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GENDER ISSUES IN CROP-SMALL RUMINANT INTEGRATION IN WEST AFRICA

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A B S T R A C T

The role of gender in ensuring an enhanced integrated crop-livestock production system in West Africa cannot be underestimated. This paper is based on data generated from the baseline survey for the crop-livestock project from 960 households across Gambia, Mali, Ghana and Benin. It highlights the contribution of gender towards achieving an integrated crop-livestock system in West Africa. Results revealed that females play an active role in grain and fodder marketing such that 11.80%, 41.70%, 46.40% and 66.90% of legumes grain marketing in Gambia, Mali, Ghana and Benin respectively were carried out by females. Females were also active in drying, harvesting and sowing. Despite their active participation in production, their role in decision making as to when to sell livestock was limited. Only 17.0%, 5.4%, 13.0% and 47.4% of females in Gambia, Mali, Ghana and Benin respectively took part in decision making as to when to sell livestock in the household. Their role in deciding how to spend income from livestock sale was also limited. Only 20.0%, 6.2%, 13.5% and 35.2% in Gambia, Mali, Ghana and Benin respectively had this opportunity. To conclude, women play a significant role in production and marketing within the system. Their ability to benefit from the system however depends on the scale of involvement and their role in decision making and access to economic resources. Improving their capacity and strengthening their resource base will enable them play an active role and achieve maximum benefit from the integration process.

Keywords: Male, Female, Crop- livestock production, Respondent, Dominance.

INTRODUCTION

Agriculture can be the engine of growth and is necessary for reducing poverty and food insecurity, particularly in sub-Saharan Africa (World Bank, 2007). Agriculture has central role in African economies but its sustainable development faces enormous challenges (Asres *et al*., 2012). Among these challenges is low productivity affecting the ability of the sub-region to become food secured and economically independent. This is at a time when several initiatives at both national and regional levels have been designed and implemented. Various protocols and conventions have already been signed and implemented in an attempt to address the issue of low productivity and food insecurity. The problem however still exist to the extent that, agricultural contributions to Gross Domestic Product (GDP) for some countries in the sub-region is on the decline (IMF, 2013). The effect of the low productivity levels is not only on food security but also affect income of farmers especially vulnerable groups like women and smallholder farmers. Studies conducted indicate several reasons accounts for this low productivity in the sub-region. One of such reasons is the continuous decline in soil fertility of agricultural lands (Buresh *et al.*, 1997). This situation is worsened due to the lack of integration between crop production and animal production. Integrating these two systems has enormous benefits and can be harnessed for the improvement of agricultural productivity and development of the entire sector (Lenné and Thomas, 2006).

Livestock production is an important component of agricultural activities in developing countries (Mutibvu *et al*., 2012). They complement cropping activities

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through the provision of manure for soil fertility maintenance, draught power for cultivation, transport, cash and food (Powell *et al*., 2004; Peden *et al*., 2007). Livestock play an important role in farming systems, as they offer opportunities for risk coping, farm diversification and intensification, and provide significant livelihood benefits (Bossio, 2009). Integrating livestock production with crop production backed by effective female participation has enormous effect on productivity improvement. The role of gender in agriculture activities gained growing attention among researchers, aid donors and policymakers in 2012 (Meinzen-Dick & Quisumbing, 2012). This emphasises the critical role gender role plays in crop-livestock integration system since the gender of a farmer has the likelihood to determine his or her rate of adoption of a technology or practice for productivity improvement and income generation. This is confirmed by Doss and Morris (2001) using evidence from Ghana to suggest that gender-linked differences in the adoption of modern maize varieties and chemical fertilizer result from gender-linked differences in access to complementary inputs. The redistribution effect of income from production depends to a large extent on who makes decisions in the household.

To achieve the maximum benefit from crop-small ruminant integration in West Africa will require a proper understanding of gender issues in the integration process and the need to mainstream these issues into the integration process. Women play a significant role in the production and marketing of crops as well as the rearing of animals. Their ability to benefit from the production process however will depend on their scale of involvement and their role in decision making and access to economic resources like land. Improving their capacity and strengthening their resource base will enable them to play an active role and achieve maximum benefits from the integration process.

