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Feed the Future Innovation Lab for Livestock Systems

Evaluation of feed resources in the mixed crop-livestock systems of the Sahelian zone in Burkina Faso and Niger

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Summary

Livestock productivity in the West African Sahel is constrained by seasonal scarcity of feed resources for the animals and often of low quality in the dry season. In addressing this problem of feed shortage, it is necessary to assess the existing and potential feed resources, their use for ruminant feeding and gaps with respect to ruminant production to meet the requirements of livestock. Evaluation of feed resources in the study sites in Kaya and Dori in Burkina Faso, and in Maradi and Torodi in Niger was conducted using Feed Assessment Tool (FEAST) developed by the International Livestock Research Institute (ILRI). The overall objective of this study was to assess existing and potential feed resources and gaps at farm household level in order to enhance efficient use for improved livestock productivity in the Sahelian zone of Burkina Faso and Niger. In all the project sites, the major sources of income were agriculture, livestock, small scale commerce (business), and remittances. The results suggest that occupational specialization tends to be influenced by ethnicity. Similar crops were grown in the project sites in Niger and Burkina Faso namely sorghum, millet, cowpea, groundnut, maize and vegetable. More land areas were cultivated in Maradi, Niger than in all other project sites. The livestock holdings in the project sites varied markedly for all animal species. Cattle is the dominant animal species in all the sites according to the respondents followed by sheep and goats. In all the sites, farmers purchased feeds to bridge the feed deficit gap. The common feeds bought by the farmers in the sites were crop residues namely sorghum and millet straws, groundnut haulms and cowpea hay, and agro-industrial byproducts such as cereal bran and cotton seed cake. Grazing accounted for between 38% and 52% of the dry matter of animal diet in all the project sites while crop residues accounted for between 21% and 28%. Purchased feed also contributed significantly to the dry matter of the animal diet in all the sites ranging from 13% in Dori, Burkina Faso to 23% in Torodi, Niger. Grazing is also the major source of crude protein in animal diet in all the sites followed by purchased feeds. The availability of different types of feed varied across the year. Feed availability is largely defined by seasons. Generally, the results from the surveys in the project sites in Niger and Burkina Faso tend to be similar with some variations in terms of land holdings, land area of major crops grown, livestock holdings which tended to be higher in sites in Burkina Faso, contribution of agriculture (crop farming) and livestock to livelihood of households. Interventions that will improve feed availability and quality, particularly in the dry season is essential to improve

livestock productivity and livelihood of smallholder farmers in the Sahelian zone of Burkina Faso and Niger.

Keywords: Feed resources, mixed crop and livestock system, livestock productivity, Sahel

1. Introduction

Livestock are the main source of livelihood in West African Sahel. In the Sahelian zone of Burkina Faso, livestock are important for the food security of the rural households through direct consumption of animal products and or sale of the animals to buy food, particularly grains (Ayantunde et al., 2011). Besides, livestock play an important role in the intensification of the mixed crop and livestock systems as they provide traction for crop cultivation and manure for soil fertility (Ayantunde et al., 2018). Livestock also play different socio-cultural functions for many households in the Sahel. Livestock productivity in the region is constrained by seasonal scarcity of feed resources for the animals and often of low quality in the dry season. The marked variation in the availability and quality of feed resources largely explains the perennial cycle of weight gain during the wet season and weight loss in the dry season. Addressing the challenge of feed scarcity will improve livestock productivity thereby enhancing livelihood of the smallholder crop and livestock farmers.

In addressing this problem of feed shortage, it is necessary to assess the existing and potential feed resources, their use for ruminant feeding and gaps with respect to ruminant production to meet the requirements of livestock (Umutoni et al., 2015). The evaluation of the existing and potential feed resources will inform the development of effective strategies to improve nutrition and livestock productivity based on locally available feed resources, and efficient utilization of the available feeds. The results of this study will contribute to identification of improved feeding strategies for livestock and can help in defining future interventions to enhance livestock feeding systems in the Sahelian zone of Burkina Faso and Niger.

The overall objective of this study was to assess existing and potential feed resources and gaps at farm household level in order to enhance efficient use for improved livestock productivity

in the Sahelian zone of Burkina Faso and Niger. The specific objectives of this study were to describe the existing farming systems and livestock management practices in the study sites, and to assess locally available feed resources for livestock production. The Feed Assessment Tool developed by ILRI (Duncan et al., 2010) was used for the evaluation of feed resources in the project sites.

2. Material and methods

2.1 Description of study sites

In Burkina Faso, four of the six communities where baseline survey was conducted were selected for the survey on the evaluation of feed resources, namely Korsimoro and Foulla in Kaya site, and Sampelga and Gnagassi in the Dori site. In Niger, five of the ten communities where baseline survey was conducted were selected. The details of the communities where the FEAST surveys were conducted are presented in Table 1. The main reason for not conducting the feed assessment survey in all the villages where baseline survey was conducted is that feed resources in communities that are close to each are similar as the farming systems are the same and the socio-economic profiles of the households are also similar.

