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Baseline characterization of farming systems in the province of Bassitenga in Burkina Faso

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ABSTRACT

The security crisis in Burkina Faso has driven internal population displacement, increasing pressure on agropastoral resources and exacerbating food insecurity in areas with fragile farming systems. Using a systemic approach, this study characterized farming systems in 18 villages of two communes (Loumbila and Zitenga) in Bassitenga province, Burkina Faso, to establish the baseline of the farming systems for targeted and structural support to households. Potential usable agricultural land area, cattle size, cropping and cattle breeding systems, number of active household workers, and farm equipment were used to discriminate against farming systems. Fifteen cropping systems and nine livestock breeding systems were identified, grouped into five farming system types. Type 1 (22% of households) covered 2.5 ha, with poultry, small ruminants, basic tillage equipment, and a donkey. Type 2 (39% of households) covered 4 ha, combining draft animals, cattle, small ruminants, rainfed crops, and market gardening. Type 3 (21% of households, 3.5 ha) and Type 4 (18% of households, 5 ha) relied on free-ranging cattle, rainfed cropping, draft animals, poultry, and market gardening, with progressively more equipment. Type 5 (0.5%) comprised specialized laying-hen holdings. Livestock breeding and market gardening emerged as means for households to build resilience against shocks underscoring their role in stabilizing farming systems in the study area.

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INTRODUCTION

In developing countries, small scale farming systems hold by households is the most dominant form of agriculture and the primary source of food production contributing to food security (Wiggins, 2009; FAO and FIDA, 2019). The small-scale farming systems provide more jobs than any other therefore; it is a relevant and effective mean of poverty alluviation of many resource poor people while significantly contributing to the food security achievement (Ferraton and Touzard, 2009).

In Burkina Faso, almost 74% of households representing 81% of the population make their substance from farming activities (Kouame *et al.*, 2025). Despite effort made in preventing food crisis in 1980s and the policy development for addressing the issue, food insecurity is still a challenge in the Sahel. As the other Sahelian countries, Burkina Faso experienced between 2019 and 2024, an increase in the number of food-insecure people from 672,000 to approximately 2.8 million representing a fourfold increase in five years and nearly 13% of Burkinabè representing the most fragile strata is affected.

Numerous interrelated factors are the reasons of food insecurity among which, low access to farm input and equipment, low agricultural output, harsh climatic conditions, leading to poor performance of production systems. As reported by (Tabsoba-Maré *et al.*, 2022) the low productivity of the farming systems is due to the poor production techniques and skills of farmers. Furthermore, most of the functioning systems and characteristics of the small-scale farming systems are not well-kwon.

This poor knowledge do not allow targeted actions and support according the effective needs of the different type of farming systems. According to (Traoré *et al.*, 2013; Savadogo *et al.*, 2016) any efficient support to the farmers should consider their socioeconomic diversity.

As for Bassitenga province, in addition to above reported reasons, the security crises experienced by the country has led to population displacement and has exacerbated the already fragile socio-economic situation of farming households. Indeed, due to its proximity to the northern provinces of Burkina Faso which are affected by civil insecurity, the province hosts many displaced families trying to escape the violence. For example in February 2021, the province was hosted approximately 4,000 internally displaced persons (OCHA, 2021).

This migratory movement put under pressure the already fragile agro-pastoral resources and daily food consumption, thereby exposing both host and guess households to food insecurity (FEWS-NET, 2024). This precarious situation disrupts existing farming systems and exacerbates food insecurity.

As documented above, poor understanding of farming systems characteristics exacerbated by the arrival of the guess households hinders the implementation of structured, integrated, and sustainable approaches, thereby undermining the effectiveness of responses in these structurally vulnerable areas. This situation challenges traditional crisis management strategies, largely relied on short-term approaches such as stockpiling, transferring supplies from surplus to deficit areas, providing humanitarian aid, and selling subsidized food. Consequently, serious concerns have been raised regarding the effectiveness of current methods addressing food insecurity (RPCA, 2018; RPCA/CSAO, 2022).

With regard to the recurrence of food crises and the high number of affected households; it is essential to examine structural approaches that can enhance household resilience to socio-economic and climate-related shocks. Achieving this requires a solid understanding of the farming systems.

