

Business Plan Brief

Strengthening Mali's Small Ruminant Value Chains through Innovative Feed Solutions



Dynamic Business Plan

For a High-Performance Feed Pelleting Project in Ségou, Mali

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Sustainable Animal Productivity for Livelihoods, Nutrition and Gender Inclusion (SAPLING)

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About SAPLING

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.

Acknowledgment

This work was conducted as part of the CGIAR initiative on Sustainable Animal Productivity, which is supported by contributors to the CGIAR Trust Fund. <https://www.cgiar.org/funders>

Citation

Idoudi, Z., Rudiger, U., Sow, A. 2024. Dynamic Business Plan for a High-Performance Feed Pelleting Project in Ségou, Mali. Beirut, Lebanon: International Center for Agricultural Research in the Dry Areas.

Cover page figure caption: Livestock producers are feeding their goats with care, Baroueli/Segou, Mali (Photo: Zied Idoudi, ICARDA) – July 2023

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Context & Background

Feed is a fundamental component of small ruminant value chains and has a significant impact on animal growth, health, productivity and overall profitability. In Mali, the need for efficient feed processing and effective marketing strategies is critical to ensure a consistent supply of high-quality feed from locally available resources. The small ruminant sector plays an important role in rural economies, particularly for women who often depend on these animals for their livelihoods.

In 2024, the CGIAR research initiative known as SAPLING launched two innovative feed processing units in Mali – in Farakala (Sikasso) and Baroueli (Segou). These state-of-the-art units were co-designed and locally produced to strengthen farmer organisations and establish multi-stakeholder innovation platforms (MSIPs). The aim is to facilitate the production and sale of animal feed using local ingredients such as cotton cake and residues from cereal and legume crops. Each unit has advanced machinery, including grinders, conveyors, feed mixers and pelletizers, with a production capacity of 500 kg of feed pellets per hour.

The allocation of these feed production units targets two dynamic communities: the Wutango Women Farmers Group in Sikasso and the Baroueli Pastoralist Women's Association. The first unit will directly benefit 32 women members of the Wutango group, while indirectly supporting over 216 livestock producers in 12 villages through the Farakala MSIP. Similarly, the second unit will serve 100 farmers from the Baroueli Association and extend its benefits to 16 villages.

To promote sustainable operations and business growth, both communities participated in joint workshops and field visits to develop tailor-made business plans. These plans cover key aspects such as management, marketing strategies, input supply channels, potential profitability and financial mechanisms. More than 70 participants attended these events, of which a remarkable 60-70% were women - an indication of the increasing female leadership within the small ruminant value chains.

Stakeholders in the small ruminant value chain have worked together to prioritize three specific diets tailored for maintenance, fattening and dairy production. These diets will be refined based on comprehensive feed analysis to ensure they effectively meet the nutritional needs of the animals.

The commitment of local governments and stakeholders – including institutions such as the Institut d'Economie Rurale (IER), the Union Regional de la Filière Lait-Viande and the Direction Nationale des Productions et Industries Animales and its regional and local entities (DNPIA/DRPIA/SLPIA) – demonstrates a collaborative effort to improve livestock productivity in Mali. By supporting these initiatives and monitoring the use of machinery, SAPLING aims to create a sustainable framework that not only increases profitability but also uplifts local communities. This innovative approach represents a major step forward in shifting Mali's small ruminant value chains into a more resilient and locally productive industry.

Objectives & Justification

The main objective of this project is to increase the value of agricultural by-products and to recycle them in a well-structured system, transforming them into animal feed pellets while maintaining appropriate proportions. This involves the collection of all crop ingredients, its utilization based on a pre-determined nutrient combination and finally its processing into feed pellets.

There are several compelling arguments for implementing such a project in Baroueli/Segou:

- Insufficient feed resources: Many regions of the country face a shortage of local feed sources, coupled with high prices for imported feed.
- Limited grazing land: The encroachment of agricultural practices limits the area of grazing land available.
- Abundance of by-products: There is a significant quantity and variety of by-products and residues that can be reused to feed livestock.
- Cost-effectiveness: The production costs associated with feed units (FU) are particularly advantageous.
- Waste reduction: This initiative contributes to the elimination of certain agricultural wastes.
- Affordable quality feed: It provides a low-cost, high-quality feed option during periods of feed scarcity or when prices on local markets are exorbitant.
- Urgent need for supplementary feed: There is an immediate need for supplementary feeding, especially during the lean season (February to June) when natural pasture conditions are poor.
- Stabilization of agro-pastoralists: By ensuring sufficient fodder availability in the Baroueli production areas from January to June, this project aims to reduce transhumance and stabilize agro-pastoralists, thus preventing livestock losses associated with migration to southern regions (Guinea, Côte d'Ivoire).

