

Farm Women and Men choices for livestock feeding practices and technologies-A case from Mali

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Abstract: *Social norms also restrict the amount of data to be obtained from women, both within farming groups and research organizations, thus reinforcing the notion that women are not farmers or producers. In the past, studies on feed resources have been performed, but little is known about gender roles and preferences in feeding technology, based on agricultural-animal husbandry. In order to deal with this lack in information, a study was carried out by 23 instruments of qualitative and quantitative methods in two districts of Bougouni and Koutiala in six villages of Mali. In each village 5 men and 5 women farmers were randomly selected for 12 joint and separate focus group discussions. Data were collected in Bougouni from July to August 2015, in Koutiala from December 2015 to January 2016. Method of triangulation between different tools and secondary sources were used for cross-checking of data.*

Results indicated that the impression of both men and women was that men played a greater role in various crop and livestock activities (0-6 hours) during the dry season while there was more work in the rainy season (8 hours). In Koutiala, men (1.5 hours) spent fewer hours in dry season than women farmers (3-5.5 hours) while men spent more hours (8.75-10 hours) during rainy season than women farmers (7.5 hours). Feed technology depended on the type of animal kept by farmers from both men and women, and on local feed resources. In Bougouni men raised cattle, sheep's while women kept chicken and goats and did not go for grazing while men most preferred feeding technology was grazing. The preferred way for women to feed small ruminants was stall feeding, while for poultry was free range. In Koutiala women and men in followed a practice of cutting dry fodder through hache a sickle like equipment. In both districts most men and women preferred brans that were made of maize and sorghum, followed by legume haulms such as cowpea and groundnut. Addressing gender preferences in Mali's crop-livestock feeding technologies has considerable potential for growth in itself, as it is a key element in meeting the challenges of seasonality, quantity, quality of cropland feed resources and other income-generating activities such as livestock fattening.

Keywords: *Women farmer, Men farmer, choice, livestock feeding*

1. INTRODUCTION

Research institutions have released a good number of improved technological innovations for food security for different agro-ecologies in Mali, leveraging the synergies from combining crops and livestock to reduce poverty. Located in West Africa and land locked, Mali is one of the least developed countries with an economy that relies heavily on rainfed agriculture and livestock (Ebi et al., 2011; Saxena et al., 2018). Nevertheless, crop-livestock systems in Mali are severely constrained due to various physical, geographic, social, political, and environmental issues. Consequently, the majority of the rural population either survive on

subsistence agriculture and livestock keeping or migrating to other parts of the country for employment (Balakumar et al., 2008; Srivastava et al., 2014; Vaid et al., 2014)

Although the information and technologies was produced in the last four decades for farmers to increase crop productivity, for example, a variety of animal-nutrition-based technology and practices in developing countries is established and implemented both on-site and on-farm.

Some innovations have provided profound benefits and were widely used; others have demonstrated promise at research stations but are not used by farmers. And it is often known as men when the term farmers is used. Furthermore, demand driven by cowpea and groundnut is listed as cash crops and women's crops while sorghum is a male crop (Chaudhary and Singh, 2012). So what part do men and women play in these gender-based crops? These studies of an agricultural system frequently confuse researchers with paradoxes and ambiguities. Apparent paradoxes are a useful starting point to differentiate between the expectations and opportunities mentioned and actual actions and objectives. Though studies have been conducted on available feed resource base in Mali, yet the gender preference on feeding is not been documented (Patel, 2012; Nagpal et al., 2012; Sharma et al., 2019). Tackling gender differences between women and men in crop feeding technologies in Mali has a significant potential for growth as it is an important element to meet the seasonal challenges, amounts, quality of feed resources from croplands and other revenue-generating activities such as livestock feeding.

In recognition of the need to deal with the gender differences in crop-living systems to exploit men and women's skills, resources and empowerment, it is important to understand the preferences of women and men on crops that they grow, on livestock, on their choice, on food strategies they prefer and on their constraints to better manage and enhance risk management (Nagpal et al., 2012; Ansari et al., 2016; Singh et al., 2017).