METHODOLOGY

Data for this study was generated from a baseline survey conducted in 2012 as part of the sustainable intensification of crop-small ruminant project in West Africa. The study was based on a non-experimental design using a multi stage probability sampling. Four countries were purposively sampled based on their level of cereal, legume and small ruminant production.

Data were generated across the countries using the same methodology with some modification to take care of local differences. Eight (8) districts covering forty-eight (48) communities across the four countries were sampled to give a total of 960 households across the four countries. This was based on proportional simple random sampling of 240 households from each country producing cereals, legumes or small ruminant. Data were elicited through the use of both formal and informal survey methods. Diagnosis analysis through the use of Participatory Rural Appraisal (PRA) was conducted prior to the conduct of the formal survey. This gave the basis for the development of the formal survey instrument in the form of a standardised questionnaire. This instrument was then used to solicit data through one-on-one interviews. Data generated was analysed in SPSS to produce descriptive statistics in the form of frequency tables. Comparative analysis is used to compare variables across countries and gender. Trend analysis is also used to investigate if similar trends exist across countries or gender lines.

RESULTS AND DISCUSSION

Socio-demographic diversity: Access to formal education play a critical role in ensuring improved productivity and incomes. The level of education of a farmer has a relationship with his or her ability to adopt new production technologies and practices. Unfortunately, across the four countries, most respondents had no formal education. Gambia (83.7%) had the highest non- educated respondents for males and 100% for females. Only 7.2% of respondents in Gambia had access to basic education (males). Mali (27.4%) and Ghana (27.3%) however had the highest male respondents who had access to basic education. The prominence of secondary and tertiary education for females was in Mali (10.3% and 5.1%) respectively. Male respondents in Benin (13.5%) had the highest tertiary education (Table 1). This access to educational structure will require a paradigm shift for developing a well-integrated crop livestock system. To develop effective technologies and practices for an effective integrated system that plays emphasis on intensification will require partnership with the non-formal educational system in these countries to provide some level of education to farmers through adult learning.

Most respondents in the study areas were engaged in crop production as their main occupation. Mali which is noted for high level of animal production had most respondents indicating crop production was their main occupation for both males (97.5%) and females (92.3%).

The trend was the same across the four countries were crop production was the main occupation. Livestock production was a secondary occupation across the countries which show the low level of development of the sub-sector. It is mostly women especially widows and the aged who lack strength to go into crop production and also do not have money to hire labour who take up rearing of small ruminants as a main occupation. This explains why 27.8%, 3.10% and 2.90% of female respondents in Gambia, Ghana and Benin were engaged in animal production as their main occupation. To support household income, some female respondents were also engaged in petty trading as their main occupation and took either crop or animal production as a secondary occupation. That is 5.10% for Mali and Ghana and 4.80% for Benin (Table 1). Some respondents were also salary workers or casual workers and engaged in farming as a secondary occupation.

The average age of respondents across the countries confirms the ageing population of farmers and the need for mechanizing agriculture. Respondents in Mali had an average age of 53years (Males) and 50years (Females). The lowest average age for males and females were in Benin. That is 45years for males and 41years for females respectively. The need to attract the youth into agriculture is therefore critical to ensure sustainability of the sector. This will mainly improve productivity and efficiency through an integrated intensification approach to make the sector more profitable and rewarding. Mechanisation, provision of credit, support services and introduction of technology should be paramount to re-structure the sector for the youth to be attracted.

Table 1. Gender Socio-Demographic Diversity of respondents.

Variables	Gambia (%)		Mali (%)		Ghana (%)		Benin (%)	
	Male	Female	Male	Female	Male	Female	Male	Female
Educational Level								
No formal education	83.7	100	63.7	66.7	56.2	63.3	55.6	81.9
Basic	7.2	N/A	27.4	17.9	27.3	34.7	21.1	10.5
Secondary	1.4	N/A	7.5	10.3	10.2	2.00	9.8	2.9
Tertiary	7.7	N/A	1.5	5.1	6.2		13.5	4.8
Main Occupation								
Crop production	88.9	61.10	97.50	92.30	94.50	88.80	88.70	79.00
Livestock rearing	3.2	27.80	N/A	N/A	0.80	3.10	3.80	2.90
Petty trading	3.7	N/A	N/A	5.10	1.60	5.10	1.50	4.80
Craftsmanship	1.4	N/A	1.00	N/A	0.80	1.00	0.80	5.70
Salary worker	2.8	11.10	1.50	2.60	2.30	2.00	3.80	6.70
Casual Labour							1.50	1.00
Mean Age of respondents	49.11	46.17	52.86	49.15	46.93	44.50	45.42	40.86

Fields Survey, 2012.