Project Holder

Established in 2005, the Association des Femmes Pasteures de Baroueli (AFPB) has a strong administrative, logistical and technical infrastructure, supported by qualified administrative, technical and field staff. This community association is fundamentally involved in several activities, including livestock production, milk processing and the production and marketing of feed blocks. It also prioritizes gender-based initiatives aimed at promoting gender equality and empowering women in various agricultural sectors, particularly livestock. The AFBP is made up of 100 women and operates through 16 cooperatives, effectively reaching most villages in the Baroueli commune. The organisation has established a strong presence in the Ségou region and maintains strong partnerships with key national and regional institutions, such as the Direction Régionale des Productions et des Industries Animales (DRPIA). It also collaborates with local stakeholders, national and international NGOs, networks, as well as private sector actors and local financial institutions.

Types of By-products & Operational Period

The project has the potential to be implemented in any region. In order to increase profitability, it is essential to locate the project in an area with a high concentration of local by-products and residues, thereby utilizing existing local resources. The project is designed to operate throughout the year. However, as the availability of by-products and residues tends to peak at harvest time - particularly for certain combinations of pellets – it is expected



A happy livestock producer working with the pelleting machine in Baroueli/Ségou, Mali (Photo: Zied Idoudi, ICARDA) – 2024

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that there will be adjustments to the combinations of finished products throughout the year.

Table 1. Possible Diets for Small Ruminants: A1 (Maintenance), A2 (Fattening), A3 (Dairy)

Ingredient	A1 (%)	A2 (%)	A3 (%)
Maize Grain	-	40	40
Cotton Cake	-	17	17
Maize Bran	40	40	40
Rice Bran	-	-	-
Oyster shell	-	1	2
Maize Cereal Residues / Stalks	50	-	-
Millet Bran	-	-	-
Millet Cereal Residues / Stalks	-	-	-
Sorghum Residues / Stalks	-	-	-
Cereal Fonio Residues / Stalks	-	-	-
Elephant Grass	-	-	-
Legume Stalks (Cowpea, Groundnut/Peanut, Mucuna, Pigeon pea, Soya)	10	-	-
Pods of Acacia albida, Piliostigma sp., Prosopis sp.	-	-	-
Soya, Peanut and Cotton Grains	-	-	-
Brachiaria	-	-	-
Moringa oleifera	-	-	-
Zelou	-	-	-
Panicum	-	-	-
Néré flour	-	-	-
Salt	-	1	1
Urea	-	1	-
Total	100	100	100

Production Capacity

The machine has a production capacity of approximately two tons per day, i.e. 50 tons per month. It is designed to produce a total of 600 tons of pellets per year.

Table 2. Monthly Production of Feed Pellets and Required Quantities of Ingredients (ton)

Diet	JV	F	M	A	M	JN	JL	A	S	O	N	D	Total
A1	10	10	10	10	10	10	10	5	5	5	5	5	95
A2	25	25	25	25	30	30	30	15	15	15	15	15	265
A3	15	15	15	15	10	10	10	30	30	30	30	30	240
Total	50	50	50	50	50	50	50	50	50	50	50	50	600

Ingredient	JV	F	M	A	M	JN	JL	A	S	O	N	D	Total
Maize Grain	16	16	16	16	16	16	16	18	18	18	18	18	202
Cotton Cake	6,8	6,8	6,8	6,8	6,8	6,8	6,8	7,65	7,65	7,65	7,65	7,65	85,85
Maize Bran	20	20	20	20	20	20	20	20	20	20	20	20	240
Oyster shell	0,55	0,55	0,55	0,55	0,5	0,5	0,5	0,75	0,75	0,75	0,75	0,75	7,45
Maize Cereal Residues / Stalks	5	5	5	5	5	5	5	2,5	2,5	2,5	2,5	2,5	47,5
Legume Stalks (Cowpea, Groundnut/Peanut, Mucuna, Pigeon pea, Soya)	1	1	1	1	1	1	1	0,5	0,5	0,5	0,5	0,5	9,5
Salt	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,45	0,45	0,45	0,45	0,45	5,05
Urea	0,25	0,25	0,25	0,25	0,3	0,3	0,3	0,15	0,15	0,15	0,15	0,15	2,65
Total	50	50	50	50	50	50	50	50	50	50	50	50	600