Against this background the specific objective of the study were:

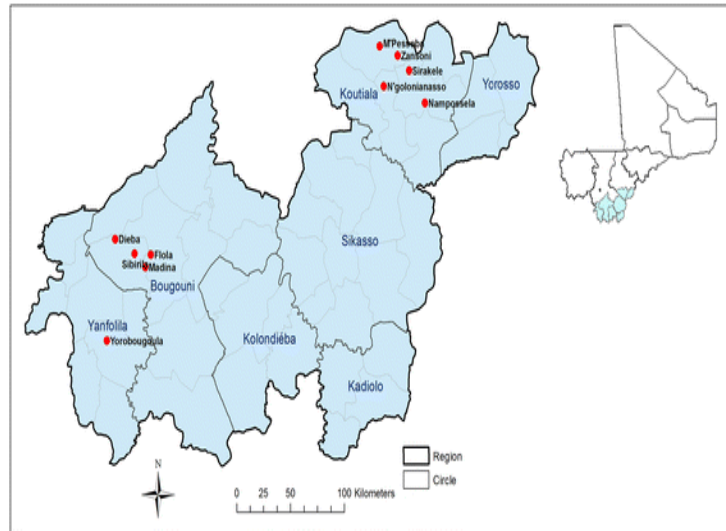
1. An integrated analysis of social, economic and environmental dynamics considering the crop-livestock system.
2. An analysis of livestock biodiversity and main local crops including preferences, practices and producers' knowledge by taking gender into account.

The present study is only focussed on analysis of livestock biodiversity and main local crops including preferences, practices and producers' knowledge by taking gender into account.

2. MATERIALS AND METHODS

The survey was conducted in six villages of purposive selected two districts of Bougouni (villages- Djeba, Flola and Sibirila) and Koutiala (villages- Serakele, Zanzoni and M'Pessoba). Yaninfolila site was initially selected and later abandoned because of the logistical reasons. The selection criteria used for village selection was the villages falling under Sudo Savannah zones of Koutiala and Bougouni for USAID Africa Rising project interventions.

Figure:1 Site location of two districts in Mali



Research sites in the Sikasso region in ten farming communities (circle refers to a district and is the lower administrative structure next to a town). The red dots refer to where the farming communities are situated. (Source: Birhanu & Tabo, 2016; Jnawali et al., 2016)

The methodology utilized various qualitative and quantitative methods, participatory qualitative tools of socio-economic gender analysis (SEGA) approach, four square analysis and matrix tools. The survey was carried from July to August September 2015 in Bougouni and December 2015 to January 2016 in Koutiala. The methodology involved selection of 15 men and 15 women from both villages for joint focus group discussions and for separate key informant interview 5 men and 5 women farmers were randomly selected for the participatory exercises. The data was verified using triangulation techniques with SEGA tools and secondary sources.

3. RESULTS AND DISCUSSION

Development context-

The results using SEGA analysis indicated that under the development context indicated the trends in both districts.

In Bougouni: The three villages of Bougouni benefitted from Guinean climate prevailing in the district with a yearly average rainfall 1000 mm. The vegetation is constituted of tree species in savannah area. The predominant trees were mangoes, sheas, cashew nuts, baobabs, nere and tamarinds (Mishra et al., 2018; Pudake et al., 2013). The soils were clayey. Natural rangelands, forest reserves, arable lands and watersheds constituted the natural resources of the community. The main environmental constraints faced was the great drought (1973-1985), deforestation, forest fires, transhumance and animal diseases (trypanosomiasis, “charbon”).

In Koutiala: in the three villages, the most important environmental trends were: drought and erosion. Watrebrone diseases, decreasing crop yields, the most important demographic trends migration, high birth rate increased number of households headed by women in increase (Singh et al., 2015).

Livelihood analysis

In the three villages in Bougouni-the local economy relied heavily on rainfed cultivation. The main economic activities performed by women and men were cotton, maize and sorghum, fonio, groundnut, potato, rice, and cowpea produced in the village. Livestock keeping was the second important economic factor along with seasonal migration for employment to urban areas. While the main economic activities for Koutiala were agriculture, gardening, forestry, trade, schooling, livestock and religious practices. Besides trade and religious practices, all of these activities were carried out by women. The economic opportunities are the selling of market garden goods, and processed and natural foods (Shea and Néré) (Gupta et al., 2014). Men and women, ethnic groups and socioeconomic groups enjoyed the same rights of access.