Crop production and animal rearing diversity: Farmers naturally cultivate certain crops with different motivations. This can either be for food, income or both. This motivation has to be aligned with climate and other agronomic conditions as well as socio-economic factors in the cultivating area. Respondents in the study areas did cultivate cereals such as maize, rice, millet, sorghum and soybean. Production of legumes like cowpea and groundnut was also very important for food and its ability to fix nitrogen into the soil. Male or female production dominance of a particular crop did differ from country to country. Gambia (100%) and Mali (92%) had male dominance in the production of sorghum. Females' active participation in Gambia (8%) and Mali (36%) was in rice production followed by millet 7.7% and 11.4% respectively. Ghana and Benin had male dominance in rice (66.70%) and millet (71.40%) production respectively (Table 2). Generally, most respondents were into cereal production across the countries since it plays a critical role in ensuring food security. Female participation in both cereal and legume production was high in Ghana and Benin compared to Mali and Gambia.

The average land area allocated to the production of the different crops in the study areas reveal an interesting picture. Land allocation to cereal and legumes in the study areas was prominent to food security needs of the people.

Table 2. Crop production and animal rearing.

Variables	Gambia		Mali		Ghana		Benin	
	Male	Female	Male	Female	Male	Female	Male	Female
Common cereals and legumes (%)								
Cowpea	93.9	6.1	91.9	8.1	59.4	40.6	53.5	46.5
Groundnut	93.6	6.4	90.8	9.2	50.4	49.6	60.00	40.00
Maize	94.7	5.3	91.5	8.5	55.8	44.2	55.8	44.2
Rice	92.00	8.00	64.00	36.00	66.70	33.30	50.00	50.00
Millet	92.30	7.70	88.60	11.40	N/A	N/A	71.40	28.60
Sorghum	100.00	0.00	92.20	7.80	N/A	N/A	60.00	40.00
Average cultivated land area (ha)								
Cowpea	1.56	1.13	1.20	0.93	1.34	1.21	1.22	1.65
Groundnut	3.04	2.30	1.36	0.75	1.26	1.12	1.09	0.90
Maize	1.76	1.56	1.18	0.97	2.64	2.18	2.10	1.67
Rice	2.19	2.57	2.36	4.96	3.23	1.68	0.50	0.75
Millet	3.04	3.48	4.70	4.75	N/A	N/A	3.12	0.20
Sorghum	1.15	N/A	3.76	3.71	N/A	N/A	0.67	0.40
Soybean	1.88	N/A	N/A	N/A	N/A	N/A	1.73	1.38
Livestock production (%)								
Sheep	47.2	54.2	53.8	60.8	49.3	47.9	42.2	45.2
Goat	52.8	45.8	46.2	39.2	50.7	52.1	57.8	54.8
Average herd size								
Sheep	9	7	10	4	15	14	9	8
Goat	7	5	15	8	12	10	9	9

Source: Field Survey, 2012.

Though male dominance was more pronounced in sorghum than millet in Gambia and Mali in terms of land allocation, priority was given to millet which is one of the key stables in these areas. On the average, 4.7ha and 3.04ha was allocated to the cultivation of millet compared to 3.76ha and 1.15ha for sorghum in Gambia and Mali respectively. This means that though many male farmers in these countries cultivate sorghum, this is done on smaller land sizes which have effective implication on yields and output. The females in Gambia and Mali did not depart from their male colleagues' taste of having bigger sizes for millet than their dominant crop. Though rice was the female dominant crop, millet had a high average land size than rice, confirming its importance in ensuring food security in these countries. The situation in Ghana and Benin was different and unique. Male dominated crops actually had the highest land size allocation. An average of 3.23ha and 3.12ha was allocated for rice and millet cultivation in Ghana and Benin respectively which were the male dominated crops in these countries. The female farmers did not allocate the largest fields to groundnut which is the female dominated crop in Ghana, but rather to maize due to its food security role. Benin was not different from Ghana such that maize was cultivated on a larger field size, with average land size of 1.67ha by females though rice was their dominant crop (Table 2). Generally, males had a higher land size for cultivation than females which confirms the gender parity in developing countries. It is however interesting to note that females in Gambia and Mali had bigger rice fields on average than their male counterparts and females in Benin also had bigger cowpea fields than their male counterparts.

