranging from one to about 100 animals, making it feasible to secure approximately 500 breeding ewes needed for CBBP from nearby communities.
- Our observation revealed that many animals were in poor body condition, emphasizing the need for improving breeding and husbandry practices, feed production and feeding interventions. The recent introduction of a feed grinder and mixing machine by ICARDA, ILRI, and other partners should be utilized to produce quality feed, with a focus on developing feed compositions specific to each animal category. Additionally, tailoring feeding practices according to age class and category is crucial for optimizing livestock nutrition and overall productivity.
- Challenges such as foot rot and diarrhea caused by coccidiosis are prevalent in the area. While health services are accessible, the lack of diagnostic laboratories poses a challenge in accurately identifying diseases. Treatment is mainly symptom-based, potentially leading to inaccurate prescriptions and the development of drug resistance.
- It should also be noted that SAPLING is currently evaluating its integrated package in the Farakala commune. This package has been developed by several experts in the fields of animal health, nutrition, reproduction and genetic improvement from ILRI, ICARDA and ABC-CIAT. Its extension could optimize efforts in all these areas and substantially improve the productivity of small ruminants.



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CGIAR's Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) is working in seven countries focusing on livestock value chains to package and scale out tried-and-tested, as well as new, innovations in livestock health, genetics, feed and market systems. SAPLING aims to demonstrate that improvements in livestock productivity can offer a triple win: generating improved livelihoods and nutritional outcomes; contributing to women's empowerment; and, reducing impacts on climate and the environment. Its seven focus countries are Ethiopia, Kenya, Mali, Nepal, Tanzania, Uganda and Vietnam.

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Projet : Initiative de productivité animale durable pour les moyens de subsistance, la nutrition et l'inclusion du genre (SAPLING) au Mali

**Activité de Caractérisation génétique des petits ruminants au Mali :
Community Based Breeding Programm (CBBP)**

**Rapport de mission de suivi-évaluation des activités de CBBP à
Siguidolo Wère et Noukoula dans la commune de Konobougou,
cercle de Barouéli, région de Ségou du 09 au 14 septembre 2024**

Présenté par

Dr Doubangolo COULIBALY, chercheur, Direction scientifique

M. Idrissa SACKO, chercheur, CRRA SAME Kayes

Septembre 2024

1. Introduction :

Suivant les ordres de mission N° 000086/IER-DSAT du 03 septembre 2024 de Dr Doubangolo COULIBALY, Coordinateur scientifique des productions animales de l'IER à Bamako et N° 0031/2024-CRRA/K du 02 septembre 2024 de M. Idrissa SACKO, chef de programme petits ruminants au CRRA de Kayes, se sont rendus dans les villages de Siguidolo Wère et de Noukoula dans la commune de Konobougou, cercle de Barouéli, région de Ségou. L'objet de la mission était de suivre le déroulement des activités de CBBP auprès des enquêteurs de ces villages. La mission a consisté à la vérification de l'état d'avancement de la collecte des données sur les animaux identifiés, le renseignement correct des registres et la saisie des informations dans la base de données DTREO. Elle aussi visité les troupeaux pour apprécier l'état des animaux et afin la mission a fait la restitution aux communautés.

2. Déroulement de la mission

La mission à l'arrivée à Konobougou a rendu une visite de courtoisie au sous-préfet de Konobougou et le lendemain à la préfecture de Barouéli. Cette visite a été mise à profit pour briefer les autorités administratives sur les activités de CBBP du démarrage à nos jours et en même temps viser les ordres de mission. Dans chacun des villages, la mission a rendu une visite aux chefs de villages et échangé avec la communauté sur l'état d'avancement des activités.

Village de Siguidolo Wère

Dans ce village, la mission après l'accueil et présentation de la mission, les activités suivantes ont été menées :

Visite des animaux : lors de cette visite, il a été constaté de deux modes de conduite des chèvres. Certains éleveurs conduisent leurs chèvres au pâturage alors que d'autres les maintenaient en stabulation au piquet en les apportant des fourrages verts et de l'herbe. Les chèvres en stabulation avaient un meilleur embonpoint que celles qui pâturent (photos 1 et 2). Toutes les naissances ont été identifiées avec des bagues sauf celles de la semaine. Lors de la visite, il a été signalé par les éleveurs la fréquence élevée de diarrhée et de gale. Il a été conseillé aux éleveurs de prendre attache avec le service vétérinaire pour identifier les causes éventuelles de diarrhée. Les animaux n'ont pas d'abris en cette saison des pluies. Les éleveurs évoquent que la pluie est une cause des maladies cutanée et la mortalité des chevreaux.