The study reported herein aim to a qualitative assessment of the farming systems in Bassitenga province in order to refine targeted recommendations for structural resolution of food insecurity.

MATERIALS AND METHODS

Study area

The investigations were conducted in Bassitenga Province, in Oubri region, in the central part of Burkina Faso (Fig. 1). Data was collected in 18 villages across the rural communes of Loumbila and Zitenga. Due to its proximity to Northern provinces of Burkina Faso, subjected to security issues, Bassitenga province hosts many guess households trying to escape insecurity.

As for, the number of internal displaced persons hosted by province in 2021 was estimated at 4,000; According to, population of the commune of Loumbila and Zitenga are estimated at 36,465 (206 inhabitant/km2) and 50, 162 (67 inhabitants/km2) respectively.

In the two communes, the majority of the population is making their livelihoods out of farming activities; and this sector employs over 80% of them. Since subsistence farming is the most dominant practice, the high dependence of the population led to land pressure. As for the cropping systems, they are mainly dominated by cereal crops: sorghum, millet, and maize grown under rain-fed condition with an average field area ranged from 0.5 to 2.5 hectares per household. Taking advantage of the water harvesting systems developed in region and the proximity to a lucrative market, market gardening is also practiced. Agricultural products, mainly plant and animal products are either for family consumption or sold in order to generate cash income. Supplementary activities, such as trade and handicrafts, also serve as sources of income for agricultural holdings.