Normally men in the villages in Bougouni concentrated on cotton and maize farming, cattle rearing, and trade. In addition to the groundnut and cowpea cultivation, maize and sorghum were cultivated by men during the rainy season. The main tasks carried out by the village men are the rebuilding or renovation of the buildings, the repairing of agricultural equipment, the distributing of organic manure in the fields when preparing for the rainy season. The storage of crop residues for fodder or compost and the selling of harvested cotton and maize are the main activities carried out at the start of the dry season by farmers.

Both men and women perception was men played greater role in various cropping and livestock activities in Bougouni. Women farmers had lesser role *vis-a-vis* men farmers in crop activities like: seed access, sowing, soil improvement, weeding, harvesting, selling and livestock activities like: animal purchase, shrub collection, complementary feed purchase, animal watering, shelter cleaning, grazing and selling in the selected villages. Bougouni, Women generally cultivated groundnut, paddy, engaged in fishing, poultry and kept small ruminants like goats and sheep's. The farming of groundnut was usually practiced on plots leftover by men. The processing of cotton stems to soap, groundnut and the shea fruits gathered are usually practiced by women as income generating activities.

While the daily activity clocks in Bougouni showed that there was less work for women and men farmers during the dry season while more work during the rainy season. On average, men spent 8 hours in rainy season for activities related to agriculture, while in dry season 0-6 hours in agriculture related activities. Collecting wood, preparing meals, taking care of children and sick people in the households are among the main tasks carried out by women in the villages under survey. EOLBREAK In the case of Koutiala, the men (1.5 hours) spent less hours in agriculture-related activities in dry season than women farmers (3-5.5 hours) while men spent more hours (8.75-10 hours) in agriculture-related activities during rainy season than women farmers (7.5 hours).

Men's preferences in livestock keeping In Bougouni:

In term of livestock : cattle, sheep's were mostly raised by men's this explained by a better access of men's and the control of natural resources and better access to agricultural equipment in the community. Some men farmers raised chicken and goats it was mostly the case in poor and medium households. Chickens and goats were not as expensive as sheep's and cattle and had a higher reproduction rate in addition to the ease of their care. In the village of the Dieba, the common livestock species reared are the N'Dama cow, the Djallonke sheep and the Bambara Nain goat.

Women's preferences in livestock keeping in Bougouni:

They raised chicken and goats. The cattle breed raised were the N'Dama, breed resistant to trypanosomiasis prevailing under the guinean climate. The other cattle breeds preferred Meru and Zebu. The Djallonke sheep and the Bambara Nain goat constituted most of the small ruminants

Feed technologies and preferences in Bougouni

The feeding technologies available for cattle and small ruminants in Bougouni were: grazing, collection of grass and shrub/tree leaves, feeding of high quality haulms such as cowpea, groundnut, concentrates/brans of sorghum, and maize, cotton cake, and feeding of stovers of maize and sorghum through- out the year. The season wise strategies followed by men and women farmers is summarized in tables below. During rainy season men grazed cattle while women did not have a role in grazing (in Flola and Djeba villages), with an exception in Sibirila village where cattle and small ruminants were sent for grazing. Women generally tied their goats/sheep by a rope in nearby fields. Poultry was raised on scavenge based system by both men and women. Animals grazed on natural parks and grassland under the supervision of men/boy cow herders. The most common feeding strategy by the men in the three villages of Bougouni was grazing for cattle and small ruminants while scavenging for poultry. In case of women the most preferred feeding strategy was intensive feeding using shrubs and grasses, tree leaves, concentrates and stovers of maize and sorghum. In the villages farmers sold cowpea and groundnut fodder.