Table 1. Project communities where the feed assessment survey was conducted

Country	Project site	Village	Commune rurale
Burkina Faso	Kaya	Korsimoro	Korsimoro
		Foulla	Korsimoro
	Dori	Sampelga	Sampelga
		Gnagassi	Sampelga
Niger	Maradi	Akora Idi	Adje Koria
		Karazomé	Guidan Roundji
		Safo	Oubandawachi
	Torodi	Djoga	Torodi
		Patti	Makalondi

2.2 Methodologies

Evaluation of feed resources in the project sites was conducted using the Feed Assessment Tool (FEAST) developed by International Livestock Research Institute (Duncan et al., 2010). FEAST is a systematic method to assess local feed resource availability and use. It informs and guides the

design of intervention strategies aiming to optimize feed utilization and animal production. FEAST consists of two components namely Participatory Rural Appraisal (PRA) and individual farmer's survey. PRA exercise aims at capturing an overview of the farming system with particular emphasis on livestock feeds and description of major problems facing livestock production. The individual interview of the farmers aims at collecting quantitative information on crop-livestock production, feed availability and quality.

The FEAST surveys were conducted in two project sites in Burkina Faso namely Kaya in Region du Centre Nord and Dori in Region du Sahel. Specifically, the surveys were conducted in two communities in Kaya namely Korsimoro and Foulla, and in two communities in Dori namely Sampelga and Gnagnassi. The surveys were conducted in November and December 2018 in the four communities. The surveys were also conducted in the two project sites in Niger, Maradi and Torodi. In Maradi, the surveys were conducted in Akora Idi, Karazome, and Safo Oubandawai communities while the surveys were conducted in Djoga and Patti communities in Torodi. The FEAST surveys in Niger were conducted in February and March 2019. For the PRA, 20 farmers were selected including 6 women in each community. The individual interview involved 12 farmers including 3 women. Those selected for the individual interview were

The goal of the individual survey was to gather specific information from individual farmers about their farming practices. A semi-structured questionnaire was used for data collection. Twelve farmers in each study village were selected for the individual interview relating to their farming systems and feeding practices. The twelve farmers selected were representative of 3 wealth categories in the community namely farmers with small, medium and large land holdings.

2.3 Data analysis

Data collected from Korsimoro and Foulla were combined for Kaya site while the data collected from Sampelga and Gnagnassi were combined for Dori site. The data collected from Akora Idi, Karazomé and Safo were combined for Maradi site while the data from Djoga and Patti were combined for Torodi site. Where necessary, results from the villages were presented otherwise the results were presented by project sites in Burkina Faso and Niger. Data were analyzed with Excel and the graphs were also prepared by Excel.

3. Result and discussions

3.1 Rainfall distribution

According to response of the respondents in all the project sites, there are two distinct seasons namely wet season from May/June to October, and the dry season which occurs from November to May. The peak period for rainfall in all the sites in Burkina Faso and Niger is in August (Table 2).

Table 2. Rainfall distribution in different study villages according to farmers' perceptions on the scale of 0 (none) to 5 (very high)

Month	Burkina Faso		Niger	
	Kaya	Dori	Maradi	Torodi
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	1	0	1	1
June	2	2	2	2
July	3	3	3	3
August	4	4	5	5
September	4	3	4	4
October	1	1	3	3
November	0	0	0	0
December	0	0	0	0

3.2 Household characteristics, land holdings and use pattern

The average household size ranged from 7 to 15 in the project sites. The household size tended to be similar in the communities where the FEAST surveys were conducted except for Gnagassi where the household size reported was the lowest (Table 3). Seasonal migration of the members of the household was reported in all the project sites and this ranged from 10% in Foulla to 50% in Sampelga. Seasonal migration is common in the Sahel which is often to the urban areas for manual work during the dry season by young men (Turner, 2000). The main drive for this migration is to support the family financially during the dry season when there is hardly any

farming activity and to generate money for the next cropping season (Turner, 2000). The income generated from the short-term migration is also partly invested in livestock husbandry.

Except in Djoga in Torodi site, there was no report of landless farmers in all the project sites (Table 3). In Djoga, 10% of the farmers in the community were reported to be landless. The main explanation was that they were newly settled pastoralists in the community otherwise all the indigenes had access to land. The respondents categorized medium scale farmers as having between 1 and 2 ha of land for cultivation, of which nearly 50% of the community belonged. The average land area cultivated varied markedly from 2.5 ha to 17.4 ha. Generally, more land area was cultivated in Maradi than in other project sites. Access to water also varied from 40% to 100% while access to irrigation was generally low in all the sites except in Djoga in Torodi site and in Korsimoro in Kaya site. Access to irrigation essentially drives off-season vegetable production.

3.3 Major sources of income

In all the project sites, the major sources of income were agriculture, livestock, small scale commerce (business), and remittances (Figure 1). In the sites in Niger, labour was also mentioned as a source of household income. This entails household members working in the farms of another person or taking care of the animals of another household. The relatively large area of land being cultivated in the sites in Niger, particularly, Maradi might have necessitated hiring of external labourers to work on the farms. In Dori site, livestock is the main source of livelihood for the households which is understandable given the fact that the pastoralist ethnic group (Fulani) is dominant in the site. In the case of Maradi, agriculture or crop farming is the main source of livelihood. The results suggest that occupational specialization tends to be influenced by ethnicity.

3.4 Dominant crops cultivated

Similar crops are grown in the project sites in Niger and Burkina Faso namely sorghum, millet, cowpea, groundnut, maize and vegetable (Figure 2). More land areas are cultivated in Maradi, Niger than all other project sites. Maize is the least cultivated crop in the project sites given that all the sites are in the Sahelian zone and maize thrives well in a wetter condition. In all the sites, sorghum and millet were grown on more land areas than other crops as they are the main source of staple food in the Sahel.

