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ASSESSMENT OF THE IMPACT OF TRANSHUMANCE ON

THE SUSTAINABLE MANAGEMENT OF ANIMAL GENETIC RESOURCES

Under the Funding Strategy for the Implementation

of the Global Plan of Action for Animal genetic Resources (GCP/GLO/287/MUL)

EFFECTS OF TRANSHUMANCE ON THE MANAGEMENT OF ENDEMIC RUMINANT GENETIC RESOURCES IN PROGEBE ZONE (THE GAMBIA, MALI, SENEGAL, GUINEA)

Regional Report

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[29/05/2015]

Regional Project for the Sustainable Management of Endemic Ruminant Livestock in West Africa (PROGEBE)

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ACRONYMS AND ABBREVIATIONS

AOL: Agricultural Orientation Law

CBPP: Contagious bovine pleuropneumonia

DIREL: Department of Livestock, Senegal

DNPIA: National Department of animal productions and industrie, Mali

EAP: Environmental Action Plan

ECOWAS: Economic Community of West African States

ERL: Endemic Ruminant Livestock

FAO: Food and Agriculture Organization of the United nations

ISRA: Senegalese Institute for Agricultural Research

ITC: International Trypanotolerance Centre

LUP: Land Use Plan

PROGEBE: Regional Project on Sustainable Management of Endemic Ruminant Livestock in West Africa

TLU: Tropical Livestock Unit

EXECUTIVE SUMMARY

The West and Central Africa is an important zone for rearing ruminants that are made up of about 91 millions of cattle, 157 millions of goats and 109 millions of sheep, respectively 36%, 55% and 52% of the livestock of sub-Saharan Africa. However, in the humid and sub humid zones endowed with better fodder resources, the potential of production of ruminants is compromised seriously by the parasitic diseases such as trypanosomiasis, endoparasitosis and dermatophilosis (Murray Trail et al., 1984; Osaer et al., 1999; Snow et al., 1996).

The endemic ruminant livestock (ERL), which are endowed with the capacity to resist parasites while adapting to environmental constraints, constitute the principal means of valorizing pastoral resources and the main source of income for indigenous herders of humid and sub humid areas, and also genetic resources of global interest. However, the conservation of the ERL in its natural habitat is threatened today by the influx of nomadic herders with their Sahelian livestock breeds. The situation is very preoccupying in the area of operation of the regional project on sustainable management of endemic ruminant livestock in West Africa (PROGEBE), which has about 72.8% of the ERL cattle and 20% of ERL small ruminants of West and Central Africa.

The present assessment is part of the portfolio of projects approved under the first call for proposals of the trust fund established by the Food and Agriculture Organization of the United nations (FAO) to finance the implementation of the global Plan of Action for animal genetic resources, for the biennium 2013- 2014 (GCP/GLO/287/MUL). According to the agreement signed in March 2014 between the International Trypanotolerance Centre (ITC) and FAO, the FAO will put at the disposal of ITC a total amount not exceeding 100,000 US dollars in cash, and the PROGEBE will provide a direct contribution in cash of 20,000 US dollars and in-kind contribution estimated at 30,000 US dollars.

The study was carried out through a participatory approach using investigations and interviews of those involved in the transhumance: herders, regional livestock authorities, veterinarians, livestock assistants, field staff of environmental services, local authorities, community members, farmers, NGOs, civil society and the private sector. The results have been discusssed, improved and approved during national and regional workshops.

The study enabled the identification of the principal factors that negatively affect conservation of ERL on the short and long-terms:

1. The absence of rules and regulations and transboundary control of transhumance. This absence increases the risk of introduction of damaging transnational animal diseases that are fatal to the ERL.

2. The weak control of the reproduction of animals. Indeed, in the majority of ranches, this absence of reproduction control, associated with the proximity of the animals at the drinking points, facilitates the accidental crossings between the Sahelien and ERL breeds.

3. The perception of indigenous herders of the superiority of the sahelien breeds in terms of their production potential and level of profitability compared to the ERL breeds. As a consequence, a larger proportion of indigenous herders try to cross their ERL with the sahelien breeds to improve their productive potentials.

4. The conversion of the surrounding humid and sub humid areas into savannas constitutes an important factor encouraging the influx or even the *sendentarisation* of the transhumant herders of sahelien origin, and the adoption of the Sahelian ruminant breeds or crossbreds by the local populations.

5. The overgrazing, bad clearing practices, abusive felling of trees and use of bush fires favours pollution and deterioration of natural resources.

6. The absence of a specific value chain to promote ERL products (meat and living animals) appears as a constraint to their conservation and development.

7. The massive arrival of transhumants increases tensions on resources and engenders conflicts between them and the native livestock keepers.

8. The tools of local management and participative development (land use plan (LUP), local conventions, and follow-up committees of transhumance) are weakly used in the studied sites.

9. The specific policies and strategies for the conservation of ERL breeds and their habitats are not yet explicit and harmonized across the sub-region. These policies should provide a clear direction towards the identification, conservation, and demarcation of high interest ERL territories. This should be done on the basis of purity of the breed, diversity and sustainability of farming systems and husbandry practices.

10. The West African regulation on trans-border transhumance, and notably the action plan of the Economic Community of West African States (ECOWAS) on transhumance adopted in 2011, is not yet sufficiently enforced nor integrated in the local arrangements of management of natural resources.

To master these factors of risks and attenuate their negative effects on the conservation of ERL, the set of tools available at the regional (action plan of ECOWAS), national (national policies, national plans

applicable to transhumance, sectorial laws and regulations on the management of space and resources) and local levels (LUP, local conventions, follow-up committees), must be mobilized and supplementary actions must be put in place to facilitate their application at the local level (see below).

More equitable mechanisms must also be put in place to include the transhumants in the phases of creation and management of resources (more specifically new watering points) in order to mitigate the tensions that already exist around the present water points. These tensions limit / block collaborations between the actors of transhumance.

The principal operational actions to put in place to control and attenuate the negative effects of transhumance on the conservation of ERL stand on:

1. The diffusion, revitalization, dissemination and application of the rules and existing management tools: LUP; forest code, local conventions; agricultural orientation law (LOA); pastoral charter; reception committee of transhumants; fire brigade against bush fires; participative disposition for sanitary surveillance of transhumant livestock.

2. The development of avenues for dialogue between the transhumants and the local community leaders of the reception zones for the co-management of transhumance (agreements on the dates and the itineraries of transhumance, facilitation of the access of the transhumant to the crop residues and grazing in the dry season, access of the local farmers to the manure of transhumant animals, etc.).

3. The implication of local and administrative authorities and technical services in the departure zones of transhumants to sensitize them better before they leave and in the reception zones to improve the local management of the transhumance.

4. The putting in place of processes for the follow-up of transhumant in the zones of departure, transit and reception.
5. The sensitization and the implication of transhumant herders on the management of the environment (fight against bush fires, fight against the abusive felling of trees and the bad practices of pruning the trees and branches).
6. The putting in place of disease control and prevention systems to secure the transhumance. In this regard, a veterinary certificate providing proof of the vaccination of the herd against the preoccupying illnesses could be required from the transhumant.
7. The improvement of the availability of water (creation/development of water points), fodder (pastoral amenities, cultured fodder, better collection and conservation of crop residues), and the setting up of a

management/regulation system taking into account the holding capacity of the different types of resources.

8. The development of tracks for livestock to facilitate the movement of the animals toward the sites of grazing and drinking, in order to reduce the damages on crops and on other resources, and to limit the conflicts between different actors.
9. The creation of agencies for the promotion of ERL and the products and services coming from their rearing.
10. The diffusion and rigorous application of the regulations on the exploitation of natural resources.

The implementation of these actions must come with an improvement of the political, socioeconomic and technical setting of intervention of the projects aiming at the conservation of ERL and the durability of the ERL rearing systems. To do this, the following recommendations are for decision makers and their partners:

1. Enhancing and implementing the mechanisms of cooperation that are existing among ECOWAS countries to better coordinate zootechnical and health policies related to the ruminant livestock sub-sector.
2. Making mandatory the implementation of legal texts and the dissemination/exploitation of existing management tools: LUP ; forestry code; local conventions; AOL; pastoral charter; committees welcoming transhumants; Brigades fighting against bush fires; participatory systems of monitoring the health of transhumant livestock; etc.
3. Organizing actors, strengthening their capacities and creating consultative frameworks to better manage transhumance at different scales (territory, municipality, value chain).
4. Improving the availability and quality of resources and agro-infrastructures;
5. Supporting specific studies and research contributing to the sustainable management of ERL, natural resources, territories and value chains related to ERL production systems.

I. INTRODUCTION

1.1. CONTEXT

The West and Central Africa is an important zone for rearing ruminants that are made up of about 91 millions of cattle, 157 millions of goats and 109 millions of sheep, respectively 36%, 55% and 52% of the livestock of sub-Saharan Africa (2013 data: FAOSTAT, 2015). However, in humid and sub humid zones endowed with better forage resources, the potential for ruminant production is seriously compromised by parasitic diseases such as trypanosomiasis, endoparasitosis and dermatophilosis (Murray and Trail, 1984; Osaer et *al*., 1999; Snow et *al*., 1996, Wilson, 2007).

The endemic ruminant livestock (ERL) with capacities of resistance to parasites and environmental constraints is the main way of exploitation of pasture resources and the main source of income for herders of wetland and subhumid zones (Wilson, 2007; Murray and Trail, 1984; Osaer et al., 1999; Snow et *al*., 1996). In West and Central Africa, ERL is mostly made of N'Dama cattle; West African dwarf goats and Djallonke sheep, which represent 21%, 32% and 47% of the total herd of cattle, sheep and goats in this area (Agyemang, 2000). The other ERL cattle breed is the savannah shorthorn cattle that consists of pure breeds and cross breeds (shorthorn x zebu) representing respectively 20% and 17% of total number of ERL cattle of West and Central Africa in 1985 (Hoste et al., 1988).

However, ERL conservation in its natural habitat is now threatened by the influx of nomadic herders with their Sahelian breeds. This transhumance is national and cross-border and involves both small ruminants and cattle. According to Diop et *al*. (2013), 70% to 90% of the Sahelian cattle herds rely on this system of production.

The situation is very worrying in the PROGEBE (Regional Project on Sustainable Management of Endemic Ruminant Livestock in West Africa) intervention areas, which have about 73% of the ERL cattle and 20% of the ERL small ruminants of the West and Central Africa regions (Hoste et *al*., 1988).

The PROGEBE was established to contribute to *in-situ* conservation of ERL, especially its unique genetic traits and habitat, in an area that encompasses the east of the Gambia, the south and south-east of Senegal, the west and south of Mali, and the central and south of Guinea. In these areas, the stakeholders and experts are of the view that the breeding and conservation of ERL breeds in their original habitat are facing several constraints. However, the documented information on these constraints as well as the proposed solutions, are still missing. The scale of the threat is therefore very imprecise.

The Study on "Assessment of Impacts of transhumance on the sustainable management of animal genetic resources" is one of the regional projects approved under the first call for proposals of the trust fund established by FAO to finance the implementation of the global Plan of Action for animal genetic resources for the biennial 2013- 2014 (GCP/GLO/287/MUL). It contributes to fill the information gap.

1.2. OBJECTIVES OF THE STUDY

The overall objective of the study is to contribute to a better understanding of the impacts of transhumance on the sustainable management of ERL in sub-humid areas of the Gambia, Guinea, Mali and Senegal.

The specific objectives of the study are to:

- Identify adverse impacts of transhumance on the management of endemic ruminant genetic resources;
- Propose mitigation strategies to those adverse impacts;
- Promote the implementation of the proposed mitigation strategies.

II. METHODOLOGY

2.1. PRIOR CONSULTATION

Based on the conceptual framework of the study developed by the regional consultant (Annex 1), consultations were held firstly between the national consultants and national coordination of PROGEBE, and secondly between the national consultants and the regional consultant of the study.

Consultation between the regional consultant and the national consultants focused on four points:

- Sharing the conceptual framework of the study and explanation of relevant indicators to be collected;
- Discussion and adjustment of the methodology to meet with the specificities of each country;
- Co-construction of data collection tools;
- Identification of categories of stakeholders to be surveyed in each country.

Consultation with the national coordination of PROGEBE focused on the following key points:

- Procedures of recruitment and training of survey teams;
- Sampling of sites, towns, and herders to investigate;
- Identification of key stakeholders to be interviewed: chief of villages, Head of farmers and herders organizations; loggers; head of technical services in charge of livestock, agriculture, environment, water and forests; NGO leaders; etc.;
- Adjustment of the methodology of the study;
- Validation of data collection tools by the national coordinators.

2.2. RECRUITMENT AND TRAINING OF SURVEY TEAMS

Survey teams were recruited by the PROGEBE team and trained during 2 days in each country by the national consultant: 5 surveyors in Senegal; 7 in Mali, 9 in the Gambia and 14 in Guinea. The purposes of the training were to strengthen the capacities of the surveyors and test the data collection tools in order to have a common understanding of indicators to be collected and the collection method.

2.3. RESEARCH APPROACH

2.3.1. Choice of the study area

The study covered the entire PROGEBE intervention area (Figure 1). A sample of sites was chosen for the surveys (Table 1). The sites were chosen in collaborative manner by each national consultant and the national coordinator of the PROGEBE. A detailed presentation of the studied sites can be seen in the 4 national reports. Their synthetic presentation is provided in Annex 2 of the current report.

Figure 1: Indicative map of the project sites (source: PROGEBE)

In The Gambia, three sites were studied (see *Daffeh Kebba, 2014* and Annex 2 of the current report). The Kiang West District is situated in the Lower River Region, 100 km from the Atlantic coast. The District of Niamina East is located in the Central River Region South, 200 km from the Atlantic coast; (iii) The District of Nianija is situated in the northern part of the Central Rivers Region, 200 km from the Atlantic coast.

In Senegal, Bandafassi and Ouassadou were studied (see *Thiam Bayo, 2014* and Annex 2 of the current report). The site of Bandafassi includes several rural communities (Bandafassi Dindefelo and Ninéfécha) belonging to the district of Bandafassi, located in the Department of Kedougou within the Region of Kedougou in Senegal. The site of Ouassadou is located in the Kolda region, department of Velingara and more precisely in the district of Pakour.

In Mali, the sites of Madina Diassa, Manankoro, Tousseguela and Sagabari were studied (see Konaté S. Mamary, 2014 and Annex 2 of the current report). Madina Diassa covers an area of over 321,600 hectares and has a population of about 35,371 inhabitants distributed among 51 villages. Manankoro has an estimated area of over 430,000 ha and a population of about 30,000 inhabitants distributed among 55 villages. Tousseguela has an estimated area of 154,700 ha and a population of about 34,314 inhabitants distributed among 22 villages. Sagabary covers an estimated area of approximately 149,600 hectares and has a population of about 18,000 inhabitants distributed among 17 villages.

In Guinea, the sites of Gaoual, Beyla and Dinguiraye were studied (see Diallo Hassane, 2015 and Annex 2 of the current report). Gaoual is located in northwest on the border between Guinea and Guinea-Bissau. PROGEBE was involved in the rural municipalities of Koumbia and Kounsitel. Dinguiraye is part of the major livestock areas of the country and covers an area of 3,825 km^2, with a density of 22 inhabitants per km^2. Beyla is the first prefecture of the pre-forested region in terme of livestock activities and also the main target area for pastoralists arriving from neighboring areas including Ivory Coast and Mali.