Photo 1: chèvres en stabulation



Photo 2 : chèvres conduites au pâturage

[illegible]

Dans ce village, tous les troupeaux de chèvres sont en stabulation depuis le début de la saison des pluies. Les chèvres ont un bon embonpoint, seule une femme a construit un abri en hangar couvert des feuilles de tôle pour ses chèvres (photo 5). Toutes les autres chèvres sont exposées aux pluies et autres intempéries (photo 6). Pas de problème de santé au sein des troupeaux du village.



A photograph showing two brown goats in a dirt enclosure. One goat is in the foreground, facing away from the camera, while the other is slightly behind it, facing the camera. They are surrounded by a large pile of green grass. In the background, there is a wall made of mud and a pile of dry branches. A small portion of a third goat is visible on the right edge.

3

Elle a évoqué quelques difficultés qu'elle rencontre lors de la collecte des données, comme le retard de la fourniture de l'information et le refus de baguer les chevreaux avant un mois par certains bénéficiaires. Lors de la restitution, il a été notifié au chef de village et aux autres participants de s'impliquer pour palier à ces déficits et que toute la communauté soit mobilisée comme un seul homme pour la réussite du projet.

Le chef de village et les participants ont rassuré la mission en réitérant leur engagement pour la sensibilisation des bénéficiaires et l'accompagnement dans la collecte des données.

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Photo 7 : extrait du registre

Treize naissances ont été enregistrées dans la période du 24 juillet au 10 septembre 2024. La situation des sorties des chèvres (au nombre de 13) est la suivante : 6 chèvres vendues, 3 cas de mortalité, 2 cas de donation, 1 chèvre égarée et 1 chèvre abattue.

L'enregistrement dans la base de données DTREO continue. Au passage de la mission, 100 entrées de données ont été effectuées envoyées et 32 saisies faites et non envoyées pour des problèmes de réseau de connexion. Il a été instruit au collecteur de faire régulièrement la saisie pour faciliter la vérification et les mise à jour de la base de données.

Visite parcelle d'expérimentation des cultures fourragères à Barouéli

La mission a été mise à profit pour visiter la parcelle expérimentale des cultures fourragères avec le service local des productions et industries animales (photo 8) de Baraouéli. Au total 12 variétés de cultures fourragères sont en expérimentation dont *Andropogon gayanus*, 3 variétés *Panicum* (*P mun river*, *P mansai* et *P mombasa*) ; 8 variétés de *Brachiaria* (*B ruziziensis*, *B marandu*, *B basilisk*, *B hybride GP 1794 cobra*, *B mestizo*, *B hybride CIATGP1005 BR talisman*, *B hybride GP 3025 Camello* et *B hybride GP 0423*). Les dates de semis ont été le 10 et le 11 août 2024.



Photo 8 : parcelle expérimentale de Barouéli

Visite de l'unité de transformation de l'aliment bétail de l'association des femmes pasteurs de Barouéli

Également, la mission a profit pour visiter l'unité de transformation offerte à l'association des femmes pasteurs dans le cadre de la valorisation des sous-produits agricoles et la contribution à l'alimentation de qualité des animaux pour une meilleure production et productivité du bétail. L'unité (photo 9) est installée dans la parcelle de production des cultures fourragères de l'association en dehors de la ville. L'association a bénéficié aussi de l'appui de l'Oxfam en partenariat avec Danida pour la clôture de 2 hectares en grillage et d'un forage équipé. L'association a également reçu des semences et des boutures de *Panicum mun river* (photo10)



Photo 9 : unité de transformation



Photo 10 : bouture de *Panicum* régénéré

3. Conclusion

La mission s'est déroulée dans les bonnes conditions.. Les remerciements vont à l'ensemble des personnalités rencontrées pour l'accueil et la collaboration dont elles ont monstre. La mission a permis de recenser les difficultés rencontrées par les collecteurs et de formuler des recommandations atteindre les objectifs du projet..

Recommandations :

- Former les éleveurs de ces deux villages sur le paquet intégré ;
- Diligenter la mise à disposition des tablettes aux collecteurs des données ;
- Remplacer les pots de mesure de lait par ceux à précision ;
- Renforcer l'équipe de collecte des données à raison de deux par village ;
- Construire des abris pour les animaux ;
- Sensibiliser les bénéficiaires à participer à la collecte des données de pesée des animaux et le contrôle laitier par la traite des chèvres.

Bamako, le 17 septembre 2024

Le Chef de la mission

Dr Doubangolo COULIBALY