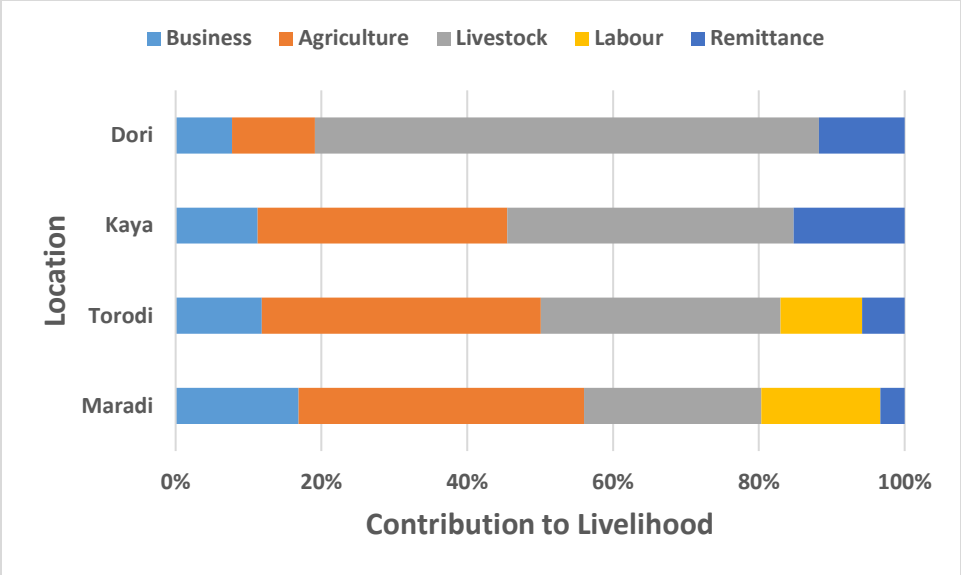


Figure 1. Contribution of different activities to livelihood of households in the project sites

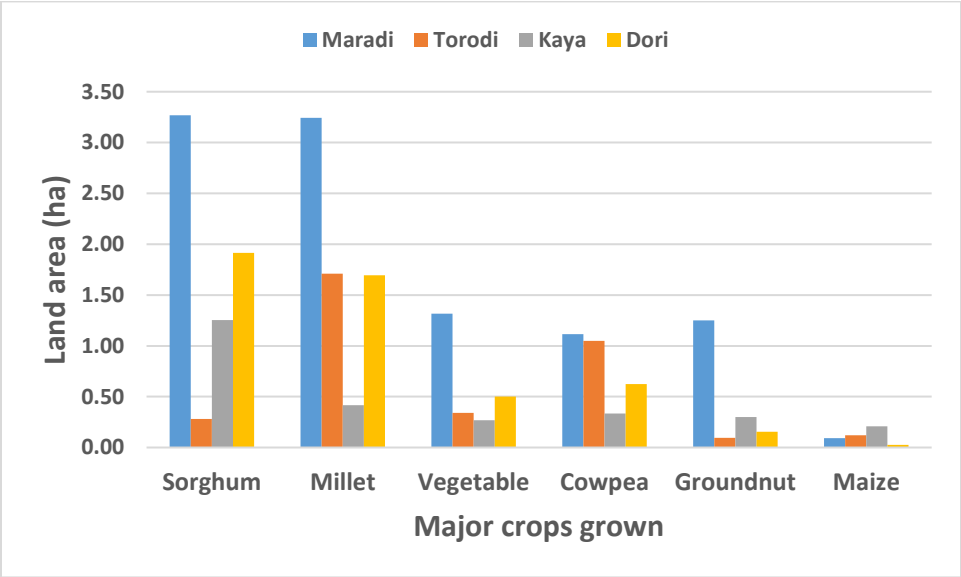


Figure 2. Land area of major crops grown in the project sites

Table 3: Land holdings and household characteristics in the project sites in Burkina Faso (Kaya and Dori) and in Niger (Maradi and Torodi)

Site	Maradi			Torodi		Kaya		Dori	
	Akora Idi	Karazome	Safo Oubandawai	Djoga	Patti	Korsimoro	Foulla	Sampelga	Gnagnassi
% Landless farmer	0	0	0	10	10	0	0	0	0
% Small farmer (0 – 1 ha)	20	70	20	50	50	20	35	40	20
% Medium farmer (1 – 2 ha)	50	20	50	30	30	30	45	55	60
% Large farmer (> 2ha)	30	10	30	10	10	30	20	5	10
Average land area cultivated	8.5	17.4	5.0	2.5	2.5	2.8	2.8	6.6	3.2
Average household size	15	15	15	11	13	15	10	15	7
% of Household in the community that migrate seasonally	40	30	30	35	20	20	10	50	30
% of Household in the community with access to water	70	60	80	70	90	100	40	100	100
% of Household in the community with access to irrigation	0	10	30	90	30	70	0	0	0

3.5 Livestock assets, their role and management

The livestock holdings in the project sites varied markedly for all animal species (Figure 3). Cattle is the dominant animal species in all the sites according to the respondents followed by sheep and goats. Donkey is also common in the sites in Niger and Burkina Faso especially for transport and related household activities. Expectedly, higher number of cattle was reported in Dori site given the domination of the Fulani pastoralists in the area. The number of cattle owned is a source of prestige in the pastoralist's communities.