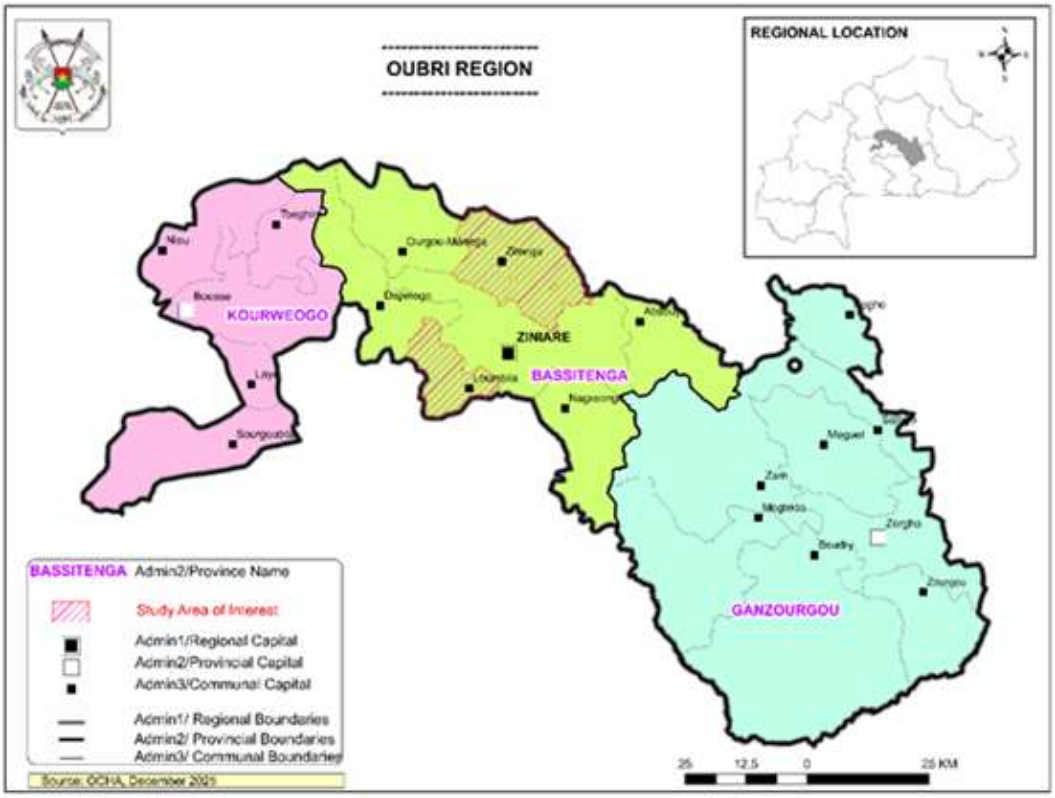

Fig. 1. Map of the Oubri region and study area, source: OCHA, 2025

The province of Bassitenga has a soudano-sahelian climate, characterized by two contrasted seasons. A dry season of seven to eight months succeeding to a rainy season of four to five months. The rainy season goes from June to September or October depending to the year, with average annual rainfall ranging from 600 to 900 mm (Fig. 2). Precipitation characterized by its irregularity; rainfall is often concentrated within a short period with significant inter- and intra-seasonal variability. This irregularity poses a major risk to agricultural activities.

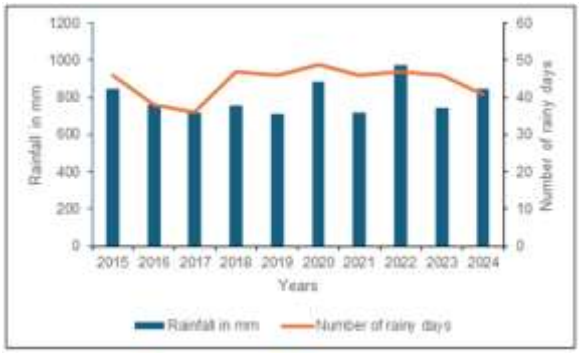

Fig. 2. Variation of annual rainfall and the number of rainy days recorded at Ziniaré rainfall station from 2015 to 2024

Sampling

The selection of the 18 villages (Fig. 3) was preceded by a preliminary survey involving technical departments responsible for agriculture, livestock, and the environment. The information gathered was subsequently cross-checked through semi-structured interviews, general assemblies, and transect walks to ensure the diversity of farming systems required by our approach. This phase enabled the collection of data on population size of each village, cropping and livestock systems, and the different farming systems. Information regarding average household size and livelihoods as well as the producers' own definitions of "wealthy," "average," and "poor" households was established based on these investigations. For the survey itself, a systems-based approach was used; to this end, a multidisciplinary team of an agronomist, an economist, and a sociologist spent ten months in the study area for data collection.

The in-depth surveys on cropping and cattle breeding systems were preceded by semi-structured interviews with key informants (traditional leaders, heads of cooperative organizations, etc.). This approach allowed to refine the data collected during the previous steps. These preliminary results were presented at general meetings in each village to verify the cropping and livestock systems; and to ensure that these systems were representative among households for in-depth surveys. Following this process, 180 households, 10 per village, were selected as sample for the study.