Table 1: Gender preferred feed technologies and strategies in Bougouni in Rainy Season

Livestock type	Flola (May to October) technologies		Djeba (May to October) technologies		Sibirila (May to October) technologies	
	Women	Men	Women	Men	Women	Men
	Cattle		1.Grazing 2. Collection of shrub/tree leaves 3.Mixed bran of sorghum and maize		1.Grazing 2.collection of shrub/tree leaves 3.Mixed bran of sorghum and maize	1.Grazing, 2.cereal bran-maize and sorghum
Sheep, goat	1.Shrub/tree leaves 2.mixed bran of sorghum and maize	1.Mixed bran of sorghum and maize 2.Shrub/tree leaves	1.Shrub/tree leaves 2.Mixed bran of sorghum and maize 3.Collection of grass	1.Shrub/tree leaves 2. Grazing	1.Shrub/tree leaves 2. Mixed bran of sorghum and maize 3.Collection of grass	1.Shrub/tree leaves 2. Grazing

Poultry	1.Sorghum , maize grain 2.Mixed bran of sorghum and maize 3.Termites	1.Scavenging 2.Mixed bran of sorghum, maize 3. millet, maize grain	1.Sorghum , maize grain 2.Mixed bran of sorghum and maize 3. Termites	1.Mixed bran of sorghum and maize 2.millet, maize grain 3. Scavenging	1.Sorghum , maize grain 2. Mixed bran of sorghum and maize 3. Termites	1.Mixed bran of sorghum and maize 2.millet, maize grain 3.Scavenging
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In the dry season, after harvest in September and October, sorghum and maize stover, cowpea and groundnut haulms were conserved and the prices were generally low during this period. Stover portion leftover by animals was either used as compost or throw away, burnt and when kept in field invited rodents and occupied space. Sometimes lack of transportation and storage space discouraged farmers' in utilizing properly its abundant feed biomass in their field, parklands through conservation and paradoxically the most pressing problem faced by men and women farmers is scarcity of feed in dry season.

Table 2: Gender preferred feed technologies and strategies in Bougouni in Dry Season

		Villages in Bougouni				
		Flola		Djeba		Sibirila
Livestock type	Dry Season (November to April) technologies	Dry Season (November to April) technologies		Dry Season (November to April) technologies		
	Women	Men	Women	Men	Women	Men
Cattle	X	1.Cowpea, groundnut haulms, cotton stalks, 2. mixed bran of sorghum and maize 3.Salt	X	1.Maize stover, groundnut, cotton stalks cowpea haulms 2.Mixed bran of sorghum and maize	1. Rice straw, maize bran, salt ,cotton stalks 2.Shrubs/tree leaves,	1.Maize stover, groundnut cowpea,haulms,cotton stalks, salt 2.Paddy straw, Sorghum residues,
Sheep, goat	1.Collecti on of shrub/tree leaves	1.Paddy straw sorghum and maize stovers 2. Shrub/tree leaves	1.Mixed bran of sorghum and maize 2.Collectio n of shrub/tree leaves 3.Salt	1.Paddy straw 2.shrub/tree leaves 3.Mixed bran of sorghum and maize	1.Mixed bran of sorghum and maize 2.Collectio n of shrub/tree leaves 3. Cowpea	1.Shrub/tree leaves 2.Mixed bran of sorghum and maize 3.Grazing 4. Cowpea and groundnut Haulms 5.Salt

		and salt		3.Salt	and groundnut Haulms ,salt	
Poultry	1. Mixed bran of sorghum and maize 2..Millet grain 3. Maize grain 4. Termites	1.Mixed bran of sorghum and maize 2. Scavenging 3. Mixed bran of sorghum and maize	1.Millet grain 2. Maize grain 3. Termites 4.Scavenging	1.Grazing 2.Sorghum & maize grains 3.Mixed bran of sorghum and maize	1.Mixed bran of sorghum and maize 2.Scavenging	1. Mixed bran of sorghum and maize 2. Scavenging

In Bougouni, the fodder trade was limited as only a few persons produced for fodder trading.