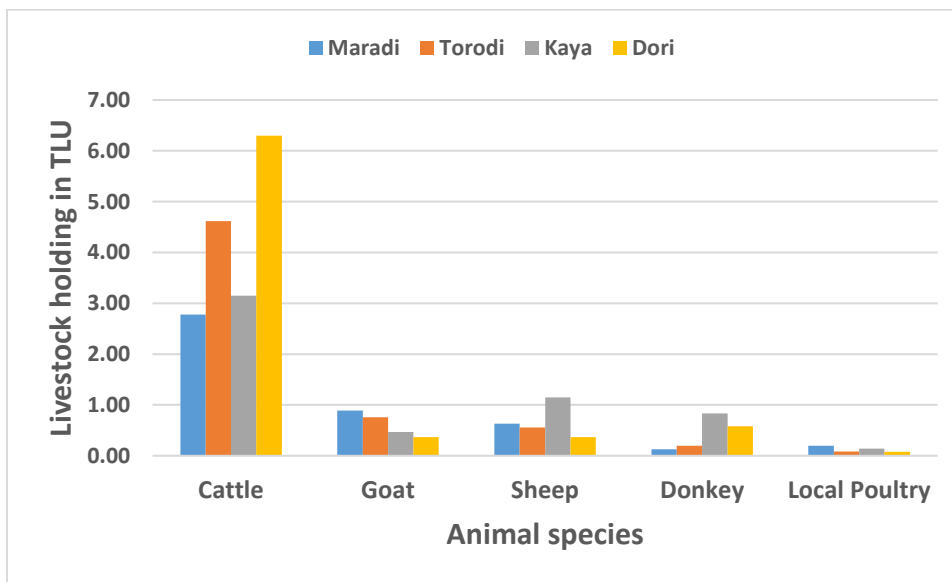


Figure 3. Livestock holding in Tropical Livestock Unit (TLU) per household in project sites

3.6 Major livestock feed resources and seasonal feed availability

In all the sites, farmers purchased feeds to bridge the feed deficit gap (Table 4). The common feeds bought by the farmers in the sites were crop residues namely sorghum and millet straws, groundnut haulms and cowpea hay. In addition, the farmers also bought agro-industrial byproducts such as sorghum bran, millet bran, and cotton seed cake. Farmers in the sites in Niger generally bought more feeds than those in Burkina Faso. Perhaps this is due to less grazing areas compared to the sites in Burkina Faso.

Grazing accounted for between 38 and 52% of the dry matter of animal diet in all the project sites while crop residues accounted for between 21 and 28% (Figure 4). Purchased feed also contributed significantly to the dry matter of the animal diet in all the sites ranging from 13% in Dori, Burkina Faso to 23% in Torodi, Niger. Grazing is also the major source of crude protein in animal diet in all the sites followed by purchased feeds (Figure 5). The results showed that farmers tended to buy nutritious feeds for their animals.

Table 4: Major feeds purchased by the respondents in the past 12 months (kg dry matter/household; mean \pm standard error)

Feed	Maradi	Torodi	Kaya	Dori
Wheat bran	859.54 \pm 7.19	23.48 \pm 5.50	-	-
Pearl millet straw	91.81 \pm 6.96	829.17 \pm 7.57	-	-
Pearl millet bran	21.90 \pm 6.18	3656.54 \pm 5.85	18.54 \pm 1.84	85.53 \pm 3.53
Sorghum bran	74.67 \pm 3.33	-	17.01 \pm 3.80	85.28 \pm 4.09
Groundnut haulm	12.28 \pm 2.23	3.00 \pm 1.06	6.06 \pm 1.79	2.50 \pm 0.88
Sorghum straw	130.06 \pm 6.83	-	1154.32 \pm 15.49	288.55 \pm 4.29
Cowpea hay	1156.00 \pm 8.26	201.36 \pm 4.07	90.78 \pm 4.24	27.28 \pm 9.64
Cotton seed cake	1.67 \pm 0.72	-	228.00 \pm 6.63	384.28 \pm 0.10

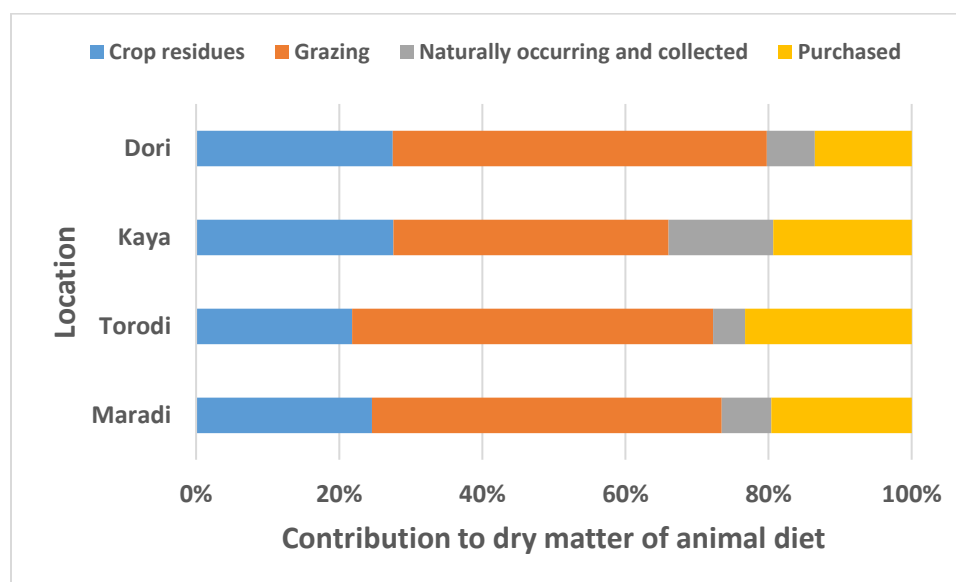


Figure 4. Contribution of different feed sources to dry matter of animal diet in the project sites