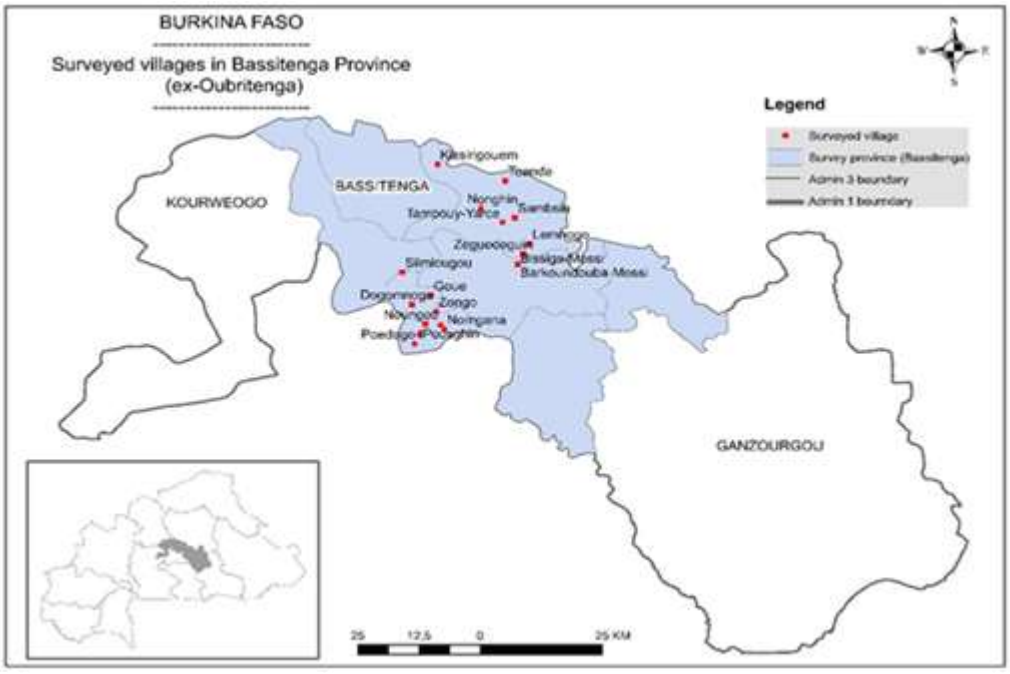

Fig. 3. Location of data collection sites

Data collection

The information collected on cropping and livestock systems, as well as other sources of household income, concerned the ones of the last three (3) "normal" campaigns. As for the characterisation of cropping systems, it was based on the main crops grown, crop rotations systems and the inclusion of the market gardening in the farming systems, as well as

the geomorphological location of the fields. Qualitative analysis of the cropping systems enabled a better description and understanding of the agricultural practices in the study area. Each cropping system was described in detail: cultivated area, the plot's geomorphological position, the weight the different crop within the rotation system. Land use efficiency, soil fertility management approaches and the reason of these practices were described as well.

Regarding the livestock systems, the key criteria considered were the type of livestock, herd management techniques, location of the cattle, feeding, reproduction, and zootechnical performance.

Qualitative data were collected using interview guides while quantitative ones were collected through field investigation by direct measurement of plots size, crops yield and livestock performance enumerated in the fields. The information collected in the field was cross-referenced with the technical services' databases.

Data analysis

Finally, analyses of data regarding cropping and livestock systems, including the various combinations of these two components by producers, the number and nature of farm equipment hold by farmers, the size and type of herds were the parameters used for the discrimination of the different types of farming systems.

RESULTS AND DISCUSSION

Cropping and cattle breeding systems have been identified as the main components of the farming systems in investigated villages. A total of fifteen (15) cropping systems (CS) and nine (9) Livestock breeding systems (LBS) were identified in these villages.

Cropping systems

The fifteen (15) cropping systems (Table 1) were identified based on the diversity of technical management practices (ITK) in Bassitenga province. These systems represent production strategies that include, rain-fed cereal cropping on plateau using inter-annual rotation (SC1 and SC2) ; cereal-legume association combined with inter-annual rotation with crops such as sesame (SC3). These cropping systems are mainly located on the plateaus and it is implemented by 30.58% of households. Land use efficiency in the three cropping systems was 100%. The second group of cropping systems is based on rain-fed cereal cropping, in intra-annual rotation with irrigated market garden crops. The main vegetables are grown either as sole crops or in association with cereals (SC4 to SC15). These systems are predominantly practiced in valley bottoms, with better land-use efficiency (200%). The majority of households (69.42%) applied these cropping systems

A total of 15 cropping systems (CS) were identified during this study. The general trend emerging from the analysis of these systems showed that the annual cultivated area ranges from 1.15 ha (CS1) to 3.85 ha (CS7). The absence of fallowing (Table 3) confirms the increasingly high land pressure facing the study area. This situation is part of a broader trend documented in the Sudan-Sahelian zones of Burkina Faso, where increasing pressure on land and the economic appeal of market gardening are driving farmers to cultivate the land continuously (Ouédraogo and Sorgho Millogo, 2007; Sanfo, 2025; Tega *et al.*, 2025). Furthermore, the results showed that cropping systems with market gardening (SC4 to SC15) make more effective use of the land, achieving a utilization efficiency of 200%, compared to 100% for systems relying solely on rain-fed agriculture (SC1, SC2, and SC3).

These findings align with the work of (Sanfo, 2025), highlighting the economic advantage of the market gardening cropping systems, as well as the productive value of lowlands in the Sudan-Sahel zone of Burkina Faso. Our surveys reveal that the introduction of market gardening into traditionally rain-fed cropping systems is a widespread trend, involving 69.42% of households. This phenomenon has been driven by urban growth and shifting urban diets resulting in ever-increasing demand for market garden products. In addition, the market gardening crops enable households to cope with land pressure by producing crops during the dry season and to diversify their income sources.