Table 1 : Characteristics of the sites of the project

	The Gambia				Senegal			Mali					Guinea			
	Sour-ce	Kiang West	Niamina East	Nia-nija	Source	Banda -fassi	Ouas sadou	Sour ce	Madina Diassa	Manan-koro	Saga-bary	Tousse-guéla [4]	Source	Beyla	Dingui-raye	Gaoual
People	[1]	14610	19320	8305	[1]	21392	16017	[1]	26297	37711	16386	34314	[1]	25161	56559	36168
Number of households	[1]	1646	1949	701	[1]	2442	1650	[1]	3991	5516	2217	4 985	[1]	4099	8946	5367
Size of household	[1]	8.56	10,43	10.43	[1]	9	10	[1]	6,6	7,4	6,8	49	[1]	6,8	6,8	7,0
Rainfall (mm)		884	660	650	[2]	1192	1015	[1]	1100 - 1400	1000 - 1200	950 - 1200	1100 - 1400				
Number of cattle	[2]	10716	6530	5932	[3]	20999	9 805	[2]	130566	180123	164111	37075	[2]	34484	66717	103349
	[3]	9269	9058	6811				[3]	92920	101278	27200		[3]	18917	57727	72526
Number of sheep	[2]	1626	5417	3320		7121	3203	[2]	38491	88600	134632	9432	[2]	8087	16038	11813
	[3]	1580	4316	1683				[3]	28800	3111	9689		[3]	3083	27818	14105
Number of goats	[2]	7320	5086	3592		4459	5862	[2]	42585	88579	107482	5465	[2]	4344	12662	17 574
	[3]	7667	5409	3727				[3]	29200	36167	9333		[3]	2542	15273	21579

Source : Guinea : [1] Recensement Général de la Population et de l'Habitat, 1996 [2] Recensement National du Cheptel 2000 (Direction Nationale de l'Elevage, 2000) ; [3] Estimations à partir des données d'enquêtes de base PROGEBE

The Gambia : [1] : Gambia Bureau of Statistics (2003); [2] et [3]: respective data of (PROGEBE Livestock Census, 2013)

Senegal : [1] : Agence Nationale de la Statistique et de la Démographie, ANSD ; [2] : FAO/Portail d'information sur l'état de la terre et des ressources en eau et nutrition des plantes [3] : PROGEBE/Sénégal

Mali : [1] : Recensement Général de la Population et de l'Habitat - RGPH (April 1998) ; [2] FAO - Ministère de l'Agriculture Mali, 2005a (ces chiffres comprennent les concessions et les fermes commerciales et sont donc plus élevés qu'on trouve dans d'autres sources) ; [3] Estimations des enquêtes de Baseline PROGEBE ; [4] GAGE (2011).

2.3.2. Sampling

According to the conceptual framework of the study and the prior consultations held between the regional consultant, the national consultants and the national coordinators of PROGEBE, the study area was circumscribed by selecting intervention sites of PROGEBE and other outside sites when it was relevant. The choice was oriented to assess both the departure territories and the host territories of transhumants. The respondents were chosen according to their professional category and also with aim to highlight the diversity of views (Table 2).

Table 2 : Distribution of surveyed population

	Senegal	The Gambia	Mali	Guinea
Number of villages inside the project sites	23	92	80	194
Number of villages outside the project sites	6	10	3	68
Total number of herders	200	578	216	479
Total number of key actors	33	89	21	349

2.3.3. Collection and analysis of data

Secondary data were collected and synthesized from the literature available at regional and national units of PROGEBE coordination. Other documentary sources available in each country or accessible via Internet were also exploited.

A team of surveyors trained and supervised by national consultants collected primary data from herders and key informants.

The surveys were conducted individually with each herder (Senegal, The Gambia, and Guinea) or with focus groups (Mali). Interviews with resource persons were conducted individually. The surveys questionnaires are presented on Annex 3 and Annex 4. Data analysis was based on descriptive statistics (averaging, frequency, etc.).

The results of the analysis and the information from the national stakeholders' workshop on transhumance were used to elaborate national reports in each country by national consultants (Thiam Bayo, 2014; Kebba Daffeh, 2014; Konate Mamary, 2014, Hassane Diallo, 2015). These national data as well as report of the regional workshop of stakeholders have been exploited to develop the regional report (Dongmo, 2015).

III. RESULTS

3.1. POPULATION AND SPECIES OF RUMINANTS PER COUNTRY

The total stock of PROGEBE countries is estimated at about 16 million cattle, 18.5 million sheep and 22.5 million goats (DIREL, 2012; DNPIA, 2010 Agricultural Census of the Gambia, 2011/2012). The Mali owns the great part of this regional herd, which is mostly made of Sahelian breeds.

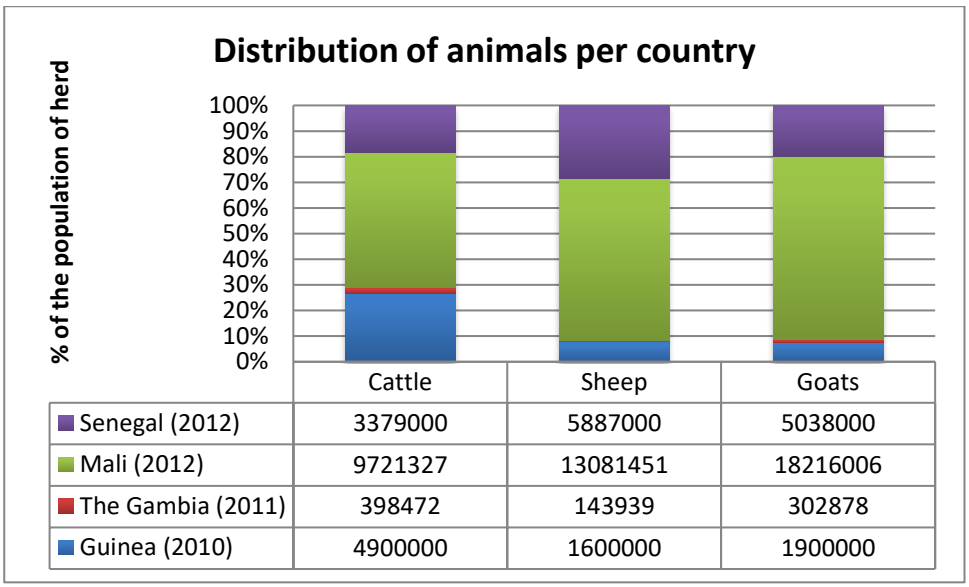

Figure 2: Ruminant livestock distribution in 2010/2011 in PROGEBE countries

Mali

The total ruminant livestock was estimated in 2012 at 9,721,327 cattle, 13,081,451 sheep and 18,216,006 goats (DNPIA, 2012). Mopti region has the largest number of cattle with 28% of the national total, while Gao has the largest number of sheep and goats with 20.34% and 19.33% of the national herd, respectively.

Apart from the Kidal region located in the Saharan zone and Bamako located in urban area who respectively rely on 1% and less than 1% of livestock, cattle is well distributed in other regions of Mali (**Table 3**).

Table 3 : Population of animals (heads) per species and per region in December 2012.

Regions	Number of heads			%		
	Cattle	Sheep	Goats	Cattle	Sheep	Goats
Kayes	1035321	1514832	1533788	10,65%	11,58%	8,42%
Koulikoro	1395009	1092301	1932719	14,35%	8,35%	10,61%
Sikasso	1549580	970644	1162180	15,94%	7,42%	6,38%
Ségou	1096567	1142011	1808849	11,28%	8,73%	9,93%
Mopti	2721972	2412220	3477436	28,00%	18,44%	19,09%
Tombouctou	983799	1656111	2746974	10,12%	12,66%	15,08%
Gao	837978	2660766	3521154	8,62%	20,34%	19,33%
Kidal	69021	1582855	2001939	0,71%	12,10%	10,99%
Bamako	32080	49710	30968	0,33%	0,38%	0,17%
Total	9721327	13081450	18216007	100,00%	100,00%	100,00%

Source : DNPIA, 2012

The cattle population is very diverse in terms of breeds:

- The N'Dama cattle is encountered with other breeds at Bougouni, Yanfolila, Kenieba and southern Kita.
- The crossbred Mere, originated from crossing N'Dama and Zebu, is found in Kaarta, Beledougou, Mande and Miankala regions.
- The Fulani Zebu is found in the Macina and the regions of Nara and Nioro and in the loop of Niger and the Nigerien central plateau. Currently, with the movement of cattle population, the Fulani zebu area extends to the extreme south of the country in the circle of Kadiolo.
- The Moors zebu is encountered along the border with Mauritania, the Niger, in the area of Goundam and inside the Delta.
- The Tuareg zebu is mainly found in "Boucle du Niger" at the north of the central Delta of Niger (Niafunké, Goundam) and on the Nigerian central plateau.
- The Azawak zebu is found in the circle of Menaka.

The sheep population consists of the following breeds:

- The Djallonke sheep is a dwarf sheep that is found in southern Mali, Guinea, Senegal, Niger, Ivory Coast, Burkina Faso and Benin
- The Fulani sheep are mainly raised by the Fulani and include breeds such as Toronké, Samburu and Bali-Bali
- The sheep with wool of the Macina is located in the central Niger Delta, but it is encountered in the regions of Segou, Mopti and Niamey. The population is estimated at one million heads.
- The Moors sheep with short hair is encountered in the Sub Saharan and Sahelian zone in the north of the 15th parallel.
- The Moors sheep with long hair is generally black hair and is found in the Western Sahel border with Mauritania.
- The Tuareg sheep are found in the Sahelian and Saharan zone of Mali and Niger, where they are rear by Tuareg and Moorish tribes. They live in the regions of Timbuktu, east of the habitat of the Moorish breed. They are also found in the "Adrar des Iforhas".

The main goat breeds are:

- The goat of Fouta Djallon (or dwarf goat): It is small (40 to 50 cm), with a weight of 18-20 kg.
- The Sahel goat: It is very prolific and less tolerant to trypanosomiasis. It provides 0.5 to 1.5 liters of milk per day. The meat is odorless and excellent, except for the male.

Senegal

The Senegal has 3,379,000 cattle, 5,887,000 sheep and 5,038,000 goats in 2012 (DIREL, 2012 quoted by Mbaye Niang, 2013). The breed structure is as follows (ISRA, 2003):

- Cattle are composed of Gobra zebu (about 43%), N'Dama (about 36%) and Métis Djakore (about 21%) obtained from the crossing Gobra with N'Dama.
- Sheep are represented by the Sahelian sheep (73%) and West African dwarf sheep (27%).

- Goats are composed of Sahelian breeds (66%) and Guinea goat (34%).

The livestock breeds in different agro-ecological zones are:

- The cattle consist mainly of zebu Gobra located in the north and center of the country, N'Dama located in the south and east; Métis Djakore, which are taurine-zebu cross, are located at the border between the two breeds (Groundnut Basin and eastern Senegal); and exotic breeds that are encountered more in peri-urban farms or integrated in structured value chains.
- The sheep breeds are: Peul-Peul and Touabire (very popular for the sacrifice of Tabaski) in the north of the 600 mm isohyets, especially in the North and Centre of the country; Djallonké breed in the south and east; Métis and different variants Peul-Touabire (Warle) in the central part of the country.
- The main goat breeds are: the Sahel goat in the northern and central parts of the country; the West African dwarf goat or trypanotolerant Guinean goat is found in the Southern and the Eastern of the country.

The Gambia

The herd was estimated at 398,472 cattle, 143,939 sheep, 296,939 goats in 2011/2012 (Recently Agricultural 2010/2011). However, the sheep population is questioned and the Gambian department of health and animal production believes that the number of heads is higher and would approach the values of 194,722 and 251,000 heads of sheep respectively reported by the 2010 National Agricultural Survey and FAOSTAT 2010.

The distribution of livestock by breed is as follows:

- Cattle are essentially N'Dama breeds (98.5% of the herd). Zebu Gobra and Métis Djakore represent 1.5% of the population.
- Sheep are mostly made up of Djallonke (97% of the herd), and a small proportion of Sahelian sheep breeds (Touabire, Fulani breed, Bali-bali and Ladoum - 3%).
- Goats are mainly composed of dwarf goats (98% of the herd), and a small proportion of the Sahel goats (2%).

Guinea

The country livestock population is estimated in 2010 at 4.9 million cattle, 1.6 million sheep and 1.9 million goats (Sow, 2013)

- Cattle are pure N'Dama whose cradle is the Fouta Djallon Highlands (95% of the population), and race Méré obtained from the crossing between N'Dama x Zebu Fulani (5%)
- Sheep are mostly of the Djallonké breed. However, sometimes sahelian sheep and crossbreds are found in some farms, but their numbers remain very low.

- Goats are Djallonke breeds (South goat) with two types: the Fouta Djallon type, which is more common and is characterized by a slender waist (shoulder height ranges from 40 to 50 cm), a straight profile and a generally brown dress with black or white spots; and the type of forest that is less common and characterized by a stocky dwarf size (height at the withers around 35 cm) and a dress color that is black for males or ash gray or tan for females.

3.2. RUMINANT PRODUCTION SYSTEMS

Three major production systems are practiced in PROGEBE countries.

3.2.1. Pastoral systems

The extensive pastoral systems are used in semi-arid, north of the 400 mm isohyets, or associated with rain fed crops or recession crops, and may use purebred animal. They encompass transhumant pastoralism[1] practiced mainly by the Fulani (Mali and Senegal) and the nomadic pastoralism practiced by the Tuareg (at the Gourma in Mali, at Adrar des Iforas and in north of Niger central Delta). In transhumant pastoralism, the transhumance route varies little from one year to another, and the farmer moves with part of the herd and always returns to its home territory at the end of transhumance. In nomadic pastoralism, the route changes from one year to another and the farmer has no permanent home territory. In both cases, the livestock is mostly fed by natural pasture. The feeding depends on the rainfall both qualitatively and quantitatively. The woody stuff also helps to feed livestock during the lean period of the dry season.

In Senegal, these systems are encountered in the North of the country (and the Ferlo River Valley), where they contribute 38% to the national milk production, although they are primarily meat production oriented (Bâ Diao, 2003). Over 50% of the gross income of the herders comes from livestock activities (CSE, 2009).

In Mali, these systems occupy 77% of the national territory, manage 45% of Tropical Livestock Unit (TLU) available and provide 81% of herders' income (Ham et al., 2011). The nomadic pastoral systems are located in the Saharan region (Timbuktu and north Gao) and Sahel (Mopti and south Gao).

Herders of Gambia and Guinea are not involved in this type of pastoralism.

3.2.2. Agropastoral systems

The agropastoral systems are practiced in the south of the 400 mm isohyet. They are more or less practiced in close association with rain fed crops, irrigated crops and / or cash crops. In these systems, the amplitude of movements of indigenous herds becomes relatively short when rainfall, herbaceous biomass and trees increase. These systems are used in the Sudano-Sahelian zones that regularly host the

[1] The transhumance can therefore be seen as a seasonal movement of herders with some family members and part of his livestock in order to join several territories where it is possible to gain access to better resources (water and pasture) while minimizing the socio-economic and diseases risks.

transhumant herds from the north during the annual lean season. They concern many pastoralists who have settled and diversified their domestic economy with agriculture. They also concern a very large proportion of crop farmers who have now introduced livestock in their production systems to improve income, technical systems (soil fertility, draft animals...) and productivity. The cattle herds in individual or corporate ownership are drived to transhumance or grasslands by paid shepherds.

In Senegal, the agropastoral systems cover 50% of the livestock population and extend from Sudano-Sahelian zone to Guinean zone. They are found mainly in the groundnut basin named "Bassin arachidier", but also in the south. They are faced with the expansion of farmland at the expense of grasslands. The main advantage for herding in this area is the abundance of agricultural residues.

The groundnut basin counts nearly 25% of the national cattle herd (Duteurtre, 2006). Land pressure induces intensification but the decline of natural resources requires the use of concentrated feeds, resulting in higher production costs than in the Ferlo (Broutin et al., 2000).