Feed pellets produced locally by the AFPB in Barouéli/Ségou, Mali (Photo: Zied Idoudi, ICARDA) – 2024



Proposed Process Description

■ Pellet Production

Pellet production is a sophisticated process that combines agricultural recycling with manufacturing techniques. By adhering to strict equipment specifications and operating protocols, plants can produce high quality feed products that meet industry standards. Pellet production begins with the careful grinding of agricultural by-products and crop residues. These materials are then mixed with specific additives in precise proportions tailored to different formulations. The finished pellet products are produced using the pellet machine, which is manufactured locally at Bamba's factory in Bamako.

■ Equipment Requirements

The following equipment and infrastructure are essential for an efficient pellet production facility:

1. Covered area: A minimum of 80 square meters of covered space 4 meters high is required. This area must be suitable for the storage of raw materials and the installation of machinery. Adequate ventilation is essential to maintain optimum conditions.
2. Feed production unit: This unit should consist of a grinder to process the raw materials, a mixer connected to a conveyor system for efficient material handling, and a pelletizer to process the final product.
3. Power supply: A reliable generator is required to ensure continuous operation of the feed production chain.

Economic Analysis

■ Raw Material Sourcing

The raw material sourcing process includes both collection and transportation. Depending on the specific technical formulation, raw materials are either sourced directly from farmers or

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purchased from the market, including by-products such as bran, minerals and vitamins. The cooperative will establish a list of farmers and producers willing to sell their agricultural residues. A strategic plan will be developed, outlining the quantity of residues required and the timeframe for delivery. Prices for these residues will be set in advance to ensure transparency and consistency. Farmers will be responsible for delivering the residues using their own means of transport (e.g. carts), while the cooperative will rent a pick-up truck for the purchase of additional ingredients such as cereal bran or cotton cake. In addition, the cooperative will engage in forage production to support the production of animal feed pellets.

- Sales of Feed Pellets

- 1- *Price Structure*

The reference selling price for feed pellets is estimated at FCFA 230,000 per ton. This price is strategically set below the market price of industrial concentrates in Ségou, which ranges from FCFA 250,000 to 270,000 per ton for maintenance/lactation feed and FCFA 280,000 to 300,000 per ton for cotton cake.

- 2- *Marketing Strategy*

Marketing activities will include radio spots, participation in trade fairs and outreach through the association's network of focal points and extension services. A product launch event will be organised to facilitate product testing among members. In addition, social media platforms such as Facebook and WhatsApp as well as local media (e.g. Baroueli TV) will be used to increase awareness and promote feed pelleting. To stimulate initial demand, the product will be subsidized for a limited period.

- 3- *Product Distribution*

Livestock producers will collect feed pellets directly from the association's shop in Baroueli. Members delivering milk to the AFPB collection centre can offset their milk deliveries with equivalent quantities of feed pellets produced. If the demand exceeds two tons, the association undertakes to rent a pick-up truck to distribute the products.

- Project Management

The AFPB intends to establish a Monitoring and Guidance Committee (MGC) consisting of representatives from DRPIA/SLPIA, veterinary services, local livestock and industry services in Baroueli and members of the AFPB. The MGC will oversee the implementation of the project and ensure compliance with best practices and quality standards.

- Profitability & Finance & Dashboards of the Established Feed Processing Chain

This section provides an in-depth analysis of the financial dimensions of the established feed processing chain. It highlights critical components such as operating costs, working capital, investment strategies, depreciation schedules, financing alternatives and overall project profitability. By providing quantifiable insights into the financial framework, this review highlights key factors that have a significant impact on both profitability and operational efficiency.

- 1- *Operating Expenses*

Operating Expenses include all costs associated with the day-to-day running of the feed processing chain. These include costs associated with raw material procurement, labor, utilities, maintenance and transport, etc – for one year. A detailed & quantified analysis of these costs will help the AFPB to understand the overall financial health of the business (Table 3).