Table 1. Location of cropping systems and their land-use efficiency

Location	Cropping systems (SC) and crops rotation	Duration of the CS (year)	Number of cropping campaigns/ CS	Land use efficiency of CS (%)	Proportion of housholds (%) implementing the CS
Plateaus	CS1=S//S	2	2	100	11.82
	CS2 =S//Maize//N	3	3	100	10.52
	CS3=Maize + N//M+ Peanut//Sesame	3	3	100	8.24
	CS4=Maize/O//Rice/O//N/O	3	6	200	6.51
	CS5 =S/Chili//Maize/Chili//M/Chili	3	6	200	4.88
	CS6=Maize/Au +T//S+ Peanuts/Au+T	2	4	200	3.47
	CS7=Maize+N/O//S+N/O//S/O	3	6	200	6.62
	CS8=Maize/Au//S/Au//Maize+N/Au	3	6	200	8.57
	CS9=Maize/Bell pepper//S/Bell pepper	2	4	200	4.88
	CS10=Maize/Cucumber//S+N/Cucumber	2	4	200	6.07
	CS11=Maize+N+Bambara groundnut/O+Cabbage	1	2	200	5.31
	CS12=Maize/O+Au//S/O+Au//Rice/O+Au	3	6	200	3.15
	CS13=Maize/T+O//M/T+O//S/T+O	3	6	200	5.97
	CS14=S/T+Au//Maize/T+Au//S+N/T+Au	3	6	200	6.40
	CS15=S/T//N/T//Maize/T//M/T	4	8	200	7.59

Note: S: sorghum; N: cowpea; M: pearl millet; O: onion; T: tomato; Au: eggplant ; //: annual rotation; /: intra-annual rotation; +: intercropping; *Relative proportion (%): ni/180, where ni is the number of farms of type i and 180 is the total number of farms studied in the communes of Loumbila and Zitenga

Table 2. Livestock farming systems and their locations

Location	Livestock breeding systems (LSB)	Proportion of household = ni/180(%)
Around the homesteads Grazing within a 2 km radius of the village	LSB1: Poultry farming	29.70
	LSB2: Draft animal rearing (cattle and donkeys)	22.44
	LSB3: Tethered small ruminant rearing (sheep, goats)	15.02
Stabling	LSB4 : Free-range cattle rearing	11.39
	LSB5: Small ruminant flock rearing	4.95
Around the homesteads	LSB6: Cattle fattening	7.92
	LSB7: Sheep and goat fattening	5.28
Stabling	LSB8: Pig farming	2.81
Around the homesteads	LSB9: Laying hen farming	0.50

*Relative proportion (%): ni/180, where ni is the number of farms of type i and 180 is the total number of farms studied in the communes of Loumbila and Zitenga.

The high productivity of cropping systems including market gardening can be attributed to their diversity, combining rain-fed crops (cereals and legumes) with high-value vegetable crops. Furthermore, the fact that these systems are practiced in lowlands where soils are more fertile and irrigation available boosts crop yields in terms of both quality and quantity. In light of the above, the introduction of market gardening emerges as an alternative to land pressure, while the cultivation of high-economic-value species contributes to improving land productivity.

Livestock breeding systems

In general, for the household livestock rearing, animal grease within a radius less than two (2) km from the homestead in free-ranging, while fattened animals are tethered or kept in stalls. Based on the type of livestock and breeding practices, nine farming systems were identified (Table 2). Poultry breeding (LBS1) is the most common system practiced by 29.7% of the households, followed by draft animals breeding (LBS2) : oxen and donkeys practiced by 22.44% of households. SE3 consists of tethered grazing, practiced by 15.02% of households; animal type concern is small ruminants (sheep and goats). LBS4 and SE5 is free-range livestock, of cattle and small ruminants, respectively.

Households practicing these breeding systems are 11.39% for cattle and 4.95% for small ruminants.