The south (administrative regions of Kolda, Ziguinchor and Tambacounda) contains nearly 20% of the national cattle herd and nearly 45% of the cattle are N'Dama. It is an important area of semi-intensive production (Duteurtre, 2006). This area is characterized by high rainfall (more than 1000 mm of water / year), abundant natural vegetation and higher meat production potential. Agropastoral potentialities of the south are higher than those of the groundnut basin due to lower land pressure and thus the existence of important livestock tracks and the possibility of combining the use of natural resources and housing systems (lower production costs) (Broutin et al, 2000).

In Mali, agropastoral systems cover the Sudano-Sahelian and Sudanian zone from East to West. Depending on the area, these systems combine rain fed agriculture, flood recession agriculture (Niger bend, Kolimbine, Terekole, Magui lake), irrigated crops (zones Office du Niger), cash crops (cotton areas of Mali-south). They occupy 23% of the territory, contain 55% of TLU and provide 18% of herders' income.

In the Gambia, the agropastoral systems cover the whole territory and are characterized by low displacement amplitude. Transhumance is practiced during the dry season in order to access to better resources, and during the rainy season to free growing areas.

In Guinea the agropastoral system is the major livestock system. It differentiates into two sub-systems, one of which is sedentary and the other transhumance. The sedentary sub-system is practiced by small size cattle farms (average of 10 heads of cattle) or medium size farms (11-30 heads of cattle) and small ruminant farms (average of 10 small ruminants). This system is found in communities owning significant pastoral resources (water, fodder, etc.). Animals are sedentary throughout the year and left in free grazing during the dry season. However, during the dry season, local resources including water points attract herders from neighboring areas, located within a radius generally less than 30 km. They come for small

transhumance. They perform successive movements in the lowlands and plains for a stay between 14 to 30 days.

The transhumant subsystem is practiced by ranchers with over 30 heads of cattle. They are typically associated with small ruminants, especially sheep. This subsystem is characterized by a dry season transhumance that covers a radius of up to 150 km. The great transhumance is practiced mainly in the northwestern part of the country between the foothills of the Fouta Djallon (departure areas) and the coastal plains (reception areas).

3.2.3. Peri-urban systems

They are market-oriented through milk production. They are developed around the major consumption centers and use only animal food purchased locally or imported: cultivated fodder; agro-industrial by-products (concentrates); cereals; cake; straws and stalks; etc. Livestock are composed of exotic breeds (inaccessible to the poorest herders), which are more productive than local crosses. The fattening of sheep and cattle coming from pastoral livestock are also common.

3.3. GENERAL CHARACTERISTICS OF LIVESTOCK FARMS

3.3.1. Herd composition

The average herd size varies depending on the site and type of farming:

- In Gambia the average size is 57-76 heads. They are mostly ERL.
- In Senegal, in monospecific farms, the average herd is 40 heads for cattle and 10 heads for small ruminants, while in multispecies farms, there are on average 33 heads of cattle, 11 heads of sheep and 11 heads of goats per household.
- In Guinea, farms in the departure areas of transhumance have on average 66 cattle, 12 goats and 9 sheep. 93% of cattle are of N'Dama breed. Dairy cows represent 23% of the cattle population. In the reception areas of transhumance, the livestock population is made up of 80% of N'Dama and 20% of zebu. The zebu is mostly located at Lola.

3.3.2. Housing of livestock

Cattle are housed in open pens according to 90 to 100% of the surveyed herders. This accommodation is typically a park built with rudimentary materials (wood, twigs...). In the dry season the cattle are usually left free of control. Young calves are housed in the camp.

Small ruminants are better housed. In the Gambia, 75.9% of the women surveyed house their small ruminants in closed pens with or without elevated platform, and only 24.8% house their small animals in open pens. In Senegal, the small ruminants are housed in covered shelters, according to 56% of herders. In Mali, the majority of herders house their small ruminants in unroofed enclosures, except in one site where the use of covered enclosure is widespread.

In the surveyed sites in Guinea, 99 % of cattle are generally housed in open parks built with rudimentary materials (wood, vines and twigs). The young calves are housed in covered shelters near dwellings. For small ruminants, 80% are in covered shelters and 20 % are in the open kraals. Covered shelters are usually small traditional sheepfold built near dwellings to protect animals from predators.

3.3.3. Feeding systems

The feeding system is based on natural pastures throughout the rainy season. Indeed, from the onset of the first rains, the animals are led by a shepherd and tethered near homes to avoid conflicts with crop growers. In some cases, they are taken away from homes to free agricultural areas or are moved into the forests to release agricultural areas (Senegal). This displacement during the short rainy season does not displace livestock outside its traditional ecology.

After the harvests, animals belonging to the territory are brought near houses to exploit fallow as common pasture. After depletion of fallow lands and water resources, large herds go on transhumance and certain categories of animals (dairy cows, oxen) are maintained and fed with agricultural by-products and crop residues remaining in fields or housed for this purpose. The rest of the animals are left free of control (free grazing).

In Senegal, the supplementation and the use of crop residues are still low. Fodder collection is still low and concerns only the groundnut hay.

Food scarcity is felt by the majority of herders, both in areas of departure and arrival. This food scarcity is the major cause of transhumance in Guinea according to 100% of the herders surveyed in the starting areas and 54.19% of the herders surveyed in reception area. In Senegal the fodder shortage at the late dry season is experienced by 74% of surveyed herders. It is accentuated by the bushfires. The authorities' response to this issue is not sustainable and involves only the granting of concentrates to herders at a subsidized price.

The livestock watering is also a major constraint to livestock because it is mainly based on wells that are generally deep and on natural water points that dry up early or when access is denied because of the presence of rice crops. According to 20% of herders of Ouassadou, In Senegal, the waste produced by rice production (fertilizer and pesticide residues) pollutes the water points that become harmful to animals.

3.3.4. Mortality and management of animal health

Pathogens and diseases remain a strong constraint to productivity of ruminants. Their negative effects are accentuated by the transhumance and are not yet mastered given the absence of a regional strategy for health protection, in general, and transhumant ruminants, in particular. The lack of preventive measures exposes the local livestock to diseases from transhumant livestock in a context of free grazing. The mortality rates remain high during the transhumance period (Table 4).

Table 4 : Mortality rate

	Cattle	Small ruminants
The Gambia	8%	12%
Senegal	4%	22%
Mali	3,5%	7%

Source: Transhumance study (2014) in The Gambia, Senegal, Mali

The situation varies across countries with strengths and weaknesses that can be capitalized to develop regional policies, strategies and actions for effective management of animal health:

In the Gambia, livestock mortality is high and is close to the rate reported by ILRI (PROGEBE-Gambia Baseline Report, 2010). Contagious bovine pleuropneumonia (CBPP) is considered by respondent herders as the main cause of mortality of cattle. This disease has seen resurgence in the Gambia in 2012 after 41 years of absence. It was reported for the first time in November 2012 in the district of "Niamina Dankunku", in the region of "Central River". This district is the main transhumance destination of pastoralists of the two sites studied in the Gambia (Niamina East and Nianija) and of pastoralists from Casamance in southern Senegal.

In Senegal, the high mortality of small ruminants is due to the weak enforcement of health regulations by herders, and also the weak management of the animals. The vaccination of small ruminants is not systematic, since only 60% of herders of PROGEBE sites take preventive measures and only 24% of herders of non-PROGEBE sites. The most common diseases are the plague of small ruminants, sheep pasteurellosis, diarrhea, and scabies.

In Mali, the mortality of cattle in the study sites is much more related to dystocia and pasteurellosis. The mortality of small ruminants is generally due to the PPR, poor quality of food and drinking water. Mortality is much higher in the months of March and June. The national livestock policy in Mali has implemented a number of actions that have reduced the mortality rate of livestock including: improving cattle health coverage: strengthening the animal health information system, and strengthening the process of privatization of the veterinary services.

In Guinea, specific measures for livestock protection are collectively taken before departure of transhumance: vaccination against soil-borne diseases and against CBPP in areas where it is endemic (Dinguiraye, Beyla, Mandiana and Siguiri). On transhumance routes, 77% of surveyed herders say that they have not experienced any health problems. 61% of transhumants do not record deaths. Generally, mortalities recorded during the transhumance are due to food poisoning or accidents.

Improving animal health therefore appears to be a priority for the development of livestock in the different study sites.

The implementation of programs of control and prevention of diseases in partnership with the departments in charge of livestock, and the implementation of stakeholders' capacity-building measures in the sites of

departure, transit and destination are among the measures to reduce the risk of disease transmission and ERL mortality.

3.3.5. Reproduction and crossing of breeds

The involvement of herders to control the reproduction of cattle and small ruminants is generally low (Table 5). Indeed, the farming system is of extensive type and characterized by wandering of animals during the dry season, making difficult the control of the reproduction by the livestock keeper. The proportion of herders who strictly control the reproduction with purposes of genetic modification in order to derive an economic interest is relatively low for cattle and virtually null for small ruminants (Table 5).

Table 5: Percentage of herders of reception zones involved in the crossing of animals

	Cattle			Small ruminants		
Countries	Strictly controlled	Poorly controlled	Un-controlled	Strictly controlled	Poorly controlled	Un-controlled
The Gambia	31	45	24	4	20	76
Senegal	19	30	51	6	15	79
Mali	10	42	48	1	35	64
Guinea	3	11	86	3	11	86

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

3.3.6. Potentialities and capacities of production

Milk production is low in all sites (Table 6). Except in the case of Mali, the milk production in the study sites is largely from N'Dama cows. Production of milk by small ruminants is almost nonexistent.

Table 6: Milk production parameters in the Gambia, Senegal, Mali and Guinea

Country	Average production per cow in the rainy season (liter / day)	Average production per cow in the dry season (liter/ day)
The Gambia	1.3	0.4
Senegal	1.0	0.5
Mali	1.5	0.2
Guinea	1.35	0.8

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

The analysis of the perception of herders on the ERL in Senegal sites indicates that:

- The N'Dama breeds are potentially resistant to certain diseases (70% of respondents) and have in terms of growth a high average daily gain. However, they have a low milk production (25% of respondents).
- The goats and sheeps have the ability to reproduce rapidly (15% of respondents)
- The N'Dama breed is popular in the local market of the village, district and region. However, 60% of herders note that the small size of Ndama cattle at maturity hinders their competitiveness in the

markets remote from their native territories. Despite this shortcoming, N'Dama cattle remain the favorite breed for people living in their natural habitat.

3.3.7. Destocking of animals

Some animals are removed from the herd and sold or used to meet the urgent needs of the family, adjust the livestock population, and seize market opportunities during major socio-cultural and religious events. The destocking rate is generally low in the studied sites.

In the Gambia, cattle owners are in capitalization strategy that limits the sale of unproductive animals of their herd. This leads to a low rate of exploitation of the herd, increases the size of animal population and increases the pressure on the agro-pastoral resources.

In Senegal, the sheep destocking rate is relatively high (31%) and favored by the strong market demand during religious ceremonies. A part of the revenue is reinvested in the herd through the purchase of veterinary products, feed concentrates during the lean period and new females. The destocking of goats (35%) allows the household to satisfy basic needs of daily life. For cattle, the destocking rate is much lower (10%) because the herd is a form of saving for herders. On PROGEBE sites (Bandafassi and Ouassadou), the destocking rates are 24%, 28% and 7% respectively for sheep, goats and cattle, respectively.

3.4. CHARACTERISTICS OF TRANSHUMANT SYSTEMS IN THE HOST TERRITORIES

3.4.1. Types of transhumance and map flows

Transhumance can be defined as a seasonal migration of livestock farmers (some members of the family) and their herds (usually much of the herd). They leave the territories in which the majority of the family is permanently settled (origin territory) to join different territories (of transit, host or destination) in order to access better resources (water and pasture) while minimizing the socio-economic and health risks (Dongmo et al., 2012).

The transhumance always incorporates the departure territories, reception territories (or destination) and transit territories. These areas are located in the same country or in different countries. The production (milk, meat, manure) is then sold throughout the trip. Overall in the studied zone, there are two types of transhumance.

- The small transhumance is characterized by short displacement with distances rarely reaching 100 km and a total length of stay not exceeding 3 months. It aims in one hand to exploit crop residues or access better pastures in the dry season and in other hand to free the crop areas (in saturated territories) during the rainy season. This form of transhumance is widespread and reduces conflicts with farmers. Very often, the transhumance is national, but also cross-border level especially for pastures installed near the borders.
- The great transhumance takes place in the dry season and does not respond to a rigid pattern in its methods, its organization and its frequency. It corresponds to large amplitude movements of livestock

(north-south to and south-north). The distances are of several hundred of kilometers, and frequently exceed the boundaries of the country.

3.4.2. Transhumance routes and flows

The transhumance itinerary usually consists of strategic points (water points, grazing areas, markets, etc.) that herders want to reach. So, they do not follow a very specific track since the fields are not grown during this period.

Upon the return from transhumance, shortly before or at the beginning of the rainy season, the precise tracks called corridors are used by herders to facilitate the crossing of agricultural lands. Currently there is a tendency to markup the corridors, to counter the progress of the fields that often generate violent conflicts between farmers and herders.

In Senegal, the great transhumance is based on three main areas:

- From Ferlo to the central west part of the groundnut basin (Cadior and Baol). This flow mobilizes the entire herd of cattle and small ruminants.
- From the north to the central south of the groundnut basin and the south of the country. This route involves small ruminants only.
- From the central west to southern Ferlo. The purpose is to release crop areas during the rainy season.

In the studied zone, at Ouassadou, transhumance is a recent phenomenon and the zone is mainly a transit area. Northern herders pass through Ouassadou to reach the nearby municipality of Pakour. Contrary to Ouassadou, the site of Bandafassi is a front area of transhumance. This site welcomes the Sahelian transhumants since more than ten (10) years, hence the very high intensity of transhumance. In this site some villages are reception areas of transhumants while others are transit villages where herders spend only a few days to reach their final destination (host village).

In recent years some transhumants pass through the site of Ouassadou to enter the Republic of Guinea. In fact, northern herders are arriving more and more in Bandafassi where resources are becoming increasingly scarce, pushing some herds to cross the Senegal-Guinea border in search of better conditions.

In Mali, several transhumance routes exist and can be grouped into two main areas: North-South and East-West.

The PROGEBE sites are affected by the North-South axis, so the most popular are:

- Nara and Nioro, Diema and Yélimané, Kokofata for the site of Sagabary;
- Mopti, Macina, Koulikoro, Segou to reach the sites of Madina Diassa, Manankoro and Tousseguela. The tracks continue until Burkina Faso and Ivory Coast;

- Region of Koulikoro and Bougouni Circle, Kabita - Kolondieba - Bougoula - Fakola - Ivory Coast (used by about 4,500 cattle and 150 sheep)
- Region of Koulikoro, Segou and Bougouni circles, Kebila-Kolondieba-Farako-Fakola- Ivory Coast (5000 cattle and 300 sheep)
- Region of Koulikoro and Bougouni Circle Mena-Kolondieba -Tousségula-Kadiana-Ivory Coast (3700 cattle and 1000 sheep)
- Regions of Koulikoro, Segou, Bougouni Mena-Kolondieba -Tousségula-Fakola - Ivory Coast (2000 cattle and 700 sheep)
- Sikasso - Nagalasso - Tiongui- Ivory Coast (2500 cattle and 100 sheep)
- Burkina Faso, Sikasso - Nangalaso - Tiongui - Ivory Coast (4000 cattle and 200 sheep)
- Region of Koulikoro and Bougouni Circle

The Niger Delta is also a major destination point that herders usually reach following north-south or east-west tracks. These areas are known since the time of the Dina of Sékou Amadou at early 19th century. In some places they are busy by human settlement but continue to be followed. These are the largest axes of northern regions to reach areas with Bourgou (Echinochloa stagnina) in the delta, and the axes coming from the pastures of Seno and the cliffs of Bandiagara.

In Mali, Over 50% of respondents have reported that the studied sites are host or transit zones for transhumants (**Table 7**).