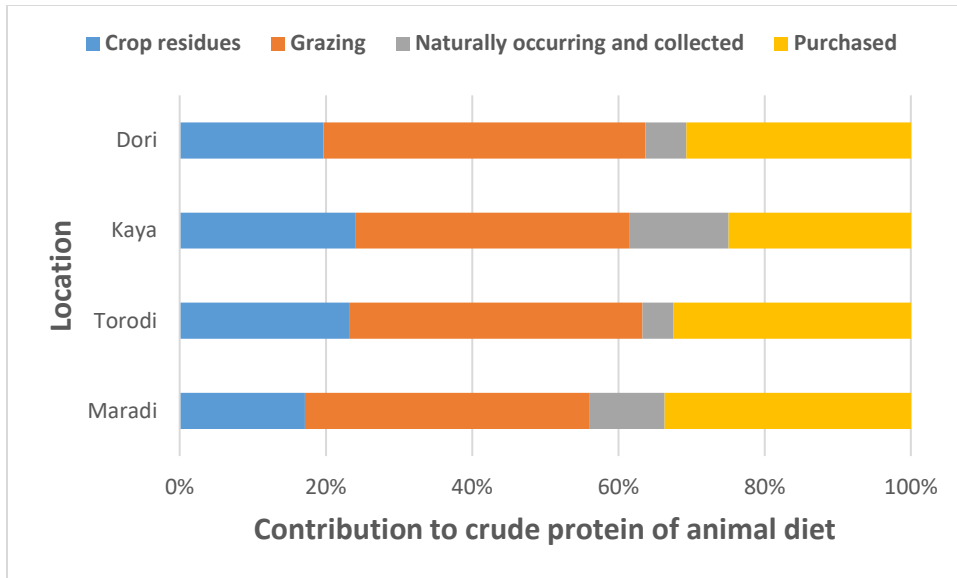


Figure 5. Contribution of different feed sources to crude protein of animal diet in the project sites

The availability of different types of feed varied across the year (Figure 6a, b, c & d). Feed availability is largely defined by seasons. While grazing is the most available feed source in the wet season (June to October), crop residues were the major source of feed in the dry season. The late dry season (March to June) is characterized by feed scarcity in all the sites.