The type of small ruminant kept in the study areas did differ in terms of dominance and number of small ruminant kept (Table 2). Across the countries, most respondents preferred to keep goats over sheep. For example, about 52.8%, 50.7% and 57.8% of males in Gambia, Ghana and Benin respectively prefer keeping goats to sheep. It was only in Mali were 53.8% of males preferred keeping sheep over goats. The preference for goats across the three countries was due to the animal husbandry system being practice in these countries.

Table 3. level of integration.

Variables	Gambia		Mali		Ghana		Benin	
	Male	Female	Male	Female	Male	Female	Male	Female
Practice of sup. feeding (%)	58.2	50	90.2	87.9	56.5	62.5	87.40	93.30
Feeding Types (%)								
Groundnut haulm	64.30	45.50	25.40	27.40	38.10	43.10	9.00	10.40
Cowpea haulms	7.10	N/A	24.90	21.90	20.60	29.40	4.10	1.00
Rice straw	17.90	9.10	5.80	17.80	1.60	2.00	???	37.50
Cowpea chaff	0.70	N/A	0.50		11.10	5.90	24.60	1.00
Soybean haulms	N/A	N/A	8.40	4.10	1.60	2.00	1.60	1.00
Soybean chaff	N/A	N/A	4.80	2.70	3.20		N/A	2.10
Maize chaff	3.60	N/A	9.60	4.10	4.80	5.90	0.80	2.10
Maize stove	2.10	N/A	6.00	2.70	N/A	N/A	0.80	N/A
Sorghum head	N/A	N/A	14.40	17.80	N/A	N/A	N/A	N/A
Millet stalk	0.70	N/A	0.20	1.40	N/A	N/A	N/A	N/A
Household waste	3.60	27.30	N/A	N/A	14.30	7.80	58.20	44.80
Stylo	N/A	9.10	N/A	N/A	N/A	3.90	N/A	N/A
Pitomash	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Others	N/A	9.10	N/A	N/A	4.80	N/A	N/A	N/A
Uses of Animal droppings (%)								
Compost	0.80	6.20	35.40	41.90	12.70	22.50	1.50	N/A
Application on soil	98.70	87.50	N/A	N/A	39.10	41.20	31.90	38.10
Thrown away	0.40	6.20	64.60	58.10	47.30	36.20	66.70	61.00

Source: Field Survey, 2012.

The semi-intensive system is more popular in these countries to which goats quite adapt better than sheep. Mali had preference for sheep since their animal industry is quite developed compared to the other countries. According to Solomon *et al*. (2010) the most important objectives of farmers keeping sheep or goat is for cash income, savings and meat for household consumption. This also explains why most farmers in the study areas preferred goats over sheep. Sheep is normally sold at festive occasions which are normally within a specific time period. Goats are however sold almost every day since they are used by restaurants and hotels for meals.

The number of animals kept per household was heavily gender dependent. While the males kept more sheep (9, 15, 9) for Gambia, Ghana and Benin respectively, females in Mali (8) and Benin (9) kept more goats than those in Gambia (7) and Ghana (14) who kept more sheep (Table 2). The number of goats kept confirms studies by Mutibvu (2012) who estimated the average herd for goat in Zimbabwe to be 7 per household and Mahanjana and Cronjé (2000) who recorded a mean goat flock size of 16 in the Eastern Cape region of South Africa. Several reasons may account for these differences in herd among which could include economic value and easy access to market.