The transhumants arriving or in transit are usually hosted by native population. Economic and trade relationships are established between transhumants and residents of the sites. These exchanges are often manifested through barters (milk, meat and even cattle against cereals). They also appear through manure agreement and use of draft animals.

Table 7 : Major role of municipalities on transhumance in Mali

	Percentage (%) of respondances per municipality						
	Gouanan	Koussan	Garalo	Sibirila	Fakola	Tousséguéla	Gadougou1
Hosting zone of transhumants	47%	100%	36%	6%	-	53%	50
Departure zones of transhumants	0%	0%	0%	6%	-	0%	0
Zone of transit	47%	0%	64%	56%	25%	6%	0
Hosting and departure zones	0%	0%	0%	13%	75%	41%	50
Not involved in transhumance	6%	0%	0%	19%	0%	0%	0
TOTAL	100%	100%	100%	100%	100%	100%	100%

Source: Transhumance study (2014) in Mali

In the Gambia, transhumants come from various locations including Senegal:

Kiang West mainly serves as recipient/host zone for transhumant herds (46.7% of respondants). The main recipient areas in the district include Dumbuto, Brikamanding, Kuli Kunda, Bajana, Jamaru, Jali, Kemoto, and Kantong Kunda among others. The transhumant herders are mainly from within the district. The main destination zone outside the district is the neighbouring Kiang East. At Kiang West, transhumance involves the district's herders (51.8% of respondents) and herders of other districts (25% of respondents). There is not yet any transhumant coming from outside the country and entering the district of Kiang West.

The Niamina East district principally serves as both host and source of transhumance (85.7% of respondants). This district located in the southern part of Central River Region is characterised by woodlands interspersed with open savannah and fresh water swamps which makes it a favourable destinations for transhumant herders from mainly Upper River Region and from Cassamance, Senegal. 96.4% of herders believe that the transhumants come from other districts of Gambia or from Senegal. The district also serves as transit zone for these herds on their way to the lowland fresh water grazing pastures of Niamina Dankunku District, a very important recipient zone for transhumant herds.

The district of Nianija plays multiple roles in transhumance: it serves as host and source (65% of respondants), recipient (40% of respondants), source and transit (13.2% of respondants). The lowland tidal fresh water plains interspersed with small islands with good pasture during the dry season makes this district a favourable destination zone for herds from other parts of the country, mainly from Central and Upper River Regions as well as from Northern and Southern Senegal. Nianija is also a major source of transhumance during the rainy season due to expansion of settlements, crop and rice cultivation. The major destination zones are in Upper Saloum as shown in Figure 3. Other destinations are mainly in Niani district all in central River Region.

In Guinea, the flow of transhumance varies among sites. At Gaoual (site 1), the great transhumance is performed by a dozen herders, especially those with more than 150 heads of cattle. It involves a total of 3,600 heads of cattle and 800 small ruminants that are moved annually on a radius of over 60 km, sometimes reaching Guinea Bissau. Small transhumance is practiced by about fifteen herders with an average of 31 to 60 head of cattle. At Koumbia, for example, there is a border transhumance reaching Guinea Bissau, where nearly 4,000 heads of cattle each year make the long journey of 45 km. In the other part of the site, transhumance is of low level. It is most common between the neighboring sub-prefectures of Koumbia (Wendou M'Bôôrou and Kounsitel).

A Dinguiraye (site 2), transhumance is practiced internally and concerns: i) animals in the sub-prefecture of Sélouma going towards Kouroussa in the east, towards Tamoun (Dabola) in the south and towards Dinguiraye-centre in the north; ii) animals in the municipality of Dinguiraye between the plateau of Diafouna and the alluvial plains of Tinkisso River in the south where a 13,764 heads of cattle annually travel on a distance of 40 Km.

At Beyla (Site 3), transhumance is very limited given the great availability of forage in the region. At Beyla the ERL is sedentary. However, the conflicts in Ivory Coast and Liberia, have been the source of a large

influx of herders with their often zebu cattle into Guinea (Beyla and Lola zones). The constant presence of these herders in Guinean territory and their tendency to always occupy new areas means their permanent installation.

At Mandiana/Siguiri, transhumant herders always arrive on the side of the Republic of Mali (Sikasso, Bougouni Yanfolila) and the Ivory Coast (Odjenné) with basically zebu cattle.

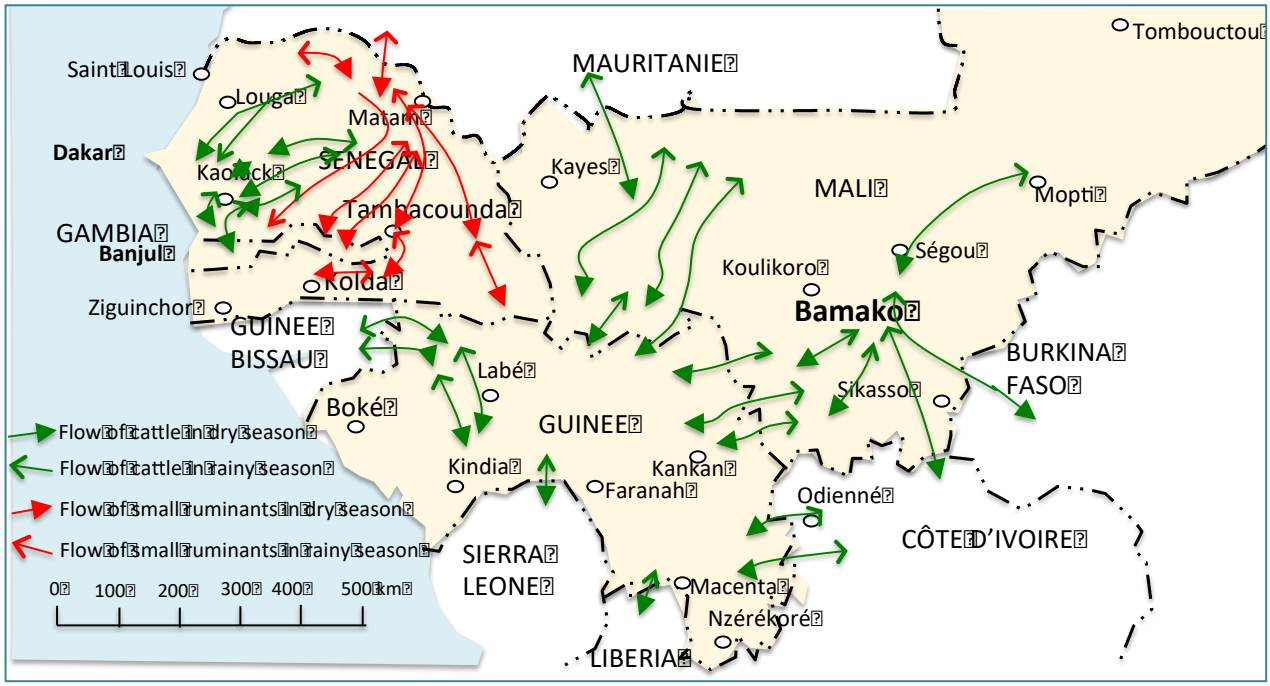

Figure 3 : Transhumance flows in PROGEBE countries

3.4.3. Involvement of actors vis-à-vis transhumance

In the Gambia

In The Gambia, in the districts of Nianija and Niamina East, the leaders consider themselves as highly involved in transhumance. They operate at different levels: Arbitration of unresolved conflicts in the villages between transhumant herders and indigenous; sensitization of arriving transhumants on local conventions and rules; and facilitation of the movement of herds during the rainy season to avoid herd damages on crops. In Kiang West, the low involvement of the chief of district is due to the fact that transhumance in this district is limited. However, despite their roles as guardians of pastoral resources at the local level, only 51 to 46% of village chiefs, depending to the districts surveyed, feel having being involved in transhumance (Table 8).

Table 8: Proportion (%) of actors involved in transhumance in the Gambia

Districts	% of herders		% of chiefs of villages		% of livestock owners	
	Yes	No	Yes	No	Yes	No
Kiang West	16	84	0	100	0	100
Niamina East	48	52	41.7	58.3	42	58
Nianija	95	5	45.5	54.5	43	57

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

Livestock services officials are also involved in transhumance in Nianija and Niamina East through vaccination of transhumant herds before departure, and the provision of veterinary services including treatment and vaccination against transboundary animal diseases of animals arriving in the district. According to the Animal Health Service, these interventions could be improved by requiring vaccination for all transhumant animals entering the district and by requiring a proof of vaccination against CBPP.

The officials of water and forests services were also directly involved in transhumance, especially in the prevention and control of bush fires currently ravaging pasture during the dry season.

Senegal

In Senegal, 60.53% of the herders surveyed do not feel involved in the management of transhumance in their territory for different reasons (Table 9).

Table 9: Reasons justifying the non-involvement of people in the management of transhumance in Senegal

Reasons	% of respondents
Not empowered by the authorities	27,85%
Not interested	13,92%
Uninformed	13,92%
Statut of woman	11,39%
No transhumants in my village	10,13%
Busy with other work	8,86%
Avoid conflicts	7,59%
Frustrated by how transhumance is managed	5,06%
Too old	1,27%
Total	100,00%

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

Indigenous peoples are not involved in the transhumance because specific responsibilities have not been assigned to them (27.85%). The lack of interest (14%) for the management of transhumance and communication problems (14%) is also a barrier to the involvement of the population in the management of transhumance. Women are also excluded from the management of transhumance.

From, Table 10, the owners (33%) and members of the host committee (30.43%) in the villages are the main actors most involved in the management of transhumance. In fact, tutors (any resident who lodgges a transhumant) have a vested interest with transhumance, while the welcoming committees are responsible of welcoming the transhumants and sensitize them on the rules and conventions applicable in the village.

Village leaders are involved in the settlement of disputes between transhumants and indigenous populations. At a higher level, technical and administrative services and local authorities are involved in the resolution of conflicts and the preservation of natural resources (Department of Water and forests).

Table 10: Actors involved in the transhumance

Actors	% of respondents
Lodging-house keeper	33.33%
Member of welcoming committee	13.04%
Member of environmental committee	11.59%
Chief of the village	7.25%
Notable (advisor of the chief of village)	7.25%
Membre of herders' committee	7.25%
Exchanges with transhumants	5.80%
Member of the committe managing the drilling	5.80%
Facilitator between transhumants and local population	5.80%
Municipal councilor	1.45%
Victim of transhumants' damage	1.45%
Total	100.00%

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

Mali

The local population has been involved in different ways in the management of transhumance through: denunciation of a misconduct of transhumant shepherds; testimony in case of conflict; Intervention to solve conflicts issues. The most involved actors are officials of the service of water and forests, mayors and chiefs of village.

Guinea

In Guinea, 77% of key stakeholders interviewed feel personally involved in transhumance. 43% of them are heads of districts. They are involved in rasing awareness, negotiation of livestock track, resolution of conflicts between farmers and herders on area of reception of transhumants, negotiations with indigenous peoples for the allocation of home sites of transhumants and for commercial transactions (sale of live animals).

3.4.4. Measures taken by herders before departure on transhumance

In the Gambia, specific measures are taken before departure on transhumance. This is done by 86.2% of herders in Niamina East, 46.2% in Nianija and 12.5% in Kiang West. These measures concern mainly vaccination against haemorrhagic septicemia and blackquarters. Thermostable vaccines for both diseases exist and can be easily accessible when needed.

Some herders also treat their cattle against worms before departure. Traditional means are also used to protect their flocks (decoctions of herbs and salts)

According to 40% of the herders' surveyed, sick or disabled animals, draft animals and newborn calves do not go on transhumance. Some lactating cows are also left in the origin territory to provide milk to the family.

In Senegal, the transhumance to the sites studied is provided by hired shepherds or family members accompanied by the owner. Unlike the transhumance observed in the Ferlo (Djolof), where mobilization of family labor (men, women, children) is important, transhumance in Fouta mobilizes fewer labor (young persons from family), with reduced logistic. The other family members remain at the home village (origin territory).

The departures on transhumance are not collectively planned at the village level. Each farmer plans his departure date and the route to take, depending on the availability of resources in the village of origin and information available on potential zones of transit and host. The material organization is sketchy: donkeys to dunnage, dishes and food.

In Mali, the sites studied are mostly areas of reception or transit of transhumants. Only 15% of surveyed herders confirm the existence of small transhumance during the cropping period. For departure, transhumants do not take special measures, but they leave behind draft animals, some dairy cows and some small ruminants reserved for religious and cultural events or for sale.

In Guinea, the main arrangements before departure on transhumance according to herders' leaders concern:

• Sanitary measures: vaccinations, deworming and other treatments (85% of respondents);

• Management measures: marking and counting of all animals (8% of respondents);

• Communication: identification of adequate track; setting the starting date; information of host communities; negotiating the route and sites of implantation (7% of respondents).

3.4.5. Dates of transhumance, transit areas and duration

The transit route followed by transhumant herders depends on the variability of rainfall in the previous year, the availability of water resources and the quality of community pastures. The affinities with local people on transit can also determine the stay of transhumants in a locality.

Periods of departure on transhumance and length of stay in the transit zones depend on the availability of water and pasture resources in the place and the density of animal according to carrying capacity on these resources in destination territories. In 2014, for example, in Senegal, the majority of transhumants left earlier their home land because of the rainfall deficit. This early start is motivated by fear of diarrheal diseases due to pollution of surface water (ponds). The status of resources is therefore a key parameter in making decisions about the starting of transhumance, the duration of transit and final destination.

Senegal

The transhumance does not know countries borders. Thus, a herd can stay in dry season in the South or South East Senegal and join Mauritania or Mali (Keyes region) during the rainy season to free growing areas in its territory of origin. The stay in these territories only serves to rest the animals and prepare the next transhumance.

The average length of stay in the host territories is 45 days. The first transhumants arrive just at the end of the rainy season (around December and January) and stay longer than their peers who arrive in the middle of the dry season (around March). At Bandafassi, transhumants usually arrive around the months of December and January and return around the end of May.

At Ouassadou, transhumants arrive in the middle of the dry season. According to the agent of livestock of the municipality of Ouassadou, the livestock farmers do not stay more than one month in the village. They are in constant displacement in the local villages during their stay and then join the neighboring municipality of Pakour.

The foreign transhumants from the north of Senegal join host territories in the sites studied more quickly (1 month) when resources in the transit areas become insufficient or of poor quality to feed the livestock adequately. Coversly, the transit may take four months if resources are available for livestock in quality and quantity on the path. The average travel time to reach final destination was estimated to be 75 days.

Though the transhumants report having a fixed route to rally their final destination, it is nevertheless clear that transit areas change from year to year. The status of the herd is another variable to be considered by the transhumance during transit. The stay in a community varies with the physical condition of the animals

and the parameters mentioned above. In order not to tire the animals, distances generally do not exceed 15 km per day.

The Gambia

Most herds go on transhumance in the region of Central River and reach their destination in one day.

For the transhumance of rainy season, the resident herds depart just before the start of the rainy season. The departure is scheduled appropriately to prevent damage to crops because livestock trails are generally insufficient or inappropriate. In Niamina East, the transhumance is also to avoid mosquitoes.

The herds entering inside the district for rainy season transhumance usually return to their original territory at the end of the rainy season to access floodplains and rice fields, crop residues and water of good quality.

For the transhumance of dry season, animals leave at the end of the rainy season or very early at the beginning of dry season. At destination territories, local rules require that animals can enter in the rice fields and floodplains only when the rice harvesting is fully completed.

Some herders (5.4% of respondents in Niamina East and Nianija and 3.3% in Kiang West) go on transhumance in the middle of the dry season after assessing whether the exhaustion of the feed and the drying up of ponds will occur or not. These departures are also linked to bush fires which destroy the dried biomass. This period was cited by 5.4% of respondents in Niamina East and Nianija against 3.3% in Kiang West.