Cattle and small ruminant fattening operations are implemented by 7.92% and 5.28% of households, respectively. The least represented systems are LSB8 (2.81%) and SE9 (0.5%), corresponding to pig and hen breeding respectively.LSB9 is practiced by agricultural entrepreneurs from Ouagadougou. This system has semi-modern livestock infrastructure and is mainly market-oriented.

Nine (9) livestock breeding systems were identified in this study, indicating a certain level of diversity. This diversity of systems observed in the study area is a common characteristic of the majority of rural areas in Burkina Faso. According to, it reflects the adaptation strategies adopted by farming households as response to the on-going economic and climatic constraints. Our investigations reveal that the diversification of livestock breeding systems is a major response by agricultural holdings to economic and climatic shocks. An analysis of the relative proportions of each system shows that poultry farming (SE1) appear to be the most significant in terms of numbers, involving 29.70% of the households. As for the raising of draft animals (SE2), 22.44% of households engage in this practice. Poultry farming requires little start-up capital and can be undertaken by the majority of social groups; indeed, it remains a type of livestock farming accessible to women and young people with limited means; that is why SE1 and SE2 have hight prevalence.

As for the raising of draft animals (SE2), its diven by agri-livestock integration; indeed, these animals play key role in facilitating farm tillage operations and transportation. Consequently, households that manage to generate some savings invest in draft animals in order to address labor shortage and labor penibility for some farm operations such as tillage and transport. Furthermore, the presence of draft animals provides manure for the fields, while strengthening the integration of crop and livestock farming.

Tethered small ruminant rearing (sheep and goats) (LBS3) and free-range cattle rearing (LBS4) account for 15.02% and 11.39% of households, respectively. LBS3 is practiced by "poor" households (Type 1 and Type 2 farming systems) that are in the early stages of capital building; consequently, tethered animals serve as a form of savings for these households. These animals are tethered because their numbers are insufficient (Table 3) for herding them to pasture. Free-range cattle's rearing is practiced by "wealthy" households with sufficient income to invest in big ruminants (cattle). Due to population pressure, these animals are entrusted to professional herders. This practice is particularly widespread because of forage deficit in agro-pastoral systems, and it makes feeding cattle difficult during the dry season without resorting to pastoral mobility. Cattle fattening (LBS6) and sheep/goat fattening (LBS7) are practiced by 7.92% and 5.28% of households, respectively. This type of livestock farming is generally pursued as an income-generating activity; it has expanded because of the development projects that promoted fattening as a tool for building resilience against climate shocks and fostering the socio-economic integration of vulnerable populations. Alongside the agricultural enterprises (SEs) commonly operated by producers, the raising of laying hens (LBS9) is emerging, undertaken by investors with an average flock size of 400 birds. Although currently representing only 0.5% of the households, the growing demand for animal products in urban centers, combined with Bassitenga's proximity to major cities, creates favourable conditions for the expansion of SE9 operations.

Farming systems typology

Based on a combination of cropping systems and livestock breeding systems, five (5) types of farming systems were identified (Table 3). In addition to cropping and livestock systems, additional parameters such as average cultivated area per year, number of active workers, and level of equipment were consider for the determination of the farming systems.

Farming systems Type 1 are hold by households equipped only with manual cropping tools (hoes, pickaxes, machetes, axes, etc.) and a cart and donkey for transport. 22% of households belong to this type of farming systems they operate at small scale with a

potential farm area of 2.5 hectares and an average annual cultivated area of 0.5 to 2.5 hectares, without fallow. The farming systems Type 1 rely exclusively on rain-fed agriculture, and their plots are located on the plateaus. On these farms, the maximum number of active workers is four (4) persons. They have a limited number of small ruminants as livestock: goats (6) and sheep (4) and around 20 chickens.

The farming systems Type 2 are engage in off-season cropping (irrigated crops). 39% of the households belong to this type. With a potential utilized agricultural area of 4 hectares, their average area cropped per year is 1.85 hectares of market garden crops and 3.85 hectares of staple crops. Households belonging to this farming system have an average of six (6) active workers. In addition to the basic farm equipment, they have motorized tricycle, water pumps, draft cattle, etc.). The main crops grown are rain-fed maize, sorghum, and cowpea, alongside irrigated onion, eggplant, chili pepper, and cucumber. Regarding breeding, farming systems Type 2 practice diversified systems with consequent livestock (Table 3). In addition, manure from the livestock is use for soil fertilization.