Level of integration: The level of integration in the study areas were of different types. That is the integration of cereals and legumes, cereals and small ruminants, legumes and small ruminant, or an integration of cereals, legumes and small ruminant. The level of integration depends on some socio-economic factors among which were gender of the respondent. Integration was very critical in ensuring the sustainability of the two systems. As indicated earlier, the semi-intensive system was the predominant system across countries. Respondents therefore practiced supplementary feeding using household waste, groundnut haulms and crop residue from groundnut, cowpea and maize to ensure animals were healthy and marketable. More males in Gambia (58.2%) and Mali (90.2%) were practicing supplementary feeding than Ghana (56.5%) and Benin (87.40%) where more females were rather involved in supplementary feeding (Table 3). About 62.5% and 93.30% of females did practice supplementary feeding in Ghana and Benin respectively.

Various crop residue and feed types were used. Respondents across with the exception of Benin feed their animals with groundnut haulms. About 64.30%, 25.40% and 38.10% male respondents in Gambia, Mali and Ghana respectively relied on groundnut haulms as supplementary feed for their animals. This was the case for female respondents such that 45.50%, 27.40% and 43.10% of female respondents in Gambia, Mali and Ghana. Dominance in terms of the use of groundnut haulms as supplementary feeding, Gambia had more responses for males (64.30%) and females 45.50% (Table 3).

Due to soil erosion and continuous deforestation among other factors, soils in the study areas have lost their fertility. One way to re-gain soil fertility is through the application of inorganic fertilizers. However, integrated nutrient management with a combination of inorganic and organic fertilizers such as animal droppings has been found to be more efficient biophysically and economically than inorganic or organic fertilizers alone (Buresh *et al,* 1997; Dapaah *etal,*. 2008). The continuous increase in the price of inorganic fertilizer made crop-small ruminant integration in the study areas very important. Animal droppings were one of the major sources of fertilizer for respondents. This was very dominant in Gambia where 98.70% and 87.50% of male and female respondents respectively applied animal droppings to their soils directly. Though other respondents in the other countries did apply animal droppings to their soils either directly or through turning it into compost, most of them also threw it away. About 64.60%, 47.30% and 66.70% of male respondents in Mali, Ghana and Benin threw animal droppings away without making use of it. This was the same for the females such that about 58.10%, 36.20%, 61.0% of female respondents respectively also threw animal droppings away (Table 3). This might be due to the poor housing conditions in these countries for animals were the floor of their pens is not cemented. Educating these respondents will be a great way of improving soil fertility and making saving from the purchase of inorganic fertilizers.

Gender roles in crop and animal production: Males across the four countries dominated in input acquisition for both cereals and legumes. About 95.10%, 74.10%, 81.0% and 72.30% of respondents in Gambia, Mali, Ghana and 72.30% respectively were of the view that males played a leading role in input acquisition for legume production (Table 4). This was not very different from cereal production were 91.1%, 93.6% and 72.4% of respondents in Gambia, Mali and Benin agree to this fact. Males' role in accessing land was also widespread across countries (Table 5). In Gambia, Mali, Ghana and Benin, about 63.70%, 54.10%, 84.80% and 59.90% of respondents agreed to this fact for legume production. Their role in accessing land for cereals though significant was not as great as legumes since 51.3%, 56.3%, and 59.0% for Gambia, Mali and Benin except Ghana (82.7%). The role of females in supporting their husbands in production was very important in the study areas. They did not just play supporting role but also took an active part in some production activities such that in Mali (13.1%) were very active in accessing land. Major female roles across countries in production were marketing of either grain or fodder. About 16.4%, 11.3%, and 67% in Gambia, Mali and Benin were involve in cereal grain marketing except Ghana were 33.4% and 33.1% were engaged in threshing and sowing respectively (Table 5). This was similar in legume production where 11.80%, 41.70%, 46.40% and 66.90% were engaged in legume grain marketing. Drying and harvesting were also areas females played an active role. About 13.30%, 40.60%, 23.80% and 41.90% of female respondents in Gambia, Mali, Ghana and Benin respectively were actively involved in drying legumes (Table 4). Encouraging female participation in other production activities will lead to enhancing their income and also contribute to providing the needed household labour for production.