Another small proportion of herders also go on transhumance at the end of the dry season (respectively 3.3% and 2.6% of Nianija and Kiang West), with the objective to seek fresh grass in areas where it raining already. The transhumance can last three months but the transit time is a few hours and rarely exceeds 24 hours because the actual distance to the final destination of transhumance is usually short.

In the Gambia, no license/authorization is required to herders for their stay in final destination. However, it was reported by 6.8% of transhumant herders of East Niamina that a license is sometimes required for transhumants going in parts of Senegal. License fees vary from four hundred to one thousand Gambian dalasi (from GMD400 to GMD1000).

Guinea

In Guinea, the transit takes 2 to 10 days and the stay in the host areas varies between 3 to 4 months. The duration of the longest transit is observed in the Gaoual zone with an average of 9 days. The main transit areas are: Koumbia (prefecture of Karina) for herders from Koumbia, and Dandé Féfiné in Wendou M'Borou for herders from Missira (Prefecture Télimélé). In areas of Dinguiraye, Beyla, Mandiana, Siguiri and Lola, the transhumance is internal and the displacements are between neighboring localities.

Mali

In Mali, the transhumants arrive in the sites during the end of the rainy season or at the beginning of the dry season. Increasingly, even before the end of the harvest, transhumants with their large numbers of cattle invade sites. They remain in the vicinity of villages and feed their cattle with crop residues. This situation is criticized by village leaders, but encouraged by some residents.

At the beginning of the rainy season or during the sowing period, transhumants cross the sites studied, causing enormous damage to seedlings.

3.4.6. Knowledge and compliance with local management rules by transhumants

The Gambia

The code of conduct is presented in details in the local conventions on sustainable management of natural resources. Significant parts of transhumants are aware of the existence of the code of conduct (according to 70% of herders in Niamina East, 48% in Nianija and 36% in Kiang West). However, few transhumants fully respect it (2% are in full compliance in Kiang West, 31% in Niamina East and 30% at Nianija).

Local conventions on sustainable management of natural resources took effect in all three districts since August 2012. They constitute a set of agreements made by the community with the support of stakeholders to operate and manage the shared natural resources. The use of these conventions is envisaged to support enforcement of regulations and control of bush fires, illegal tree cutting, unsustainable water use and overgrazing. The agreements provide a framework for the regulation of transhumance in the village. It is therefore very important to increase awareness of stakeholders involved in transhumance.

Senegal

In the project sites, the land use plans (LUP) have been developed to help communities to manage the land and natural resources. Thus, the livestock tracks and grazing areas have been delineated and actions have been undertaken to facilitate the implementation of measures taken. It is for this purpose that the host committees were established in each village to improve reception of transhumants through the promotion of dialogue. The committee's role is to welcome the transhumants, educate them on the village's rules, to facilitate their integration into society.

The LUP has reduced conflicts between herders and indigenous farmers. By contrast, although included in the LUP, the transhumance of Sahelian herders is often a source of conflicts in some host villages. Indeed according to the interviewed actors, there is a lack of communication with transhumants about the LUP. In some villages the host committees are not dynamic enough to play a full role in the management of transhumance. The workshop on transhumance also found that some chiefs of village and members of

host committees are conniving with transhumants. The lodgers of transhumants are also implicated because some do not declare the transhumants they host to the committee or to the chief of the village.

The revitalization of the host committee and the selection of its members are required to better manage transhumance. It should also involve the population and in particular owners in the prevention and resolution of conflicts between indigenous and transhumants.

Drilling management is made through an agreement with the municipality. The difference in the price of water is practiced to give a favor to members who have paid for the initial investment. This price difference is a source of conflict between transhumants and drilling management committee. The non-payment of dues by transhumants suggest to the management committees to set high prices or prohibit the watering of livestock of such transhumants in drilling.

Mali

Pastoral resources are governed by the law 01-004 of 27/02/2001 relative to pastoral charter. This law defines the basic principles and general rules governing the exercise of pastoral activities in the Republic of Mali. The law specifies the basic rights of pastoralists, especially in terms of mobility of animals and access to pastoral resources. It also defines the main obligations in the exercise of pastoral activities, especially with regard to environmental preservation and respect for the property of others. It is applied mainly to pastoral ruminant. The aspects related to animal health, livestock management and marketing are excluded from the scope of this legislation.

In practice, the pastoral exploitation (grazing grasses, trees) involves local authorities in charge of management (village institutions, municipality, administrative and technical services). The LUP of sites were developed by PROGEBE and constitute the tools of resource management in general and transhumance in particular.

Guinea

Overall, the transhumance code is little known in the opinion of 77% of surveyed herders and 73% of key actors. However 96% of herders know the veterinary requirements of transhumance and 54% comply fully with them against 46% who do comply only partially. Key actors have a similar view.

Ignorance of code of transhumance by the herders varies, but remains high: 82% at Gaoual, 73% at Dinguiraye, 72% at Beyla and 69% at Mandiana. However, the level of knowledge of veterinary requirements is 94.5% at Gaoual, 93% at Dinguiraye, 86% at Mandiana / Siguiri and 50% at Beyla. Moreover 57.7% of herders of Dinguiraye, 55% in Gaoual and 50% in Mandiana are in accordance with veterinary requirements, against 36% of herders in Beyla.

The development and implementation of LUP within 3 primary sites, the markup of the main transhumance routes in Gaoual and Dinguiraye, construction of small water points with management committees

established along the transhumance axes by PROGEBE, will allow communities to adopt local rules and code of conduct, to better manage the transhumance.

3.4.7. Interactions between resident animals and transhumant animals and penetration of Sahelian breeds in the farms located in the ERL territory

The intensity of interactions is a factor favoring uncontrolled cross-breeding and transmission of transboundary animal diseases. The transhumant livestock confinement vis-à-vis local livestock greatly reduces the risk of cross-breeding between transhumant cattle and ERL.

In the Gambia, herders of Kiang West who participated in transhumance stated that the interactions between resident and indigenous animals are essentially limited (50% of respondents), intense (33.3%) or non-existent (16.7%). In Niamina East, these interactions are limited (10.7% of respondents), intense (53.6%) or non-existent (35.8%), while in Nianija they are limited (10.5%), severe (52.6%) or non-existent (36.8%).

In Senegal, the penetration of different breeds of ERL is still low. On a total of 184 cattle observed, the zebu breeds or their crossbreds were found in 14. The presence of Sahelian sheep or their crossbreds was observed within 6.2% of herds studied. Sahelian breeds of goats and their crossbreds were in 2.4% of herds. These results confirm the predominance of ERL.

The introduction of Sahelian breeds in these areas is recent: 8 years for cattle, 3 years for sheep and 6 years for goats. The aim of cross-breeding is to obtain animals with large size and higher productivity of milk and meat. Although the phenomenon is still limited to few herders, it could increase with economic opportunities or if the ecology becomes more favorable to Sahelian breeds (Table11).

Table11: Modes of integration of other breeds in the herd in Senegal

	Cattle	Sheep	Goat
By purchase	64%	50 %	75%
Accidentally	29%	25 %	25%
Received as gift	0%	12.5 %	0%
Exchange of animals	7%	12.5%	0%
Total	100%	100%	100%

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

In Mali, the terms and the reasons for the introduction of non-ERL breeds vary from one municipality to another (Table12, Table13, Table14). Non-ERL cattle was introduced in certain municipalities more than 30 years ago and in others only 5 years ago. The introduction process is then still in progress.

Table12 : Number of years passed since introduction of non-ERL breeds in the farm in Mali

	Gouanan	Koussan	Garalo	Sibirila	Fakola	Tousséguéla	Gadougou1
Non-ERL cattle	15	5	8	10	20	> 30	15
Non- ERL sheep	10	5	7	-	15	11	20
Non-ERL goats	20						

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

Table13: Mode of introduction of Non-ERL ruminants in Mali

Mode introduction	Percentage (%) of respondents per municipality						
	Gouanan	Koussan	Garalo	Sibirila	Fakola	Tousséguéla	Gadougou1
Non ERL cattle							
By purchase	50%	82%	53%	87.5%	47.6	91%	50
By gift	0%	0%	0%	12.5%	0%	0%	0
By exchanges of animals	25%	0%	0%	0%	4.8	9%	0
Accidentally	19%	18%	35%	0%	47.6	0%	50
Other	6%	0%	12%	0%	0%	0%	0
Non ERL sheep							
By purchase	57%	64%	53%	67%	35%	100%	34%
By gift	0%	27%	0%	0%	29%	0%	8%
By exchanges of animals	29%	0%	0%	0%	0%	0%	32%
Accidentally	7%	9%	35%	33%	36%	0%	26%
Other	7%	0%	12%	0%	0%	0%	0%
Non ERL sheep							
By purchase	-	-	-	67%	36%	-	34%
By gift	-	-	-	0%	28%	-	8%
By exchanges of animals	-	-	-	0%	0%	-	32%
Accidentally	-	-	-	33%	36%	-	26%
Other	-	-	-	0%	0%	-	0%

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

Table14: Reasons of the adoption of non ERL animals in the municipalities of Mali

Reasons	Percentage (%) of respondents per municipality						
	Gouanan	Koussan	Garalo	Sibirila	Fakola	Tousséguéla	Gadougou1
Reasons of adoption of non ERL cattle							
Economic	0%	0%	0%	0%	100%	0%	58
Productivity and price	0%	0%	0%	0%	_	100%	26
Productivity	100%	100%	100%	100%	_	0%	16
Reasons of adoption of non ERL sheep							
Economic	-	-	-	-	100%	100%	58
Productivity and price	50%	50%	-	-	-	-	42
Productivity	50%	50%	100%	100%	100%	100%	-
Reasons of adoption of non ERL goats							
Economic	-	100%	0%	100%	100%	0%	58
Productivity and price	50%	0%	0%	0%	-	0%	42
Productivity	50%	0%	0%	0%	-	0%	-

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

In Guinea, particularly in the municipalities of Gaoual and Dinguiraye, the presence of breeds other than the ERL (N'Dama cattle, sheep and goats Djallonké) is not apparent. The geographical location of these two sites does not favor the penetration of Sahelian breeds. All attempts to introduce these breeds have ended in failure because of the high tsetse pressure and other diseases. Introductions of non-ERL breeds were mainly operated by purchase (76.09% of respondents herders) or accidentally (10.87%). The predominance of ERL in these areas is clearly marked because it is his birthplace.

By extrapolation, areas of Beyla, Lola and Mandiana own breeds other than N'Dama. According to the survey data, the introduction of zebu dates back to 16 years at Lola, 10 years in Mandiana and 5 years in Beyla. However, it should be noted that the presence of crossbreds Zebu x N'Dama is particularly noticed in Upper Guinea (Mandiana / Siguiri) since decades. These unstructured cross-breedings have resulted in the creation of a sub-breed named "Mere" well known by herders.

There are several methods of introduction of zebu in these sites according to herders interviewed: by purchase (83% of respondents in Mandiana, 50% in Beyla and Lola); accidentally (28.5% in Lola, 25% in Beyla and 2.8% in Mandiana); by exchange of animals (25% in Beyla, 14% in Lola and 2.8% in Mandiana).

According to herders' opinion, the adoption of non-endemic breeds is to:

- Improve the productivity of their herd (77% of respondent in Mandiana ; 61.5% in Lola; 11.5% in Beyla) ;
- Family habits (15.3% in Lola ; 9.6% in Mandiana ; 7.6% in Beyla) ;
- Improving animal labor force (Mandiana 10%);
- Docility (Lola 7.6%);
- Proximity to non-endemic herds (9.6% of respondents in Mandiana, 7.6% in Lola);
- Affection (9.6% in Mandiana);
- Better market value (7.6% in Beyla)

3.5. ADVERSE EFFECTS OF THE TRANSHUMANCE

3.5.1. Adverse effects on animal ressources

The effects of transhumance on animal resources are viewed with mixed feelings by herders. Several disadvantages are reported and the extent of appreciation will varies depending on the location. The transhumant livestock is considered as being a transmitter of diseases harmful to local livestock and as being a genetic dilution factor of local breeds.

In Senegal, 33% of respondents argue that since the arrival of transhumance, there is a resurgence of diseases such as PPR (peste des petits ruminants) in small ruminants and ovine pasteurellosis. Mange also occurs after the departure of transhumants. These diseases cause high mortality in small ruminants.

In the Gambia, the resurgence of CBPP in 2012 after 41 years of absence is considered coming from transhumance. Failure to full compliance with veterinary standards by transhumants before their move

bears a risk of contamination for local livestock. Indeed the majority of transhumance did not report to Department of Livestock Services prior to settling in the host territory, while others did not even respect prophylaxis measures before their departure.

Moreover, in order to reduce the risk of contamination of their cattle by local animal, some transhumants keep their flock in isolation. According to some livestock farmers of Senegal, the risk of contracting the disease during transhumance is higher for Sahelian breeds than for local livestock (ERL breeds).

In Mali, adverse effects are mainly linked to crossbreeding of zebu and local breeds that weakens the hardiness of descendants and facilitate the spread of diseases. Cross-breeding is not taking place due to the proximity of transhumant and local animals, as described in the previous section. The transhumance indirectly contributes to genetic dilution of endemic ruminant livestock (ERL) because of the presence of transhumants increases the interest of indigenous ones in zebu cattle and facilitates their acquisition. To date, small ruminants are not affected by this dynamic.

In Guinea, the rate of spread of diseases is favored by transhumance but is mostly linked to low vaccination coverage in some areas (Table 15)

Table 15: Disadvantages of transhumance on animal resources (ERL) according to herders of Guinea

	Gaoual	Dinguiraye	Beyla	Lola	Siguiri/Mandiana
Disease propagation	66.6%	35%	43.75%	36.8%	61.8%
Alteration of genetic capacities due to uncontrolled crossing	-	5.4%	56.55%	63%	38.1%
Death of animals	33%	59.4%	-	-	-

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

The high rate of spread of diseases in Gaoual is due to low immunization coverage and high animal density. Some individual herders with nearly 1 000 heads of cattle. At Dinguiraye, the relative low spread of diseases is due to the effect of periodical vaccination campaigns that are often performed to control the endemicity of CBPP. In the sites of Beyla, Lola, Siguiri and Mandiana, CBPP is endemic. Despite vaccination campaigns, the risk of persistence of this disease is high with the introduction of zebu cattle who are asymptomatic carriers. The movement of zebu cattle in these areas favors their contact with the N'Dama cattle, which is a significant factor of contamination and spread of the disease.

The high rate of alteration of genetic traits in areas Beyla, Lola, Mandiana and Siguiri is explained by the presence of zebu herds that use the same route as the local livestock, and this favors the uncontrolled cross-breedings.

3.5.2. Adverse effects on natural ressources and forage

Overgrazing, cutting of tree branches, bush fires, destruction of crops, disturbance of soil, competition for access to water, erosion and environmental pollution are the main negative effects of transhumance (**Table 16**). The magnitude of each effect varies across countries and sites.

Table 16 : Opinion of herders on the negative effects of transhumance in Guinea

Type of effects	Gaoual	Dinguiraye	Beyla	Lola	Mandiana/ Siguiri
Degradation of agricultural soil	7.14%	-	-	7.69%	14.6%
Bush fires	10.71%	-		7.7%	5.6%
Degradation of pastures and grasslands	3.57%	8.3%	8.3%	2.5%	7.9%
Destruction of watering points	4.34%	-	4.34%	12.8%	12%
Degradation of forest	7.14%	-	-	17.9%	-
Destruction of trees and forage	7.14%	-	-	2.5%	34.83%
Destruction of farms	3.75%	-	-	2.5%	2.24%
Drying up of rivers (erosion and trampling)	21.42%	16.66%	25%	2.5%	12.35%
Deforestation	47.82%	8.3%	-	-	3.57%
Pruning of trees	8.69%				14.28%
Destruction of natural resources by grazing and trampling	10.71%	-	-	2.5%	3.37%

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

In Guinea, the main drawbacks associated with the practice of transhumance concern the environmental destruction by bush fires, trampling, deforestation, pruning the trees and shrubs.