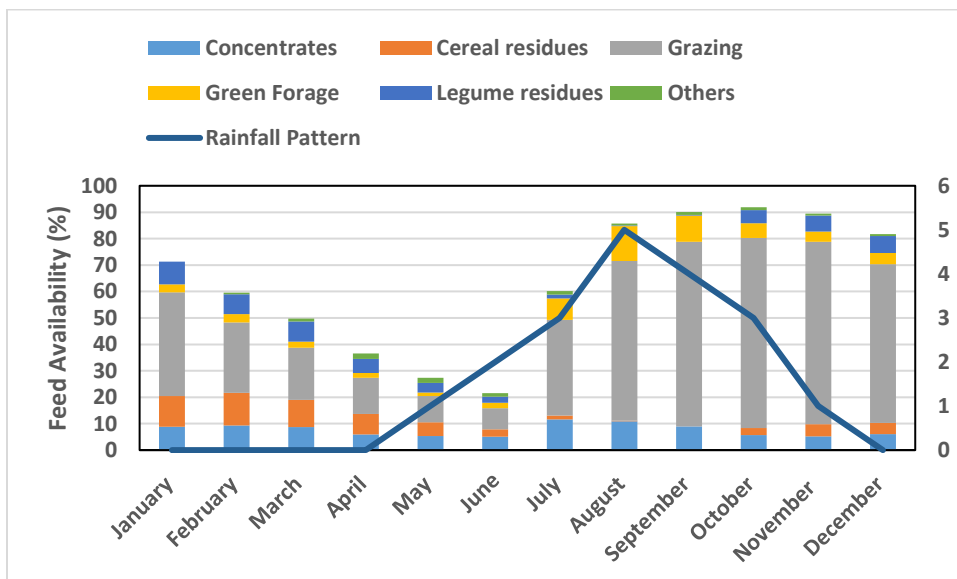


Figure 6a. Feed availability at different month of the year in Maradi, Niger

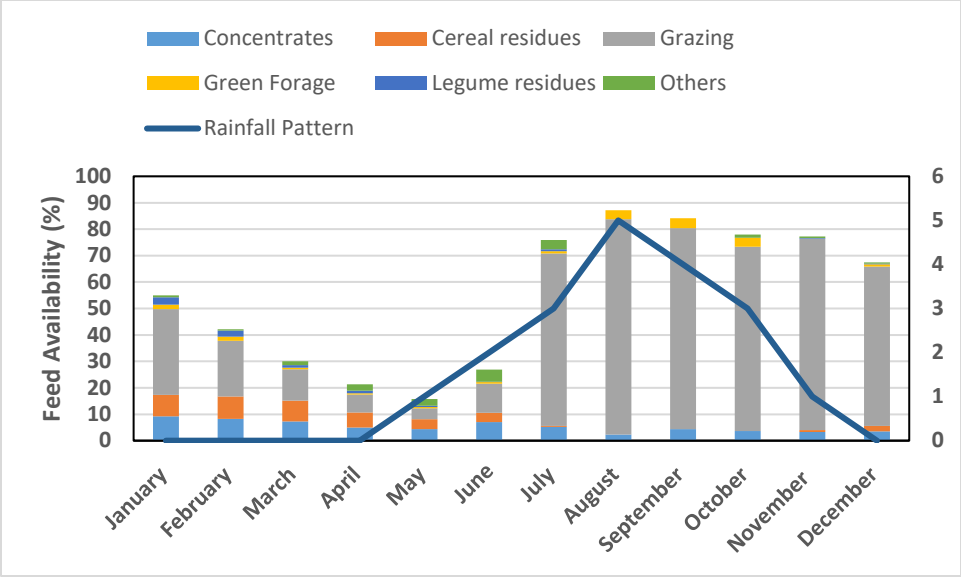


Figure 6b. Feed availability at different month of the year in Torodi, Niger

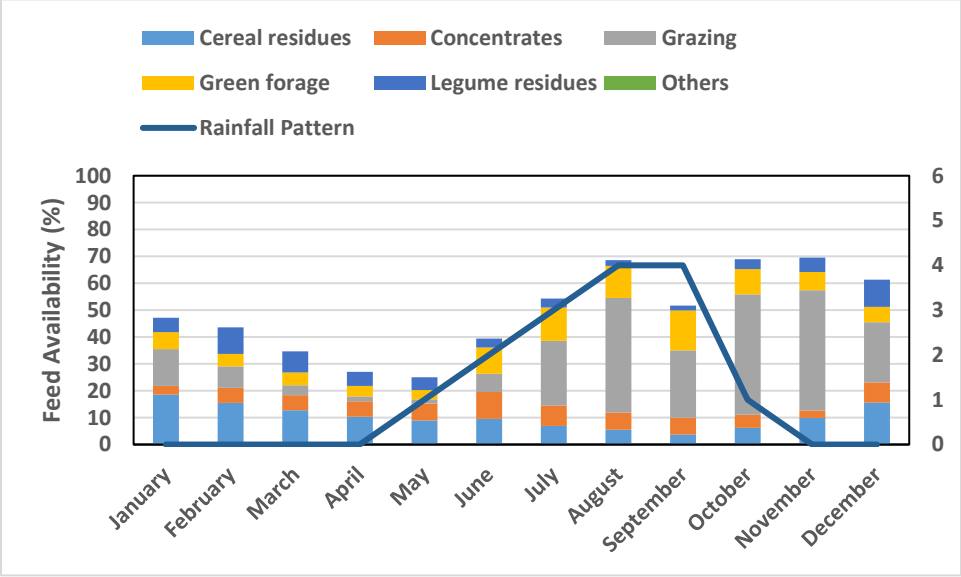


Figure 6c. Feed availability at different month of the year in Kaya, Burkina Faso

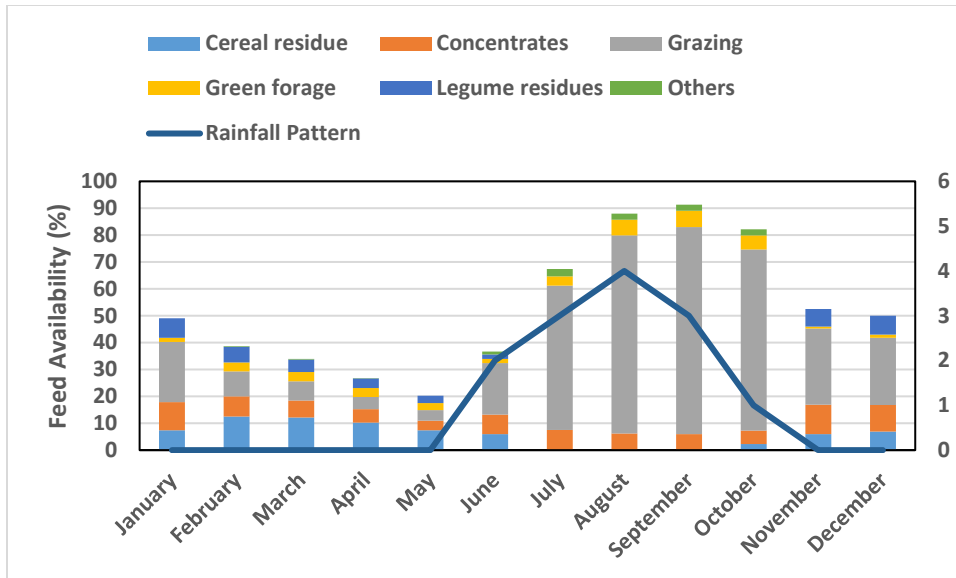


Figure 6d. Feed availability at different month of the year in Dori, Burkina Faso

The results of lab analysis of the feed samples collected during the FEAST surveys are presented in Table 5. Generally, cotton seed cake had the highest nitrogen content followed by the cereal bran (maize and millet bran), and then the legume residues (cowpea hay and groundnut haulms). Cotton seed cake also had the highest in vitro organic matter digestibility followed by concentrate feed for ruminants, and then legume residues and cereal bran. Generally, the quality of cotton seed cake, cereal bran and concentrate feed tends to be consistent regardless of the season whereas the quality of crop residues varies depending on when they are harvested and the storage method. Immediate removal of the crop residues from the crop field after grain harvest and good storage will preserve their nutritional quality and consequently will enhance animal productivity.