In Koutiala

The main feeds offered in the villages of Koutiala was tree leaves collected from bushes, sorghum , maize coarse cereal stovers, cotton stalks, paddy straw, cowpea and groundnut haulm, brans of cereals like sorghum and maize, Nere flour, minerals like salts. These animals were kept for meat (cattle, sheep, goat), milk (cattle) and draught (donkeys, oxen) were consumed and sold (Usman et al., 2019; Bashary et al., 2020). Tree leaves of *Caicedras* were given to cattle, and small ruminants during rainy season, while , *Grégré*, *Pterocarpus erinaceus*, *Mignenena neremougou*, *Foufou*, *Leinguin* leaves were given during the dry season. Stovers and brans, haulms were collected by men and women farmers throughout the year.

Table3: Gender preferred feed technologies and strategies Koutiala in Rainy Season

Villages in Koutiala						
Livestock type	M’Pessoba		Zanzoni		Sirakele	
	(May to October) technologies		(May to October) technologies		(May to October) technologies	
	Women	Men	Women	Men	Women	Men
Cattle	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum, maize and nere flour 3. Salt 4. Tree leaves of Shea, Gueni,	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum, maize and nere flour 3. Salt 4. Tree leaves of Shea,	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed	1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea	1.Maize stover, sorghum stover, groundnut, paddy straw, cowpea haulms 2.Mixed bran of

	Dabacala, Toro and Zerebeni	Gueni,Dabacala, Toro and Zerebeni	bran of sorghum and maize 3. Salt	bran of sorghum and maize 3. Salt	haulms 2.Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Caicedras</i>	sorghum and maize 3. Salt 4. Tree leaves of <i>Caicedras</i>
Sheep, goat	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum,maize and nere flour 3. Salt 4. Tree leaves of <i>Shea, Gueni,Dabacala ,Toro and Zerebeni</i>	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum, maize and nere flour 3. Salt 4. Tree leaves of <i>Shea, Gueni,Dabacala ,Toro and Zerebeni</i>	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3. Salt	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3.Salt	1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Caicedras</i> .	1.Maize stover, sorghum stover, groundnut,paddy straw, cowpea haulms 2.Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Caicedras</i>
Donkey	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Shea, Gueni,Dabacala ,Toro and Zerebeni</i>	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Shea, Gueni,Dabacala ,Toro and Zerebeni</i>	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3.Salt	1.Maize stover, sorghum stover, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3.Salt	1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 2..Mixed bran of sorghum and	1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms 2.Mixed bran of sorghum and maize 3. Salt

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The tree leaves of *Neremougou*, *Gregre*, *Founfoun*, *Wolo*, *Guenou*, *Diala* were offered to cattle and goats in rainy and dry season. And these were collected from bushes. The most preferred tree leaves were of *Pterocarpus erinaceus* or locally called as Guenou because animals liked the fodder leaves (Sharma et al., 2019, Singh et al., 2019). *Caicedras* or local name Diala was used as medicine for animals, Minerals like salt and brans were given to small and large ruminants and donkeys mixing of bran and water. *Caicedras* tree leaves (local name- Diala), *Gregre* (local name), *Pterocarpus erinaceus* (Guenou-local name) *Mignenena neremougou* (local name fufu Leinguin) were the most preferred tree leaves by men and women farmers. Nere flour was also by farmers used for cattle and shaots feeding.

Table 4: Gender preferred feed technologies and strategies in Koutiala in Dry Season

Villages in Koutiala						
Live stock type	M'Pessoba		Zanzoni		Sirakele	
	(May to October) technologies		(May to October) technologies		(May to October) technologies	
	Women	Men	Women	Men	Women	Men
Cattle	1. Stovers-sorghum, sorghum, paddy straw, groundnut, cowpea haulms, cotton stalks 2. Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Shea</i> , <i>Gueni</i> , <i>Dabacala</i> , <i>Toro</i> and <i>Zerebeni</i>	1. Stovers-sorghum, sorghum, paddy straw, groundnut, cowpea haulms, cotton stalks 2. Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Shea</i> , <i>Gueni</i> , <i>Dabacala</i> , <i>Toro</i> and <i>Zerebeni</i>	1. Stovers-sorghum, sorghum, paddy straw, groundnut, cowpea haulms, cotton stalks 2. Mixed bran of sorghum and maize 3. Salt	1. Stovers-sorghum, sorghum, paddy straw, groundnut, cowpea haulms, cotton stalks 2. Mixed bran of sorghum and maize 3. Salt	1. Stovers-sorghum, sorghum, paddy straw, groundnut, cowpea haulms, cotton stalks 2. Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Grégré</i> , <i>Pterocarpus erinaceus</i> , <i>Mignenena neremougou</i> , <i>Foufou</i> , <i>Leinguin</i>	1. Stovers-sorghum, sorghum, paddy straw, groundnut, cowpea haulms, cotton stalks 2. Mixed bran of sorghum and maize 3. Salt 4. Tree leaves of <i>Grégré</i> , <i>Pterocarpus erinaceus</i> , <i>Mignenena neremougou</i> , <i>Foufou</i> , <i>Leinguin</i>