In Senegal, among the negative practices of transhumance are: improper pruning of trees (in 90% of respondents); bush fires, the overuse of water resources, and overgrazing. Respondents also felt that transhumance also decreases the palatable species (85%) and increases shortage (11%).

These phenomena lead to medium-term degradation of forest, loss of vegetation (brush fires), drying up of temporary water points and the accentuation of erosion. Therefore, maintaining the balance of ERL ecology is necessary for the sustainable management and development of these breeds. The penetration of Sahelian breeds in northern part of the department of Vélingara in Senegal is an indication of the rupture of the ecology and environment that was preventing the invasion of Sahelian breeds. The extent of this environmental damage led parks' officials to apply repressive measures against transhumants. The transhumants seen by forest officials in possession of axes or machetes are obliged to pay a contravention of about 40,000 FCFA to 300,000 Fcfa.

In the Gambia, a significant proportion of herders (60.5% in Nianija, 39.2% in Niamina-East and 30% in Kiang West) are not aware of the harmful effects of transhumance on the environment. The bush fires are recurrent and can be avoided if public education campaigns and sensitization of stakeholders on risky practices are organized. Overgrazing has been reported in three districts according to 26.3% of respondents in Nianija, 23.2% in Niamina-East and 3.3% in Kiang West.

The destruction of crops by transhumant herds was reported in Niamina-East (by 3.6% of respondants) and Nianija (13.1% of respondents) as an adverse effect of transhumance. Factors that underpin them are: the disappearance of traditional cattle tracks, expansion of rice cultivation and encroachment on traditional lowlands pastures. Competition for water has also been reported in Kiang West (8.3% of respondents) and Niamina-East (3.5% of respondents). The pollution due to dust was reported in Niamina East.

In Mali, the negative effects on natural resources mainly concern deforestation. Uncontrolled cutting of branches and even trunks of some trees to feeding the flock is the main problem. The cut branches dry up and facilitate the spread of wildfires. According to 100% of respondents, the deforestation linked to the cutting of branches and shrubs is mostly made by transhumants. They are also the main authors of the flora destruction and are cited as being at the origin of forest bushfires.

3.5.3. Negative socio-economic effects and conflicts in host sites

The transhumance has disadvantages on socio-economic activities of the localities involved (Table **17**). Social conflicts come from different sources: damages caused by transhumant animals on the resources, problems of access to water resources, and to a lesser extent the problems related to the theft of animals and to zoonoses. In some places the high cost of living resulting from the increase in the price of basic commodities in this period is considered as a major drawback. Indeed, transhumants also unbalance prices by paying more for the products, resulting in food shortages especially after their departure from the host territories. These negative effects are variable depending on the country.

Table 17 : Socioeconomic disadvantages of transhumance according to herders in Guinea

Type of disadvantage	Gaoual	Dinguiraye	Beyla	Lola	Siguiri / Mandiana
Degradation of social relationships and conflicts	33.3%	72%	29.8%	31.6%	20.5%
Destruction of crops	13.3%	4.6%	28.3%	52.7%	17.6%
Increase of the living cost	40%	-	1.4%	5.5%	20.5%
Theft and loss of animals	13.3%	18.6%	1.4%	-	41.1%
Non respect of conventions and reduction of cropping areas	-	4.6%	38.8%	-	-

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

In Guinea, the prevalence of conflicts in the area of Dinguiraye is due to the fact that there are two distinct categories of stakeholders: crop farmers and herders except in the localities of Gaoual, Beyla and Siguiri / Mandiana where the agropastoralists are more found. At Lola a location mainly dominated by crop farmers, conflicts are mitigated due to the strong involvement of livestock farmers in local development despite the high rate of destruction of crops (according to 52.7% of respondents). At Gaoual the remoteness and isolation of host zones contribute significantly to the rising of living cost.

In Senegal, social conflicts are the main negative social effect of transhumance (acccording to 40% of respondents). The negative economic effects are related to the fact that Sahelian animals strongly compete with ERL in livestock markets. Butchers and cattle dealers prefer the Sahelian animals for their larger size and higher gain on sale. During their presence, the local livestock (small ruminants) is relegated to second place. The incomes of indigenous people coming from gathering are also adversely affected by improper pruning and cutting of trees. Over 90% of respondents claim that the destruction of trees affects the local population. For 65% of them, this destruction negatively affects the income of loggers, and for 20% of them, it affects negatively the food source of local population.

In social plan, the host population considers that transhumants don't want to integrate themselves into the local society, because they do not respect the rules established in the villages. The transhumants feel to be unloved by indigenous that see them as strangers and do not give them full rights to access the resources of the locality. The transhumance also causes school wastage because some children of the host village (according to 10% of respondents) drop out of school to follow the transhumants.

In the Gambia, the case of conflicts with host communities have not been reported in Kiang West, while in Niamina-East and Nianija respectively 7.4% and 5.5% of herders have reported cases of conflicts. They were mostly related to damage caused by cattle on crops in fields, to non compliance with the cattle tracks, or to the reluctance of some herders to fertilize fields. The presence of transhumants also leads to marital conflicts. In Nianija, a system was put in place to reduce conflicts with rice growers and maximize the benefits associated with the presence of transhumants. The transhumants are asked to come to the villages before the 15th of March of each year in order to park their herd to fertilize the fields of corn and millet. But, they are not allowed to go in the rice fields before this date. This rule helps rice growers to harvest and transport their rice without damage.

In Mali, transhumance is generally viewed negatively by agropastoralists of the studied sites. They criticize the bad behavior of the shepherds. There has also been a gradual substitution of the N'Dama by the Zebu in some farms for economic reasons. To date, small ruminants are not much affected. The arrival of transhumance is also accompanied by social conflicts and manners' problems such as rape of women and cattle rustling.

3.6. POSITIVE EFFECTS OF TRANSHUMANCE

The practice of transhumance has positive effects on production systems and socio-economic activities in the territories of origin of ERL.

3.6.1. Effects on production systems and recycling of biomass

The studied areas practice two types of transhumance that influence local production systems (natural territory of ERL). The great transhumance is mostly done by Sahelian herders arriving in the studied sites. Beyond the many drawbacks previously presented, this transhumance, when properly coordinated can have positive effects on the host territories and on the population. On the other hand, the small transhumance is practiced by herders of host territories on small distances that do not reach 100 km in the dry season. It allows during dry season, exploitation of crop residues (rice plains, lowland pastures) and access to best watering points, and in rainy season the release of growing areas. It has less negative impact on the ERL than the great transhumance. It is more performed between the territories belonging to the same country or located at the border.

Overall, the two types of transhumance contribute in different ways to the improvement of production systems practiced in the study area:

- Improvement of forage and water for ERL in the dry season
- Fertilization of plots in host territories by transhumant herds when the owners respect local conventions or grazing contracts offered by indigenous
- Release of space, improved crop-livestock integration, and reduction of pest pressure

3.6.2. Socio-economic advantages of transhumance in host territories

In host territories, the arrival of transhumance has many positive socio-economic effects, the main ones:

- Improvement of revenue of farmers through better fertilization of plots and better yields. In Mali it is performed through the establishment of manure contracts. In The Gambia, it is recognized that the yields and farm incomes are much higher for farmers of the communities receiving the transhumants than for other farmers.
- The participation and contribution of transhumants to the achievement of certain social infrastructures (mosques, schools) or maintenance of infrastructures. In Senegal, for example, to access drillings, the transhumants can pay a lump sum from 2,500 FCFA to 4,000 FCFA per flock/month or 15 000 FCFA to 40 000 FCFA per year/herd.
- The social integration which translates weddings, homonyms between people of different families, and the establishment of close personal and family ties with the host over the years.
- Increase of the activity of merchants, cattle dealers and butchers due to the supply to the local market with more livestock.
- The provision of milk, meat and live animals.

- The provision of veterinary products to local population for animal care although these products are often of dubious origin and quality.
- The contribution of transhumants in daily expenses of foster families and contribution to the social effort in case of disaster or event in the host village.

The magnitude of the benefits of transhumance can vary from one territory to another. In Guinea, for example, the benefits of transhumance on the local socio-economic development are at various levels as evidenced by the case of Guinea (Table 18).

Table 18: Advantages of transhumance according to actors surveyed in Guinea

	Gaoual	Dinguiraye	Beyla	Lola	Siguiri/Mandiana
Contribution to local development	-	-	48.75%	55.1%	-
Supply of animals and animal products	39.4%	51%	75%	37.9%	77%
Social integration	18.4%	2.3%	6.25%	-	22.8%
Increase of income	18.4%	4.6%	27.5%	-	-
Exchange of experiences	18.4%	39.5%	2.5%	-	-

Source: Transhumance study (2014) in The Gambia, Senegal, Mali, Guinea

The transhumance thus offers advantages for certain production systems and the populations of host areas. However these benefits remain localized in specific areas where agriculture-livestock integration has been shaped by history or by the proper application of management tools (LUP, local conventions, grazing contracts, manure contracts, etc.). Without a widespread application of these management tools and extension of crop-livestock integration, the negative effects of transhumance both on animal resources, natural resources and indigenous peoples continue to dominate largely its positive effects.

The accompanying measures must be taken to generalize and intensify the positive effects of transhumance on resources and actors of host territories. The strategies and actions to improve transhumance must be done simultaneously with those aiming at mitigating the negative effects of transhumance.

3.7. SYNTHESIS OF FACTORS AFFECTING NEGATIVELY THE CONSERVATION OF ERL AT REGIONAL LEVEL

The negative impacts of transhumance on the conservation of ERL identified at country level are linked to a combination of factors which most importantly are the following:

- The transhumance is neither regulated nor monitored throughout the PROGEBE zone and this greatly increases the risk of introduction of transboundary animal diseases and represents a real health threat to the population of endemic ruminant livestock. This situation is compounded by low vaccination coverage of animals.

- The reproduction of animals is poorly controlled by the majority of herders, and that increases the risk of undesired crossbreeding between Sahelian breeds and ERL breeds.
- Virtually all indigenous herders have the perception that the Sahelian breeds have a high production potential and a higher economic return than the ERL. The voluntary crossbreedings are increasingly carried out by the indigenous herders in order to increase the number of crossbreds, especially in Mali but also in Senegal. The presence of transhumant herds facilitates these voluntary crossbreedings.
- The conversion of sub-humid savannas and wetlands is an important factor favoring the influx and settlement of transhumant herders coming from the Sahel, and adoption of Sahelian breeds by local people.
- Overgrazing, the poor pruning practices, excessive cutting of trees and bush fires also lead to degradation of natural resources. These phenomena are accompanied by water pollution due to the high density of livestock in watering points, accentuation of erosion, habitat degradation, environmental pollution, modification of flora and occurrence of unpalatable plant species.
- The lack of a structured and specialized economic sector in the valuation of ERL and its products (meat, live animals) is a big limiting factor to its conservation and development.
- Although transhumance is an important means of linking socio-economic actors in the areas of transit and destination, however, it remains a source of tension and conflict between transhumants and local population.
- The participatory management tools and resources developed by PROGEBE are not yet fully implemented in the sites studied.
- The policy of livestock sector in the three countries remains weak against issues that are growing around the management of animal genetic resources including the protection / conservation of endemic breeds, equitable and sustainable management of resources including the conservation of pastures of dry season located nearby the basins of rice production.
- The absence of local adaptation/application of West African regulations on the cross-border transhumance, including the ECOWAS Action Plan on transhumance adopted in 2011 by ECOWAS. These provisions recognize the right of pastoralists to move their herds from one region to another, to protect their access to water in settled agricultural areas and facilitate cross-border trades.

3.8. PROPOSITION OF MITIGATION AND RISK MANAGEMENT MEASURES

To mitigate and manage threats and negative effects of transhumance on the ERL, all the tools available at the regional (the ECOWAS Action Plan), national (national policies, plans applicable to transhumance, sectoral laws and regulations on the management of space and resources) and local (LUP, local conventions, monitoring committees) levels, must be mobilized and additional actions put in place to facilitate their implementation

The fairer mechanisms should also be put in place to involve transhumant in the phases of creation and management of resources (specifically the new water points, improved pastures) to avoid the tensions that exist around those resources. These tensions restrict / prevent the collaboration between the actors of transhumance.

The principal operational actions to put in place to control and attenuate the negative effects of transhumance on the conservation of ERL stand on:

- Diffusion, revitalization, dissemination and application of the rules and existing management tools: PAOS (plans of assignment and occupation of soils); forest code, local Conventions; LOA (agricultural orientation law); pastoral charter; reception committee of transhumants; fire brigade against bush fires; participative disposition for sanitary surveillance of transhumant livestock.

- Development of avenues for dialogue between the transhumants and the local community leaders of the reception zones for the co-management of transhumance (understanding on the dates and the itineraries of transhumance, facilitation of the access of the transhumant to the residues of cultures and grazing in the season dry, access of the natives to animal manure through the penning of animals, etc.).

- Implication of local and administrative authorities and technical services in the departure zones of transhumants to sensitize them better before they leave and in the reception zones to improve the local management of the transhumance.

- Putting in place and/or the building of capacities of the processes for the follow-up of transhumants in the zones of departure, on transit and in the reception zones.
- Sensitization and the implication of the transhumant herders on the management of the environment (fight against bush fires, fight against the abusive felling of trees and the bad practices of pruning the trees, etc.).
- Putting in place of disease control and prevention systems to secure the transhumance. In this light, a veterinary certificate providing proof of the vaccination of the herd against the preoccupying illnesses could be required from the transhumant.
- Improvement of the availability in water (creation / development of water points) and in fodder (pastoral amenities, cultured fodder, better collection and conservation of crop residues) and the setting up of a management/regulation system taking into account the holding capacity of the different types of resources.

- Development of tracks for livestock to facilitate the movement of the animals toward the sites of grazing and drinking, in order to reduce the damages on crops and on other resources, and to limit the sectorial conflicts.
- Creation of agencies for the promotion of ERL and the products and services coming from their rearing.
- Diffusion and rigorous application of the regulations on the exploitation of natural resources.

IV. CONCLUSION AND RECOMMANDATIONS

The transhumance carried out in the zones where ERL breeds are reared plays an important role in the fertilization of agricultural land, the valorization of animal resources and socioeconomic exchanges. The positive effects of transhumance in the reception zones can be optimized on the one hand by improvement of synergies between the transhumant livestock owners and the local populations, and on the other hand, through the promotion of breeding systems and resource managements that are equitable, profitable and ecologically sustainable.

However, as practiced today, the transhumant systems can potentially modify the local breeding systems and threaten, in the medium-term, the sustainability of the genetic heritage, the health of the animals, the herbaceous and woody natural resources of the zones of traditional rearing of ERL. These practices also threaten the incomes and social stability of the local populations.

It appears that small transhumance practiced in the dry season or in the rainy season by herders of the Soudano-Guinean zone is more advantageous and presents little threat to the genetic heritage of ERL breeds than large transhumance of Sahelien origin occurring in the dry season. The later also involves a more important livestock population which stays longer in the ERL zone, thereby contributing somehow to the fertilization of the land. The big transhumance comes with tensions and recurrent conflicts between the transhumants, agriculturists and native farmers. These tensions are often exacerbated by the non-existence, the ignorance or the violation of local rules that govern access to resources and their management.

The sustainable management of transhumance and its impact in order to better preserve the genetic heritage of ERL breeds require a mastery of the main factors that negatively affect the ERL breeds, their habitat and populations. The factors put forward in this survey are specific and also multi-dimensional (authorized, organizational, anthropological, socioeconomic, technical and environmental).