3.7 Problems facing livestock production and proposed solutions

Seasonal feed scarcity was mentioned as the first major constraint to livestock production in Dori, Burkina Faso and Maradi, Niger while animal diseases was the first major constraint mentioned in Kaya and Torodi in Burkina Faso and Niger, respectively (Table 6). In all sites, feed scarcity and animal diseases were the main constraints followed by water shortage especially in the dry season. The results are consistent with other studies in the Sahel (Ayantunde et al., 2011; Amole

and Ayantunde, 2016). Animal theft was mentioned as a major problem in Maradi which was also reported by Amole and Ayantunde (2016) for the same region. Conflict between farmers and herders was mentioned as a problem in both sites in Niger as they are transit zone for the transhumant herds. Lack of training in improved animal husbandry practices was mentioned in both Kaya and Maradi.

The proposed solutions for the problem of feed scarcity by the respondents included better access to seed of dual-purpose crop varieties, provision of subsidy for feed supplements, establishment of feed input shops, and conservation of crop residues (Table 7). Generally, one of the major constraint to the adoption of dual-purpose crops by smallholder farmers in sub-Saharan Africa is lack of seed (Pretty et al., 2011; Sheahan and Barrett, 2017). To address this problem, there is the need to build capacity of the communities in production of seed of the improved dual-purpose crop varieties. The suggested solution of subsidy for feed supplements and concentrates, particularly by the government has been practiced by the Government of both Burkina Faso and Niger particularly in the dry season for the pastoral zone where there is often acute shortage of feed due to high number of the animals. However, provision of subsidy for feed supplements and concentrates is not consistent as the government depends on external project funding. Good conservation of crop residues will reduce waste and preserve feed quality, and this can partly address the problem of feed scarcity.

Training of Community Animal Health Workers (CAHW) to address limited access to veterinary services is a good suggestion that will enhance provision of basic treatments for animal diseases in the rural areas. However, training should go along with provision of the CAHWs with animal health kits to function well. Establishment of watering points for the animals is the main solution for the problem of watering the animals in the dry season. There has been establishment of watering points, such as hand-pumped wells in the pastoral zone of both countries often in the context of livestock development projects. The problem sometimes with the watering points is their locations which may be difficult to access. The suggestion to strengthen the enforcement of local rules to address the problem of management of grazing areas including livestock corridors is very important as this problem is a reflection of weakness of the local natural resource institutions (Umutoni et al., 2016).

Table 5. Chemical composition of feed samples collected during FEAST surveys in project sites in Dori and Kaya in November and December 2018 (% of Dry Matter)

Location	Name	Ash (%)	Nitrogen (%)	NDF (%)	ADF (%)	ADL (%)	ME (MJ/kg DM)	IVOMD (%)
Korsimoro	Cowpea hay	10.43	1.35	54.47	41.50	8.28	7.97	55.34
Korsimoro	Sorghum straw	6.35	0.57	73.58	42.63	4.75	6.76	46.83
Korsimoro	Maize leaves (dry)	11.32	1.56	72.48	42.32	3.43	7.56	51.52
Korsimoro	Groundnut haulms	11.95	1.77	46.43	34.03	6.63	8.39	58.42
Korsimoro	Cotton seed cake	5.29	5.76	46.03	26.28	6.95	10.19	72.46
Foulla	Sorghum bran	3.44	1.90	33.45	7.13	4.22	9.25	63.98
Foulla	Grain from immature sorghum	6.18	1.51	48.08	17.27	3.88	8.88	61.45
Foulla	Cowpea hay	10.91	1.11	61.05	49.83	9.14	7.27	50.95
Foulla	Maize bran	2.75	2.11	33.01	6.93	3.47	9.17	63.27
Foulla	Groundnut haulms	12.94	1.77	51.76	40.58	8.47	7.94	55.10
Foulla	Andropogon gayanus	6.17	0.54	72.28	40.89	4.87	6.76	46.37
Foulla	Hibiscus sabdariffa residue	6.64	1.64	63.46	36.70	6.52	8.70	59.30
Foulla	Sorghum straw	7.23	0.58	74.33	43.08	4.41	7.07	47.38
Foulla	Rice straw	16.18	0.59	66.89	47.22	3.55	7.56	50.93
Sampelga	Sorghum chaff mixed with grain	3.27	1.93	42.08	11.57	4.25	9.34	63.18
Sampelga	Cowpea hay	8.46	2.26	42.72	26.75	5.28	9.59	64.99
Sampelga	Sorghum straw	10.76	1.54	58.42	33.87	3.29	8.12	56.10
Sampelga	Cotton seed cake	6.57	4.64	44.36	24.03	6.80	8.52	64.36
Sampelga	Millet bran	7.67	2.85	27.49	3.14	3.85	8.94	66.59
Sampelga	Sorghum bran	4.93	2.02	27.03	1.28	4.52	7.81	60.64
Sampelga	Groundnut haulm	10.22	1.63	51.23	37.88	7.50	8.45	56.99
Sampelga	Maize bran	5.01	2.56	32.05	6.12	3.80	8.75	63.55
Gnagassi	Alysicarpus ovalifolis	10.72	2.92	46.64	33.83	7.13	7.94	56.13
Gnagassi	Sorghum bran	4.80	2.00	37.79	9.02	3.97	8.95	63.78
Gnagassi	Millet bran	6.03	2.57	30.75	5.72	3.68	8.68	63.46
Gnagassi	Groundnut haulm	9.24	2.13	41.17	27.97	5.86	9.18	62.08
Gnagassi	Millet straw	6.08	0.71	79.43	46.86	5.51	6.31	42.16
Gnagassi	Concentrate for ruminants	4.78	2.79	41.61	9.78	2.22	9.79	67.94