Males again dominated in terms of roles in animal production. Their main activities or roles were the slaughtering of the animals for either home consumption or sale and the marketing of either meat or hide. In Gambia, Mali, Ghana and Benin, 95.5%, 95.2%, 81.2% and 66.7% of males were involved in slaughtering respectively (Table 6). For the marketing of meat, 93.8%, 100%, 44.4% and 28.6% were involved respectively. In addition to their roles, they decided on as to when an animal should be sold and how the money should be spent. Females' voice in decision making for animal production was limited. That is only 17%, 5.4% and 13% of females in Gambia, Mali and Ghana respectively had the opportunity to decide when to sell an animal in the household. That even happens when the female owns the animal. Benin however had a different story where 47.4% took part in deciding as to when to sell an animal.

Table 4. Gender Roles in Legume production.

Roles	all family members				adult males				adult females				adolescent and children			
	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin
Accessing land	34.60	23.30	4.80	16.50	63.70	54.10	84.80	59.90	1.70	22.00	9.60	22.90	0.00	0.15	0.00	0.10
Land clearing	15.60	8.60	4.50	17.70	73.80	70.90	53.50	34.40	0.00	17.20	6.50	11.70	2.65	0.68	0.98	2.40
Ploughing	20.50	7.30	4.30	12.80	75.40	59.80	34.60	38.40	1.30	24.40	1.90	10.40	0.68	1.53	1.55	1.68
Sowing	22.40	18.90	17.20	29.80	71.00	43.20	27.00	19.50	0.80	30.80	36.20	28.70	1.43	1.63	2.15	3.03
1st weeding	38.40	12.10	9.80	30.60	58.20	50.40	42.10	19.40	1.30	29.10	4.30	18.80	0.55	1.95	5.80	2.18
2nd weeding	35.70	12.30	14.40	31.40	57.30	51.60	38.60	19.90	2.20	28.70	4.60	19.60	1.23	1.63	6.40	2.10
Fertilizer application	14.00	9.00	22.50	24.30	80.30	59.00	47.50	26.50	3.20	27.00	12.50	24.90	0.63	1.23	2.48	2.83
Manure application	18.30	10.30	15.90	19.60	58.10	54.00	54.80	17.10	2.10	31.00	7.10	22.90	5.38	1.20	3.78	7.23
Pesticide application	13.20	6.70	25.80	4.20	76.70	73.10	27.70	46.70	0.80	17.30	24.50	13.30	1.00	0.73	3.15	2.65
Harvesting	34.40	30.80	25.80	51.00	60.80	40.80	27.70	10.30	2.60	24.90	24.50	19.40	0.45	0.75	3.15	1.05
Threshing	20.30	24.10	31.50	26.30	68.00	40.10	26.70	5.10	9.10	28.50	17.10	35.90	0.65	1.28	3.60	6.43
Drying	28.30	18.00	24.50	25.50	54.90	35.90	29.10	7.00	13.30	40.60	23.80	41.90	0.88	1.38	4.13	6.05
Grain marketing	1.40	0.80	15.20	0.70	85.30	55.30	26.50	25.10	11.80	41.70	46.40	66.90	0.35	0.58	2.50	1.65
Fodder marketing	0.00	1.30	-	4.20	94.60	62.80	-	45.80	1.60	32.10	-	41.70	0.93	0.95	-	2.10
Purchasing of inputs	3.30	1.70	4.90	0.90	95.10	74.10	81.00	72.30	1.60	22.40	7.70	26.80	0.00	0.43	1.58	0.00

Table 5: Gender roles in Cereal production.