The farming systems type 3 represents 21% of the households; they have in average eight (8) active workers and crop up to 3.5 hectares per year. This type farming unit is based on livestock breeding and rain-fed farming (maize and cowpea) combined with small-scale market gardening focused mainly on bell peppers and cabbage; their equipment consists of basic farming tools; ploughs, and motorized tricycle (Table 3). As for livestock, on average they own two free-grazing cattle tended by herders, draft cattle (oxen and donkeys). Their fattening livestock are: one cattle and four sheep. They also keep 20 small ruminants (sheep and goats) on tethers, four pigs, and eighteen chickens.

The farming systems Type 4 account for 18% of the households in the investigated area. They have 5 hectares as potential usable land with average annually cultivated area ranging from 2.85 to 4.25 hectares. As for work force, they have an average of nine (9) active workers. The farming systems Type 4, combine crops production is combined to livestock rearing. They practice two kinds of crops production: the rain-fed ones mainly focused on maize, pearl millet, sorghum, groundnuts, and cowpeas; and market gardening, with eggplants, tomatoes, and onions as the main irrigated crops.

They practice various breeding systems with consequent cattle size (Table 3). Due to their size of their livestock, they produce enough manure for the fertilization of their fields. As for equipment, it included basic tillage tools to semi-modern machinery such us sprayers, motor pumps, irrigation kits, power tiller, and motorized tricycles.

The farming systems Type 5 are poultry farms; they account for 0.5% of the production unts. They are characterized by the semi-intensive rearing of imported-breed laying hens (ISA Brown), with an average flock size of 415 chicken per batch. These farmers possess three assets, a feed storage shed, two poultry houses, a motorized tricycle and breeding kits (Table 3). The farming systems Type 5 is essentially market driving: manure and eggs produced are sold.

Five (5) types of farming systems emerged from the combinations of crop and livestock production systems adopted by farmers. Analysis reveals that the systems without market gardening make poor use of the land. A factor that may explain why they are ranked among the “poor” households, unable to fully meet their basic needs. Farming systems Type 1 (Table 3), representing 22% of the households fall into this category; they are the more vulnerable households to sco-economic or climatic chocks. However, for these resource limited households, breeding (LSB2, LSB8, LBS1, and LSB3) appears as resilience approach even if they have limited livestock holdings. The combination of these factors, low land utilization and limited livestock, appears to be the cause of the low income levels observed in farming systems Type 1.

Table 3. Characteristics of the farming systems

Type of farming systems	Characteristics of the farming systems
Type 1	Proportion of households = 22 % Potential farm area = 2.5 ha Number of active workers = 4 Cropping systems (CS) : CS1 (1.15 ha); CS2 (2.40 ha) Listock breeding systems (LBS): SE2 ; SE8 ; SE1 ; SE3 cattle size: 1 donkey; 2 pigs; 22 poultry (chickens); 4 sheep and 6 goats Farm equipment: Tillage tools; 1 cart, 1 Sprayer
Type 2	Proportion households (%) = 39% Potential farm area = 4 ha Number of active workers= 6 Cropping systems (CS) : CS4(1.8 ha); CS5 (2.75 ha); CS7 (3.85 ha); CS8 (3.5 ha); CS10 (2.55 ha); CS12 (2.85 ha) Livestock breeding systems (LBS): SE1; SE7; SE3; SE8 ; SE2 Cattle size: 1 donkey, 2 draft animals, 5 fattening sheep, 6 sheep, 5 goats, 6 pigs, and 25 poultry (chickens) Farm equipment: tillage tools; 1 cart and 1 tricycle; 2 sprayers; 2 ploughs; Irrigation network + 1 motor pump
Type 3	Proportion= 21% Potential farm area (ha) = 3,5 Number of active workers = 8 Cropping systems (CS) : CS9 (2.15 ha); CS3 (3.15 ha); CS 11 (2.1 ha) Livestock breeding systems (LBS): SE8; SE4; SE5; SE1; SE6; SE7; SE2 Cattle size: 5 donkeys, 1 fattening bovine, 2 range cattle, 3 draft animals, 4 fattening sheep, 12 sheep, 8 goats, 4 pigs, and 18 poultry (chickens) Farm equipment: Tillage tools; 2 carts; 1 tricycle; 3 sprayers; 2 ploughs; irrigation network + 1 motor pump
Type 4	Proportion = 18% Potential farm area = 5 ha Number of active workers = 9 Cropping systems (CS) : CS6 (2.85); CS13 (3.25); CS14(4.25); CS15 (3.5) Livestock breeding systems (LBS): SE8; SE4; SE5; SE1; SE6; SE7; SE2 Cattle size: 4 donkeys, 4 draft animals, 3 range cattle, 2 cattle for fattening, 6 sheep for fattening, 9 sheep, 11 goats, 4 pigs, and 18 poultry (chickens) Farm equipment: Tillage tools; 1 cart, 2 tricycles; 3 sprayers; Irrigation kits (distribution network + 2 motor pumps); 2 ploughs, 1 cultivator
Type 5	Proportion = 0.5% Potential farm area (ha) = NA Number of active workers = 3 Cropping systems (CS) : NA Livestock breeding systems (LBS): SE9 cattle size: 415 laying hens Farm equipment: Feeding equipment (55 feeders and 55 drinkers); Rearing facilities (1 storage shed and 2 chicken coops); 10 rakes and 5 shovels; Tillage tools; 1 tricycle