Sheep, goat	<p>1.Stovers-sorghum,so rghum,paddy straw, groundnut, cowpea haulms, cotton stalks</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Shea, Gueni,Dabacala,Toro and Zerebeni</p>	<p>1.Stovers-sorghum,so rghum,paddy straw, groundnut, cowpea haulms, cotton stalks</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Shea, Gueni,Dabacala,Toro and Zerebeni</p>	<p>1. Stovers-sorghum,so rghum,paddy straw, groundnut, cowpea haulms, cotton stalks</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p>	<p>1. Stovers-sorghum,so rghum,paddy straw, groundnut, cowpea haulms, cotton stalks</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p>	<p>1. Stovers-sorghum,so rghum,paddy straw, groundnut, cowpea haulms, cotton stalks</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Grégré, Pterocarpus erinaceus, Mignenena neremougou, Foufou, Leinguin</p>	<p>1.sorghum,sorghum,paddy straw, groundnut, cowpea haulms, cotton stalks</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Grégré, Pterocarpus erinaceus, Mignenena neremougou, Foufou, Leinguin</p>
Don key	<p>1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Shea, Gueni,Dabacala,Toro and Zerebeni</p>	<p>1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Shea, Gueni,Dabacala,Toro and Zerebeni</p>	<p>1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p>	<p>1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p>	<p>1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Grégré, Pterocarpus erinaceus, Mignenena neremougou, Foufou, Leinguin</p>	<p>1.Maize stover, sorghum stover, paddy straw, groundnut, cowpea haulms</p> <p>2.Mixed bran of sorghum and maize</p> <p>3. Salt</p> <p>4. Tree leaves of Grégré, Pterocarpus erinaceus, Mignenena neremougou, Foufou, Leinguin</p>

4. CONCLUSION

In order to address the dry season quality feed shortage women and men farmers should plant: disease free improved dual purpose maize, sorghum, cowpea and groundnut varieties in fields while men farmers should strategies on seeding the parklands with quality grasses as grazing is mostly preferred by the men farmers. Although feeding traditional sorghum stovers and dry grasses in feed scarce period is a good nutritional strategy deployed by both men and women farmers and yet more can be achieved by conservation of feed resources during the surplus season (Tandon et al., 2018,a, 2018b, 2019). The low protein value stovers (sorghum, maize) and paddy straw can be improved by urea treatment, proper storage, drying and conservation methods. Storage of feeds in fodder banks, cultivation of fodder crops, awareness on silage and hay making could be the ways. Apart from that a simple technology of chopping of green and dry stover, grasses can reduce animal feed wastage. To reduce the drudgery mobile choppers, fodder grinders can be introduced which could be shared and utilized on community basis and fabricated taking into account the gender dimension. In addition farmers are required to be trained on the way they harvest their crops and manage the crop residues (Prabhakar and Sivakumar, 2019). Burning of crop residue should be discouraged. For example the upper section of cereal stover and the immature panicles and tillers have much higher feeding value than the remainder of the residues. Since the grain is harvested by hand the more nutritious part could be collected at the same time leaving some stubbles in the fields. Training on different least cost feed rations, and training of men and women farmers' on better feed resources conservation and management can improve considerably livestock production for enhanced dry season feeding and livestock keeping as an important intensification activity.

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