The mastery of these factors must come with a set of innovative actions identified by this survey in order to improve the practices of transhumance as well as the systems of production of ERL and conservation/valorization of its genetic heritage.

The putting in place of these actions must come with an improvement of the political, socioeconomic and technical framework of intervention of the projects aiming for the conservation of ERL and the sustainability of the systems of breeding ERL.

Based on the above, the following main recommendations are addressed to the decision makers and their partners:

1. Implementing the existing ECOWAS cooperation frameworks to better coordinate zootechnical and health policies related to the ruminant livestock sector;
2. Making mandatory the implementation of legal texts and the dissemination / exploitation of existing management tools: PAOS; forestry code, local conventions; AOL (Agriculture orientattion law); pastoral charter; committees welcoming transhumants; Brigades fighting against bush fires; participatory systems of monitoring the health of transhumant livestock; etc.
3. Organizing actors, strengthening their capacities and creating consultative frameworks to better manage transhumance at different scales (territory, municipality, value chain).
4. Improving the availability and quality of resources and agro-infrastructures;
5. Supporting specific studies and action research contributing to the sustainable management of ERL, resources, territories and value chains related to ERL production systems.

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VI. ANNEX

Annex 1: Conceptual Framework for studying the impacts of transhumance

Question 1 : What is the diversity of livestock territories in studied countries?

Specific questions	Data source	Sampling	Method of data collection	Method of analyse	Outputs	Responsibles
Q.1.1. What are the main agro-ecologic zones of the country?	Documents, country studies, project reports	Selection of relevant documents	literature review cartographic analysis	Classification of territories on agroecologic and agropastoral bases	agropastoral Map (zoning) available for each country	Regional Consultant (RC) National Consultant (NC) National Coordinators (N Co.)
Q.1.2. What are the ruminant livestock areas?	Idem	Idem	idem	Idem	Map of ruminant livestock areas	RC, NC, NCo
Q.1.3. What are the rearing areas of the endemic ruminant livestock?	Idem	Idem	idem	Idem	Map of ERL areas	RC, NC, NCo
Q.1.4. Who are generally the transhumant herders?	Idem	Idem	idem	Characterization of transhumant herders	Typology of herders	RC, NC, NCo
Q.1.5. What are the territories of departure of transhumant livestocks ?	Idem	Selection of stakeholders	Interviews Views of experts	Idem	Typology of departure territories	RC, NC, NCo
Q.1.6. What are the "territories of transit" and the "territories of destination" of herds?	project reports, surveys Key informant	Idem	interviews Views of experts	Idem	Typology of "territories of transit" and of "territories of destination"	RC, NC, NCo
Q.1.7. What is the overall length of stay in each territory of transit and in each territory of destination of transhumant ruminants?	traditional authority Herders local livestock agents	Sampling of representative territories and key stakaholders of livestock sector	formal interviews	Synthesis Descriptive statistics	Clarification of the modalities of transhumance	National consultant (NC) Regional consultant (RC) National coordinators (N Co)
Q.1.8. What are the main overall socio-economic interactions in different types of territories of transit and territories of destination?	traditional authorities Herders Local livestock agents	Idem	Formal interviews	Synthesis Descriptive statistics	Clarification of modalities of transhumance	RC, NC, NCo
Q.1.9. What are the main overall ecologic interactions (environment, ruminants breeds) within different types of territories of transit and territories of destination?	traditional authority Herders local agents in charge of livestock	Idem	Formal interviews	Synthesis Descriptive statistics	Clarification of modalities of transhumance	RC, NC, NCo

Question 2 : What are the different systems of transhumance in terms of transhumant livestock populations, periods, evolution and map flows of transhumance in different countries?

Specific questions	Data source	Sampling	Method of data collection	Method of analyse	Outputs	Responsibles
Q.2.1. What are the socio-economic and ecological characteristics of the territories of departure, territories of transit and territories of destintion of tranhsumants?	Local authorities Herders representatives, Farmers representatives, Livestock agents, Veterinaries, Environmental agents, NGO	Sampling of territories All the key stakeholders per territory selected Sampling of herders within selected territories	interviews formal surveys	descriptive Statistics comparison	Typologies and characteristics of farms in different livestock territories	Data collection by Investigators Supervision of investigations by NC Data analysis by NC Support for analysis and synthesis by RC Overall supervision : Regional coordination (R Co)
Q.2.2. What are the characteristics of livestock farms (species, races, livestock herd composition, production systems, potential and production capacities, ...) in the territories of departure, transit or destination of transhumants ?	Local authorities Herders representatives, Farmers representatives, Livestock agents, Veterinaries, Environmental agents, NGO	Sampling of territories All the key stakeholders per territory selected Sampling of herders within selected territories	interviews formal surveys	descriptive Statistics comparison	Typologies and characteristics of farms in different livestock territories	
Q.2.3. What are the typical livestock systems practiced in the territories of departure, transit, destination (structural surveys) (Types of local herders of arrival territories) ?	Herders Livestock agents Veterinaries	Representative sample of herders	Semi-structured interview	Mapping of livestock systems	Typology of farming systems Construction of maps based on views of stakeholders	

Specific questions	Data source	Sampling	Method of data collection	Method of analyse	Outputs	Responsibles
Q.2.4. What are the transhumance systems practiced by herders and their modalities in the territories of departure, transit and destination (period, farms concerned, livestock population concerned, routes, duration of stay per territory, etc.) ?	Herders Livestock agents Vets	Representative sample of herders	Semi-structured interviews	Mapping of transhumant systems	Typology of modes of transhumance Map based in stakeholders' views	Data collection by Investigation team (IT) Supervision of investigations by NC Data analysis by NC Support for analysis and synthesis by Regional Consultant (RC) Overall supervision : Regional coordination (R Co)

Question 3 : What are the effects of transhumance on endemic animal genetic resources?

Specific questions	Data source	Sampling	Method of data collection	Method of analyse	Outputs	Responsibles
Q.3.1. What are the interactions between transhumant animals and the endemic livestock within the territories of transit and destination? (types of cross-breedings, period, reasons, determinants, favoring / disfavoring crossings, etc.) ?	Herders Vets, Environmental expert and agents Livestock agents Environmental agents	Sample representative of the types of transhumant systems Sample representative of the diversity of terroirs of destination	individual surveys and focus group	Descriptive statistics Characterization	Current situation	Data collection by Investigation team (IT) Supervision of investigations by NC Data analysis by NC Support for analysis and synthesis by Regional Consultant (RC) Overall supervision : Regional coordination (R Co)
Q.3.2. What are the effects, results and effets of these interactions on the modification of population, genetic potential and production parameters (production, reproduction) ?						
Q.3.3. What are the effects, results and outcomes of these interactions on the modification of the population, genetic potential and health parameters of animals (disease prevalence, prevalence of trypanosomas)?						
Q.3.4. What are in the territories of transit and destination, the adverse effects of transhumance on the immediate environment (in terms of production / management of droppings; depletion / degradation of local resources (water, energy, pastures, forest resources); pollution of water, air and soil, landscape degradation, spread of disease, etc.)?	Herders Vets Environmental expert and agents Livestock agents Environmental agents	Sample of herders, farmers, Livestock agents Environmental agents	individual surveys and focus group	Frequence analysis	Effects List and corrective actions	
Q.3.5. What are in the transit and destination territories the adverse effects of transhumance on society (Conflicts between actors; Outbreak, diseases; degradation of the quality of products; propagation of vector and parasitic diseases; disruption in daily life of local population, impacts on local economy and on value chain of animal products) ?						

Annex 2 : Synthetic presentation of the studied sites

The Gambia

The Kiang West district is situated in the Lower River Region, 100 km from the Atlantic coast. It encompasses the largest national park in the Gambia. The vegetation, which is the savannah woodland type, is known to be one of the thickest in the country, an important quantity of fuel wood sales in the capital originates from this district (PROGEBE-Gambia, Baseline Survey 2010). The tsetse challenge is considered as medium (Agyemang *et al.*, 1997). Kiang West is known to be the district with the lowest population density in the Gambia (Jaiteh and Saho, 2006; UNDP, 2007).

The Niamina East district is located in the Central River Region South, 200 km from the Atlantic coast. Vegetation is characterised by woodlands interspersed with open savannah and fresh water swamp (Agyemang *et al.*, 1997). The area is known to have an important cattle population. During the dry season, the abundant vegetation in the swamp attracts numerous transhumant herds from other districts in search of forage and water (PROGEBE-Gambia Baseline Survey 2010). Past surveys ranked this district as an area of high tsetse challenge (Rawlings *et al.*, 1993; UNDP, 2007).

The district of Nianija is situated in the northern part of the Central Rivers Region, 200 km from the Atlantic coast. Nianija is dominated by open savannah vegetation. Precipitation values in this district are the lowest in the Gambia (UNDP, 2007).

The detailed socio-economic and ecological characteristics of these districts can be seen in the national report of transhumance study (Daffeh Kebba, 2014).

Regarding livestock production systems, it is worth noting that several changes have occurred on the livestock number between the 1993 and 2009 census. In Niamina, there was a decline in the number of all the 3 species. Cattle numbers declined by 1.7% while sheep and goat numbers declined by 10.8% and 11.5%, respectively. In Nianija, all the 3 species increased with sheep numbers increasing by 232%, goats by 193% and cattle by 83%. In Kiang West, cattle numbers increased by 103%, goat numbers by 5.2% while sheep numbers declined by 19.6% (PROGEBE-Gambia Baseline survey 2010).

Senegal

The site of Bandafassi includes several rural communities (Bandafassi Dindefelo and Ninéfécha) belonging to the district of Bandafassi located in the Department of Kedougou within the Region of Kedougou in Senegal. This site knows two forms of transhumance:

- The small transhumance whose amplitude is less than 5 km takes place around large ponds during the rainy season (June to October) and extends to the end of harvest period (January). It also used to keep cattle away from cropping areas.
- The great transhumance is recent and is practiced from December to June.

The site of Ouassadou is located in the Kolda region, department of Velingara and more precisely in the district of Pakour. Its climate is of sudano-guinean type, with a wet season that extends from May to October. Nowadays, transhumance is weakly practiced at Ouassadou.

During the rainy season, animals are managed on pastures by shepherds recruited for this purpose by agro pastoralists.

During the dry season, the animals are usually left on free grazing system and the farmer only intervenes to supply water.

Small transhumance concerns only a few people living near the border (Herders of Sare Hamady and some of Sare Ansou) who at the end of winter drive their cattle to Guinea-Bissau in order to better feed and water them.

Mali

The sites of Madina Diassa, Manankoro, Tousseguela and Sagabari are among the most important pastoral areas of Mali where agricultural and pastoral activities are closely linked. The base of the local economy is agriculture (production of rice, maize and sorghum), livestock and gathering of forest products. With the increase of population by immigration of non-native farmers, the management of the space has become difficult and conflicts between different users have become recurrent. The adverse effects of transhumance are quite noticeable on natural resources including soil, surface water, ligneous and herbaceous plants. The local cattle face the competition of thousands of transhumants' cattle who visit the area every year.

Some various local initiatives contribute to a sustainable and harmonized management of natural resources. These initiatives include the regional plan for pastoral development, the development plan and management of reserved forests and protected areas of Bougouni-Yanfolila, the development of the management plan for the Galle-Limakolé complex in the vicinity of the action site of Sagabari and the Environmental Action Plan (EAP) of Gadougou1 municipality (under development), the programme of development of municipalities (under development), the local conventions for natural resource management (ongoing adoption).

These sites have several features:

- The site of Madina Diassa covers an area of over 321,600 hectares and has a population of about 35 371 inhabitants distributed among 51 villages.
- The site of Manankoro has an estimated area of over 430 000 ha and a population of about 30,000 inhabitants distributed among 55 villages. It runs entirely in the territory of two rural municipalities (Garalo and Sibirila) and is home to most of the forest resources of Bougouni. The local livestock was estimated at 63,818 cattle and 51,970 sheep / goats (POAS, 2011).
- The site of Tousseguela has an estimated area of 154,700 ha and a population of about 34,314 inhabitants distributed among 22 villages. It covers the soils of two rural municipalities (Tousseguela and Fakola) with the particularity that the two municipalities are not contiguous. The local cattle of the site is estimated at 37,075 cattle, 9,432 sheep and 5,465 goats (POAS; 2011).
- The site of Sagabary covers an estimated area of approximately 149,600 hectares and has a population of about 18,000 inhabitants distributed among 17 villages. Local cattle is estimated at 16,856 cattle and 7,312 sheep / goats (POAS, 2011).

Guinea

The site of Gaoual is the main primary site of PROGEBE in Guinea. It is located in northwest on the border between Guinea and Guinea-Bissau. The agro pastoralism is practiced by 85% of the population. PROGEBE was involved in the rural communes of Koumbia and Kounsitel. Koumbia is the largest breeding area of the country with a herd estimated at more than 160,000 cattle, 22,000 sheep and 50,000 goats of about 1150 herders. Koumbia has several plains whose total area is approximately 1610 ha. These plains are highly coveted by the herders from the south

(Missira, Télimélé) and north (Koundara). The pressure on rangelands makes that in dry season many herders of Koumbia and Missira move westward (Guinea-Bissau) in search of pasture and water.

The sub-prefecture of Wendou Mborou located in the west of Koumbia on a vast homogeneous weakly watered plateau, is a great staging area for the transhumants from Missira (Télimélé). It hosts more than 10,000 cattle in transit per year.

The Kounsitel rural municipality is situated east of Koumbia and is not watered. Its population is estimated at more than 35,000 cattle, 39,000 sheep and 10,000 goats owned by more than 900 herders.

The Dinguiraye site is the second primary site of PROGEBE in Guinea. It is part of the major livestock areas of the country. It covers an area of 3,825 km^2, with a density of 22 inhabitants per km^2. It counts more than 150,000 cattle, 21,000 sheep and 16,000 goats. The PROGEBE is involved in the urban municipality of Dinguiraye and rural municipalities of Sélouma and Kalinko totaling 79,762 cattle, 46,966 sheep and 9,665 goats.

The transhumance practiced is internal and involves firstly the localities of Sélouma and Kouroussa in the east, the towns of Tamoun (Dabola) in the south, and Dinguiraye-centre in the north.

Another line of transhumance is taken by herders between the tray of Diafouna and the alluvial plains of Tinkisso River in the south within Dinguiraye-Centre. A total of 13,764 head of cattle is implied in this long trip of 40 km.

Beyla is the third primary site of PROGEBE in Guinea. The prefecture has enormous potentialities of resources for livestock (9 months of rain per year). With those potentialities Beyla is the first breeding prefecture of the pre-forested region and also the main target area for pastoralists arriving from neighboring areas including Ivory Coast and Mali.

Beyla has a herd of 134,000 cattle, 27,000 sheep and 38,000 goats, and the PROGEBE intervenes only in the municipalities of Beyla-Centre, Diarraguéréla, Moussadou and Samana which accumulate a population of 56,512 cattle, 7,816 sheep and 15 275 goats for about 2,500 herders.

Given the magnitude of livestock movement around the site of Beyla, characterized by an influx of zebu cattle from Mali and Ivory Coast, the surveys have been extended to other rural municipalities of Beyla (Boola and Nionsomoridou) and some areas of the Lola prefecture (Laine and Foumbadou) located in the south.

Mandiana/Siguiri is a secondary site of PROGEBE that is located in north-east of Guinea and neighboring Mali and Ivory Coast. The economic and social development activities are based on agriculture, livestock, fishing, crafts, trade and gold panning. With population increase due to the massive influx of miners from all walks, the management of pastoral areas is becoming increasingly difficult with recurring conflicts between different users. This site also receives many herders of zebu cattle from Mali and Ivory Coast.