Table 3. Operating Expenses

Designation	Unit	Quantity	Unit Price/Cost (FCFA)	Total Cost (FCFA)
1-Personnel (Staff) Costs				
Machine handling, by-product grinding, bagging and storage (# operators)	Hour/Month (h/M)	2 h x 12 M	40,000	960,000
Social charges	-	-	-	-
Total Personnel Cost (FCFA)				960,000
2-Raw Material Procurement				
Maize Grain		202	187,000	37,774,000
Cotton Cake		85,85	240,000	20,604,000
Maize Bran		240	130,000	31,200,000
Oyster shell		7.45	175,000	1,303,750
Maize Cereal Residues / Stalks	Ton (t)	47.5	37,000	1,757,500
Legume Stalks		9.5	25,000	237,500
Salt		5.05	190,000	959,500
Urea		2.65	380,000	1,007,000
Total Cost of Raw Materials (FCFA)				94,843,250
3-Other Costs				
Fuel	Liter (l)	10 l/day x 300 days	800	2,400,000
Equipment Maintenance	Lump sum	-	100,000	100,000
Water Consumption	-	-	0	0
Energy (Electricity)	-	-	0	0
Transport (By-products & finished product)	Ton (t)	100	5,000	500,000
Marketing and Communication	Lump sum	-		100,000
50 kg Bags	Unit (bag)	12,000	250	3,000,000
Total Other Costs				6,100,000
Total Operating Expenses (OE)				101,903,250

2- Working Capital

Working capital is essential to ensure that the business can meet its short-term obligations and continue to operate without interruption. This section evaluates current assets and liabilities to determine the liquidity position of the feed processing chain. Effective management of working capital is critical to maintaining operational efficiency. For this project, working capital is estimated at 30% of operating expenses, calculated as Working Capital (WC) = 0.3 * Operating Expenses (OE), approx. 30,500,000 FCFA.

3- Investment (InV)

Investment refers to the initial capital required to set up and expand the feed processing chain. It includes expenditure on equipment, facilities and technology required for production. A thorough assessment of investment needs will provide insight into potential returns and long-term viability.

For this project, in addition to working capital, investment will include the construction of a storage facility and an office, the acquisition of rolling stock and equipment, as well as associated preliminary costs (Table 4).

Table 4. Required Investment & Associated Costs

Designation	Quantity	Unit Price/Cost (FCFA)	Total Cost (FCFA)
1-Construction			
Plot of Land for Construction	-	-	-
Building Construction	-	-	3,000,000
Total Construction Cost (FCFA)			3,000,000
2-Agricultural Rolling Material			
33 hp Tractor	-	-	-
3-ton Trailer	-	-	-
Total Cost of Agricultural Rolling Material (FCFA)			0
3-Feed Densification Chain & Small Equipment			
Feed Pellet Chain (transport and installation included)	1	5,300,000	5,300,000
Power Generator	1	1,350,000	1,350,000
Electric Balance	1	45,000	45,000
Sewing Machine	1	30,000	30,000
Small Equipment (Shovel, Wheelbarrow, Basin)	Lump sum	100,000	100,000
Total Cost of Feed Densification Chain & Small Equipment (FCFA)			6,825,000

Table 4. Required Investment & Associated Costs (Cont'd)

Designation	Quantity	Unit Price/Cost (FCFA)	Total Cost (FCFA)
4-Approach Cost			
Study Costs	-	-	-
Set up costs	-	-	-
Total Approach Cost (FCFA)			0
Total Investment (FCFA)			9,825,000

4- Depreciation Schedule & Value

The depreciation schedule shows how the value of assets is allocated over time. This is important for the AFPB to understand the impact of asset depreciation on financial statements and tax liabilities. A clear depreciation plan helps the AFPB with accurate financial forecasting and budgeting.

Table 5. Depreciation and Value of Assets

Asset	Value (FCFA)	Depreciation Rate (%)	Depreciation Value (FCFA)
Construction	3,000,000	5	150,000
Feed Densification Chain & Equipment	6,825,000	20	1,365,000
Agricultural Rolling Material	0	20	0
Approach Cost	0	25	0
Total Depreciation (FCFA)			1,515,000

5- Financing Options

This section examines the various financing options available to support the feed processing chain. It covers potential sources of funding, including loans and investments. Understanding financing mechanisms is critical for the AFPB to sustain operations and facilitate business growth (Table 6).