NDF: Neutral Detergent Fibre; **ADF:** Acid Detergent Fibre; **ADL:** Acid Detergent Lignin; **ME:** Metabolizable Energy; **IVOMD:** In Vitro Organic Matter Digestibility

Table 6. Major problems facing livestock production in the study sites in Burkina Faso and Niger, according to the respondents

Country	Site	Major problem	Score	Rank
Burkina Faso	Kaya	Seasonal feed scarcity	2	3
		Animal disease including problem of access to veterinary services	4	1
		Water shortage especially in the dry season	3	2
		High price of feeds and fluctuation of livestock product price	1	4
		Lack of improved animal breeds	3	2
		Lack of training in improved animal husbandry practices	2	3
	Dori	Seasonal feed scarcity	5	1
		Animal disease including problem of access to veterinary services	2	3
		Water shortage especially in the dry season	3	2
		Problem of management of grazing areas	2	3
		High price of feeds and fluctuation of livestock product price	1	4
	Niger	Maradi	Seasonal feed scarcity	4
Animal disease including problem of access to veterinary services			2	3
Water shortage especially in the dry season			3	2
Animal theft			3	2
Limited or no access to credit			2	3
Lack of training in improved animal husbandry practices			2	3
Problem of management of grazing areas including livestock corridors			1	4
Conflict between farmers and herders			1	4
Torodi		Seasonal feed scarcity	4	2
		Animal disease including problem of access to veterinary services	5	1
		Water shortage especially in the dry season	3	3
		Problem of management of grazing areas including livestock corridors	3	3
		Conflict between farmers and herders	1	4

Table 7. Proposed solutions to the major problems facing livestock production in the study sites in Burkina Faso and Niger, according to the respondents

Country	Site	Major problem	Proposed solution
Burkina Faso	Kaya	Seasonal feed scarcity	Improve access to seed of dual-purpose crop varieties; subsidy for feed supplements
		Animal disease including problem of access to veterinary services	Training of community animal health workers; subsidy for veterinary drugs
		Water shortage especially in the dry season	Establishment of watering points for the animals; establishment of livestock path to watering points
		High price of feeds and fluctuation of livestock product price	Control of prices by the State
		Lack of improved animal breeds	Subsidy for improved breeds
		Lack of training in improved animal husbandry practices	Training of farmers in improved animal husbandry
	Dori	Seasonal feed scarcity	Improve access to seed of dual-purpose crop varieties and training in forage production
		Animal disease including problem of access to veterinary services	Training of community animal health workers; subsidy for veterinary drugs
		Water shortage especially in the dry season	Establishment of pastoral wells and building dams
		Problem of management of grazing areas	Establishment of livestock corridors
		High price of feeds and fluctuation of livestock product price	Control of prices by the government
Niger	Maradi	Seasonal feed scarcity	Establishment of feed input shops with subsidized price; conservation of crop residues;
		Animal disease including problem of access to veterinary services	Vaccination of transhumant herds to avoid disease outbreak
		Water shortage especially in the dry season	Establishment of more watering points for the animals
		Animal theft	Strengthening the community surveillance team
		Limited or no access to credit	Provision of credit by project and or microfinance

		Lack of training in improved animal husbandry practices	Organize training for farmers on improved animal husbandry
		Problem of management of grazing areas including livestock corridors	Enforcement of local rules regarding use of grazing resources
		Conflict between farmers and herders	Strengthening the local authorities to settle conflict
	Torodi	Seasonal feed scarcity	Establishment of feed input shops with subsidized price; conservation of crop residues;
		Animal disease including problem of access to veterinary services	Training and equipping community animal health workers
		Water shortage especially in the dry season	Establishment of more watering points for the animals
		Problem of management of grazing areas including livestock corridors	Rehabilitation of degraded rangelands; enforcement of local rules
		Conflict between farmers and herders	Strengthening the local authorities to settle conflict; payment of fine by the offending party

Conclusions

The results from the feed assessment surveys in the project sites in Niger and Burkina Faso tend to be similar with some variations in terms of land holdings, land area of major crops grown, livestock holdings which tended to be higher in sites in Burkina Faso, contribution of agriculture (crop farming) and livestock to livelihood of households. Purchase of feeds to bridge feed deficit, particularly in the dry season is common in all the sites. Interventions that will improve feed availability and quality is essential to improve livestock productivity and livelihood of smallholder farmers in the Sahelian zone of Burkina Faso and Niger.

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