Annex 3 : Questionnaire for herders

The study aims to identify and quantify the adverse effects of transhumance on the management of genetic resources of endemic ruminant livestock in Senegal, Mali, Guinea and the Gambia. The results of this study will help government and other stakeholders to better plan and manage transhumance in order to sustainably manage the endemic ruminant livestock, and their habitat. Your voluntary participation in the study is needed and much appreciated. We guarantee that your information will be treated confidentially.

Date of interview:…….
Place of interview: ……
Name of Interviewer:……
Interview reference number: ……
District/Circle: ……
Village:……..
Municipality:……..
Name of herder:……
Gender : ……
Size of the cattle herd :……..…
Size of sheep herd……..…
Size of goat herd……..…

1. What do you understand by transhumance?

2. Are you aware of any form transhumance being practice in the village or district in the past 5 years? (this refers to any herder inhabitant of the village who is going elsewhere for transhumance or any foreign herder coming in the village / district to perform transhumance)
   A) Yes
   B) No

3. If no: Why?

4. If Yes: which kind of transhumants have been involved
   A) Herders of your village
   B) Herders of neighbouring villages
   C) Herders for remote villages that are part of your district
   D) Herders from other district
   E) Herders from other countries

5. If yes, what species have been involved?
   A) Cattle
   B) Small ruminants
   C) Both

6. How do you assess the level of transhumance made outside the district by you and your colleague? (for each choice, please explain why)
   A) High level (Widely Practiced on large scale)
   B) Medium level (practiced but not widely)
   C) Low level (rarely Practiced)
   D) No transhumance

7. How do you assess the level of transhumance made inside the village/district by foreigners? (for each choice, please explain why)
   A) High level (Widely Practiced on large scale)
   B) Medium level (practiced but not widely)

C) Low level (rarely Practiced)
D) No transhumance

8. What major roles does the Village/District play in transhumance
   A) Serve as recipient/ host destination of transhumant livestock
   B) Serve as source/ departure point of Transhumant livestock
   C) Serve as transit zone for Transhumant livestock
   D) Serve as both host destination and also as source of transhumant livestock
   E) Not involved in transhumance

9. Have you ever been personally involved in transhumance?
   A) Yes
   B) No

10. If no why?

11. If yes, in what ways have you been involved?

12. In your View, why do herds/small ruminant flocks go on transhumance go on transhumance?
   A) In search of feed
   B) In search of water
   C) Both feed and water
   D) To avoid diseases / health problems
   E) To get in touch with key actors/markets to sale animals / products / by-products / services
   F) To get in touch with key actors to buy or exchange animals / products / by-products / services
   G) Others (specify)

13. Do herders in the village plan to go together on transhumance?
   A) Yes
   C) No

14. Which season of the year do herds usually depart from your village for transhumance?
   A) Just Before or at the onset of the rainy season
   B) At the end of the rainy season or early dry season
   C) Middle dry season
   D) Other time frame:……

15. Which season of the year do herds/small ruminant flocks usually arrive in your village/ district for transhumance?
   A) Just Before or at the onset of the rainy season
   B) At the end of the rainy season or early dry season
   C) Middle dry season
   D) Other time frame:……

16. Which season of the year do arriving herds from other destinations usually depart from your village?
   A) Just before the Onset of the rain
   B) At the end of the rainy season or early dry season
   C) Middle of the rainy season
   D) Other time frame

17. What is the composition of breeds of cattle in your herd?
   A) N'dama Cattle Number of heads……
   B) Zebu No. of heads……
   C) Mixed No. of heads ……
   D) Others (specify the breed) No. of heads …….

18. When (year) were the first cattle different from n'dama integrated in your herd

19. How?
    A) By buying,
    B) As gift
    C) Exchanging
    D) Accidentally
    E) Other

20. What reasons led you to definitely accept/ integrate the non-Ndama cattle in your herd?

21. How are your cattle housed?
    A) Open Kraal or pen
    B) Roofed Kraal or pen

22. What is the average number of milking cows in your herd?

23. What is the average number of milking cows for each breed
    A) N'dama Cattle Number of heads.....
    B) Zebu No. of heads.....
    C) Mixed No. of heads .....
    D) Others (specify the race) No. of heads .....

24. What is the average milk yield per day in your herd during peak period?

25. How many milking cow are involved during the peak period

26. What is the average milk yield per day during low period?

27. How many milking cow are involved during the peak period

28. On average how many heads of cattle do you sell or remove from your herd annually?

29. How many heads of cattle did you lost to disease during the past year?

30. In order of importance, list the 3 biggest challenges to cattle production in your village/ district?

31. How do you graze your cattle?
    A) Natural Pastures only
    B) Natural pastures and other conserved feed sources
32. Do you experience feed shortages for your cattle?
    A) Yes
    B) No
33. Is Mating controlled in the herd?
    A) Strictly controlled
    B) Loosely controlled
    C) Uncontrolled

34. Which group are excluded from the herds going on transhumance and why?

35. Do you take any specific measures to protect your herd prior to departure on transhumance?
    A) Yes
    B) No

36. If yes what measures do you usually take to protect your herd prior to departure?

37. Have you ever encountered any disease outbreaks on transit or at your final destination in the last 5 years?
    A) Yes
    B) No

38. If yes, where? what was the disease and were you familiar with it at your home village?

39. Did you encounter any mortality in the past 5 years during transit on transhumance?
    A) Yes
    B) No

40. If yes how animals died?
    A) 1-3 heads of cattle
    B) 4 to 5 heads of cattle
    C) More than 5 heads of cattle

41. Which route did you take to your destination?

42. Is it a fix route used by other herders?
    A) Yes
    B) No

43. Do you have fix transit points along the route?
    A) Yes
    B) No

44. How long do you stay on transit?

45. In what ways do you interact with your host on transit?

46. Where did you transit and for how long did you stay there?

47. What factors determine the length of stay at your destination?

48. How long does it usually take you from departure date to get to your final destination?

49. Where is your final destination?

50. What factors determine the choice of your final destination?

51. Do you report to any local authorities on arrival at your final destination?
    A) Yes
    B) No

52. If yes, who do you report to?

53. Do you requite any permits or authorisation to stay at your final destination?
    A) Yes
    B) No

54. If yes is there any fees for the permit?
    A) Yes
    B) No

55. If yes what is the amount prescribed for the permit and how do you consider the amount?

56. Are you aware of any guidelines or code of conduct for transhumant herders on transit or at final destination with regards to sustainable management of the natural resources?
    A) Yes
    B) No

57. If yes, briefly state the guidelines you know?

58. Are you aware of any sanitary/veterinary requirements for transhumant herds at final destinations?
    A) Yes
    B) No.

59. If yes, what is your level of compliance?
    A) Full compliance
    B) Partial compliance
    C) Non compliance

60. In what socio-economic ways do you interact with your host at your destination?

61. How does your herd interact with other herds at your final destination?
    A) Free interaction
    B) Restricted/ controlled Interaction
    C) No interactions

62. What is the predominant breed of cattle at your destination?
    A. N'dama cattle
    B. Zebu
    C. Mixed Breeds

63. Has there been any known cases of cross breeding with herds at your destination?
    A) Yes
    B) No

64. If yes, how regular was it?
    A) Occurs regularly every year
    B) Occurs at times but not every year
    C) Isolated incidence occur

65. If yes, what was the nature of the cross breeding?
    A) Controlled
    B) Uncontrolled
    C) I don't know

66. In your view what are the main significant advantages of each breed?

67. In your view what are the main significant disadvantages of each breed?

68. Taking in to account all parameters (resistance to disease, productivity) what should be the ideal structure of your herd in terms of breed:
    A) N'dama Cattle
    B) Zebu No. of heads……
    C) Mixed No. of heads ……
    D) Others (specify the race) No. of heads …….

69. Did you or other transhumant herders ever experience any conflict with host communities on transit or at your destination?
    A) Yes
    B) No

70. What was the nature of the conflicts and how were they resolved?

71. In your view what are the adverse effects of transhumance on the environment in host /destination zones?

72. What are the beneficial effects of transhumance on crops?

73. What recommendations do you have for the improved management of Transhumance for the benefit of all those concern?

Annex 4 : Questionnaire for key informants

The study aims to identify and quantify the adverse effects of transhumance on the management of genetic resources of endemic ruminant livestock in Senegal, Mali, Guinea and the Gambia. The results of this study will help government and other stakeholders to better plan and manage transhumance in order to sustainably manage the endemic ruminant livestock, and their habitat. Your voluntary participation in the study is needed and much appreciated. We guarantee that your information will be treated confidentially.

Date of interview: ……
Place of interview: ……
Name of Interviewer:……
District: ……
Village:……..
Name of Interviewee/ Respondent:……
Designation of Interviewee/ Respondent:……..…
Ref No. : ……

PART I : CHARACTERIZATION OF TRANSHUMANCE

1. What do you understand by transhumance?

2. Are you aware of any form transhumance being practice in the village / district / cercle / municipality in the past 5 years?
   A) Yes
   B) No

3. If no, Why ?

4. If yes, which transhumants are involved
   A) Herders of your village
   B) Herders of neighboring villages
   C) Farmers in remote villages butpart of your district or municipality
   D) Herders of other districts / circles
   E) Herders from other countries

5. What species are involved?
   A) Cattle
   B) Small ruminants
   C) Both

6. How do you assess the level of transhumance in the village / district / circle or municipality ?
   A) High level (largely practiced)
   B) Medium Level (practiced but not widely)
   C) Low level (rarely practiced)
   D) No transhumance

7. How do you assess the intensity of the transhumance made inside your village / district / circle or municipality by arrival transhumants ?
   A) High intensity (a transhumance largely practiced with significant adverse effects already observed or directly threatening local genetic resources, feed resources, feed and animal health)
   B) Medium intensity (a transhumance moderately practiced with negative impacts limited or controlled, or which do not directly threatening or short-term local, genetic resources, feed resources, feed and animal health
   C) Low intensity (rarely practiced : less intense than B)

D) No transhumance

8. What roles does your village/District/Cercle/municipality play in transhumance
   A) Serve as recipient/ host destination of transhumant livestock
   B) Serve as Source/ departure point of Transhumant livestock
   C) Serve as transit zone for Transhumant livestock
   D) Serve as both host destination and also as source of transhumant livestock

9. What has been the trend of transhumance in the village/district in the past 5 years?
   A. The transhumants are becoming more numerous
   B. The transhumants are less numerous
   C. The transhumants arrive earlier
   D. The transhumants arrive later
   E. The transhumants stay longer
   F. The transhumants spend less time
   G. Nothing has changed
   H. Other (please specify)

10. Have you ever been personally involved in transhumance?
    A) Yes
    B) No
11. If yes, in what ways have you been involved?

12. In your view, how can your specific involvement in transhumance be enhanced?

13. In your view, why do herds/ small ruminant flocks go on transhumance?
    A) In search of feed
    B) In search of water
    C) Both feed and water
    D) Others

14. Which season of the year do herds/small ruminant flocks usually arrive in your village/ district for transhumance?
    E) Just Before or at the onset of the rainy season
    F) At the end of the rainy season or early dry season
    G) Middle dry season
    H) Other time frame:……

15. What are the Predominant breeds of arriving transhumant herds
    A) Predominantly N'dama Cattle
    B) Predominant Zebu
    C) Predominantly Mixed breeds
    D) other

16. What are the predominant breeds of arriving sheep
    A) Predominant trypanotolerant sheep
    B) Predominantly non trypanotolerant breeds
    C) Predominantly mixed breeds
    D) Others

17. What are the predominant breeds of arriving goats
    A) Predominant trypanotolerant sheeps
    B) Predominantly non trypanotolerant breeds

C) Predominantly mixed breeds
D) Others

18. What is the generally the overall length of stay of transhumant ruminants in the village/municipality /district/cercle ?

PARTIE II : EFFECTS OF TRANSHUMANCE

19. What are the main overall socio-economic interactions with the arriving herders?

20. What are the main overall ecological interactions of arriving animals with the environment and with the animals?

21. List the main socio-economic benefits of transhumance on local population?

22. List the main disadvantages of transhumance on natural resources (water, fodder, tree, soil) in your village / district / circle / municipality?

23. List the main advantages of transhumance on natural resources (water, fodder, tree, soil) in your village / district / circle / municipality?

24. List the main disadvantages of transhumance on local animal resources (cattle, sheep, goats) in your village / district / circle / common to health plans and livestock genetics?

25. List in order of importance, the 3 most important issues, challenges to sustainably improve the production of small ruminants in your village / district / circle / municipality

26. Have you experienced a forage shortage in your village / district / circle / municipality
    A) Yes
    B) No
27. If so what is its intensity
    A) Strong
    B) Average
    C) Low
28. If so, at what time of year this shortage arrives?

29. What are the main causes of food shortages

30. What are the solutions proposed by the authorities
31. Are you aware of the practices of crossing of transhumant animal breeds and breeds of endemic animals in your town / city / district / circle?
    A. Yes
    B. No
32. If so what is the intensity of these crossing practices?
    A. Widely practiced
    B. Moderately practiced
    C. Rarely practiced
33. If so, these crossing are deliberate or accidental?

34. What benefits are they looking for herders practicing these cross breedings?

35. Is there any law or the advice given to herders to manage these animals breedings ?

36. If yes, indicate the species and breeds targeted by this law
37. In your opinion what are the main benefits of significant cattle breeds found in your village / district / circle / municipality?
    A. N'dama
    B. Zebu
    C. Mixed breed (N'dama x zébu)
    D. Other

38. In your opinion what are the main drawbacks (disadvantages) of each significant cattle breed?
    A. N'dama
    B. Zebu
    C. Mixed breed (N'dama x zébu)
    D. Other

39. In your opinion what are the main benefits of significant sheep breeds found in your village / district / circle / municipality?
    A. peul-peul……
    B. Djallonke ……
    C. Mixed breed (Djallonke x other breed) ……
    D. Other …….

40. In your opinion what are the main drawbacks (disadvantages) of each significant sheep breed?
    A. peul-peul……
    B. Djallonke ……
    C. Mixed breed (Djallonke x other breed) ……
    D. Autre races différentes de celles listées ci-dessus …….

41. In your opinion what are the main benefits of significant goat breeds found in your village / district / circle / municipality?
    A. Sahelian goat……
    B. Djallonke ……
    C. Mixed breed (Djallonke x other breed) ……
    D. Other …….
42. In your opinion what are the main drawbacks (disadvantages) of each significant goat breed?
    A. Sahelian goat……
    B. Djallonke ……
    C. Mixed breed (Djallonke x other breed) ……
    D. Other …….
43. In your opinion, what are the significant advantages (added value) that sedentary herders can obtain by introducing the Sahelian breeds of cattle and goats in their herds

44. In your opinion, what are the disadvantages of the introduction of these Sahelian breeds into the cattle herd of local herders

45. Avez Have you ever heard of any conflicts between arriving transhumant herders and the host community in the village/district/cercle/municipality ?
    A) Yes
    B) No
46. What was the nature of the conflict and how was it resolved?
47. Is there any formal or informal system for the census of transhumants arriving in your town / city / district / circle?
    C) Yes
    D) No

48. Do you know of any locally established code of conduct or guidelines on management of pastures and other feed resources in this District?
    A) Yes
    B) No

49. In your view what is the level of compliance of transhumant livestock herds?
    A) They mainly comply
    B) They partially comply
    C) They do not comply

50. What is over grazing?
51. How can overgrazing be controlled?
52. Are you aware of any livestock disease outbreaks with mortalities in the village/ district linked to in coming transhumant livestock?
    A) Yes
    B) No
53. Do you know of any cases of transhumant Herders permanently migrating with their livestock to settle in the District?
    A) Yes
    B) No

54. In your view what are the adverse effects of transhumance on the environment in host /destination zones?
55. What are the beneficial effects of transhumance on crops?
56. What recommendations do you have for the improved management of Transhumance for the benefit of all those involve?