Table 6. Financing Sources for AFPB

Source	Amount (FCFA)
Own Funds	500,000
Short-term loan	30,000,000*
Medium-term loan	0
Long-term loan	0
Total (FCFA)	30,500,000

* With the Banque Nationale de Développement Agricole at an interest rate of 12%.

6- Project Profitability

Finally, table 7 assesses the overall profitability of the project by analyzing revenue streams against costs incurred. A clear understanding of project profitability is essential for the AFPB to ensure long-term sustainability and attract further investment in the medium and long term.

Table 7. Project Profitability Assessment

Designation	Amount (FCFA)
1-Charges (Costs incurred)	
Total Operating Expenses (OE)	101,903,250
Financial Charges (12% of Short-term loan)	3,600,000
Depreciation Allocations	1,515,000
Total Charges (Costs incurred)	107,018,250
2-Revenue Streams	
Feed pellets (Produced & Distributed: 600 t x 230,000 FCFA/t)	138,000,000
Total Revenue Streams	138,000,000
Net Results Before Tax (NRBT)	30,981,750

Conclusions & Recommendations for Follow up

- The CGIAR Research Initiative SAPLING has made significant progress in local feed production, community engagement and gender empowerment in Mali's small ruminant value chains, particularly through its feed interventions. The establishment of the innovative feed processing unit at the local level will significantly help local communities to improve the availability and quality of local feeds by using locally sourced ingredients, which is essential for improving livestock productivity and supporting small ruminant farmers. In addition, the initiative has successfully promoted gender equality and empowered local communities through tailored business planning and capacity building workshops.
- By developing specific diets for small ruminants to address nutritional deficiencies, the initiative aims to increase livestock productivity and farmers' incomes.
- By engaging diverse local partners, including governments and agricultural organizations, the initiative has created a sustainable framework for continued support and innovation.
- Despite these achievements, several challenges may hinder the sustainability and scalability of these initiatives. Continued financial and logistical support will be needed to maintain operations at the feed processing unit and ensure that the Association of Women Pastoralists of Barouéli (AFPB) continues to operate the feed business. Ensuring that local farmers can effectively market their products remains a challenge, as there

may be barriers related to distribution channels and market competition from larger suppliers. In addition, continuous training in feed formulation, business management and marketing is essential to fully empower local stakeholders; without regular updates and support, knowledge gaps may emerge over time.

- The production cost of one ton of feed pellets is approximately 180,000 FCFA (equivalent to \$300). The initiative to produce animal feed from agricultural by-products and residues represents a viable economic opportunity for the women's group (AFPB), with a potential annual net profit (NRBT) estimated at approximately 31 million FCFA (approximately \$51,000). However, a major obstacle to starting this business is the need for access to credit, which is essential to maintain a working capital that covers 30% of operating expenses. Although the cooperative has experience in securing loans from the National Agricultural Development Bank (BNDA), it has never borrowed such a large amount. To mitigate these challenges, the cooperative should begin operations on a small scale with internal funds and a modest loan, allowing for gradual expansion as its equity base strengthens over time.
- It is also recommended that sustainable financial support be established through partnerships with NGOs and government agencies to ensure ongoing funding for the operation and maintenance of the feed processing unit and support for the AFPB. Strengthening market linkages is also critical; developing strategic partnerships and alliances with local markets and cooperatives can improve access to buyers for locally produced feeds. This could include the creation of a marketing platform or cooperative sales arrangements. Implementing a structured training plan that includes advanced topics in feed formulation, business management and marketing strategies will further empower local stakeholders. This plan should include both initial and follow-up training to keep skills up to date.
- To enhance the understanding and application of prioritized context-specific diets - particularly for maintenance, fattening and dairy production - it is essential to establish participatory performance trials (on-farm). These trials will enable the co-creation of scientific evidence on the nutritional value and ingredient composition of these diets and their impact on small ruminant productivity. Evaluating these diets in a real-world setting will enhance their adoption by livestock producers and effectively support the implementation of the established business plan.
- Establishing a comprehensive monitoring system to track progress, assess impact and adjust strategies as needed will help identify emerging challenges early.
- Finally, continued community engagement through workshops and capacity building activities that encourage feedback from participants on their needs, interests and experiences will ensure that interventions remain relevant and effective.

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We would like to thank all funders who support this research through their contributions to the CGIAR Trust Fund: www.cgiar.org/funders.

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