Note: SE1: poultry breeding; SE2: draft animal rearing; SE3: tethered small ruminant rearing; SE4: free-range cattle rearing; SE5: small ruminant flock rearing; SE6: cattle fattening; SE7: sheep and goat fattening; SE8: pig farming; SE9: laying hen farming.

Farming systems Type 2 (39%) comprise "average" living standard households; they differ from Type 1 by the initial introduction of market gardening crops into the cropping systems (CS4; CS5; CS7; CS8; CS10; CS12). These household have also farm equipment, motorized pumps and irrigation systems. All this equipment increases land-use efficiency in the CSs; as for the breeding systems, these households engage in sheep and goat fattening (LBS7) in addition to poultry breeding (LBS1), tethered small ruminant rearing (LSB3), and pig farming (LSB8).

This diversity of LSBs within these farming systems provides a degree of stability, enabling them to cope with various climatic and/or social shocks. Within these farming systems, various combinations are used to address social, economic, and edaphic constraints. Consequently, these systems exhibit greater resilience to shocks than Type 1. Vall *et al.* (2012); Bénagabou *et*

al. (2017) reported similar results in the cotton-growing zone in Burkina Faso. Farming systems Type 3 and Type 4, accounting for 21% and 18%, respectively, represent “wealthy" households; their cropping systems strongly integrate market gardening, achieving high land-use efficiency (200%). These systems are also characterized by the presence of all types of livestock farming. Unlike Farming systems Type 1 and Type 2, Farming systems Type 3 feature stronger integration between its components (breeding and cropping), and each component is efficient. This why they are more performing than the two preceding types farming systems.

CONCLUSION

This study allowed characterizing the baseline situation of farming systems in the Bassitenga province. It enabled a description of cropping and livestock breeding systems, as well as the various combinations of these systems that determined the farming systems performance and resilience. Results revealed that the farming systems can be grouped into five (5) types, with crop and livestock production remaining the primary sources of income for these systems. The study identified and described fifteen (15) cropping systems and nine (9) livestock farming systems. Analysis of the cropping systems reveals that those with market gardening (69.42%) make better use of land and labor and are consequently more efficient than systems focused solely on rain-fed crops (30.58%). Five (5) livestock breeding systems were identified in this investigation. In addition to the animal products, the LBS with high number of animal used manure for soil amendment while draft animal allowed the arduousness of the work and increased the area cultivated annually.

Five (5) livestock farming systems were identified during this study. The results also highlighted the importance of these systems for the resilience of the farming systems to the different socio-economic and climatic chocks. In addition to livestock products, by-products such as manure are used to fertilize fields in households with large herds. The study further demonstrated that raising draft animals reduces the physical burden of labor while enabling an increase in the area of land cultivated annually.

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