Roles	all family members				adult males				adult females				adolescent and children			
	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin
Accessing land	37.2	27.3	7.1	17	51.3	56.3	82.7	59	11.1	13.1	10.1	22.9	0.1	0.83	0	0.075
Land clearing	15.5	6	5.6	18	77.6	83.8	58.6	35.4	2.6	1.4	1.2	11.9	1.1	2.08	0.775	2.2
Ploughing	20.6	6.4	4.3	13.3	71.7	75.2	35.2	38.1	5.4	4.7	1.9	11	0.55	2.78	1.7	1.625
Sowing	23.7	20.2	19.3	28.6	69.1	59.7	28.3	19.4	4.2	9.1	33.1	29.4	0.725	2.25	2.25	3.05
1st weeding	39.1	11.6	12	30.7	48.7	67.9	46.7	18.6	10	7.4	2.4	19.4	0.425	3.15	5.4	2.3
2nd weeding	38	10.7	14.4	30.1	48.7	67	38.6	18.9	11.8	7.8	4.6	19.5	0.4	3.4	6.4	2.5
Fertilizer application	14.6	4.3	22.6	27.4	80.4	81.8	47.8	25.2	3.2	2.1	12.6	22.3	0.475	2.93	2.525	2.975
Manure application	19.3	6.8	23.5	20.7	52.6	78.3	38.2	15.9	5.7	1.4	6.6	23.6	5.6	3.4	6.425	7.1
Pesticide application	14	6.1	13.2	3.8	73.6	81.6	66.7	48.1	2.3	2	6.2	7.6	1.35	2.38	2.525	3.95
Harvesting	34.1	30.6	27.3	51.3	59.7	51.2	29.2	10.4	3.5	11.6	22.4	18.8	0.2	1.33	3.275	1.05
Threshing	19	24.1	24.7	27	64.5	55.8	27.6	5.4	14.3	4.9	33.4	32.4	0.525	2.78	2.525	6.825
Drying	30.8	17.6	19.2	28.5	39.7	63.8	38	5.9	25.4	9	22	38.5	1	2.4	4.325	6.5
Grain marketing	1.9	0	5.6	1	78.9	86.3	79.6	25.5	16.4	11.3	8.5	67	0.7	0.6	1.575	1.6
Fodder marketing	0	0	-	0	91.4	95.5	-	47.1	4.8	0	-	41.2	0.95	1.13	-	2.95
Purchasing of inputs	1.6	0.6	-	0.4	91.1	93.6	-	72.4	3.2	2.9	-	27.2	1.05	0.73	-	0

Table 6. Gender Roles in Sheep and Goat production.

Roles	all family members				adult males				adult females				adolescent and children			
	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin	Gambia	Mali	Ghana	Benin
Accessing land	34.4	24.9	6.4	21.2	50.4	51.3	85	58	10.7	14	2.9	20.5	1.1	2.18	1.45	0
Fattening	15.4	6	8.6	41.4	57.9	64.1	74.3	25.8	22.1	13.8	7.9	30.6	1.175	3.48	2.325	0.4
Crop residue collection	4.1	6.7	14	35.6	55.7	68	40.1	8.6	6.3	8.9	12.8	33.9	8.4	4.1	8.15	5.45
Harvesting of browse	5.3	2.4	12.4	48	46.5	68.1	39.8	22.3	4.9	2.9	6.8	6.8	10.825	6.65	9.475	5.75
Animals to grazing area	7.8	0.6	4.5	37.1	33.5	26.7	26.6	13.5	11	1.7	3.9	9.6	11.575	14.3	15.25	9.975
Feeding	18.3	9.5	9.6	51.5	33.7	51.6	33.8	10.8	16.5	12.7	16.6	30	7.9	5.9	9.4	1.925
Pen cleaning	0.4	2	9.6	12.9	27.9	39.9	18.6	5.5	38.9	21.2	25.7	34.6	8.225	9.23	11.25	11.78
Watering	16.9	6.9	13.3	47.8	18.8	27.6	28.5	10.4	24.3	20.2	17.1	24.9	10	11.1	9.975	4.2
Cut and carry - wet season	4.1	3.6	13.3	38.3	45.7	64.8	28.5	17.2	5.9	2.1	17.1	9.6	11.075	7.25	9.975	8.725
Cut and carry - wet season	4.2	2.8	8.9	40.9	52.1	61.5	46.6	16	4.2	0.6	6.2	13.8	9.875	8.68	8.75	7.2
Processing	1.7	2.9	1.4	18.8	83.4	40.2	82.7	43.8	10.3	53.9	3.6	18.8	1.15	0.75	2.5	4.7
Marketing of live animal	10.9	0.6	3	2.2	74.2	97	79.9	50.6	13.3	1.2	11.2	44.9	0.4	0.3	1.475	0.575
Marketing of meat	2.1	0	3.3	2.9	93.8	100	44.4	28.6	3.6	0	47	68.6	0.125	0	1.325	0
Hide marketing	2.6	0	5.4	0	90.2	98.6	52.7	50	5.2	0	32.6	0	0.5	0.35	1.95	0
Disease control	1.6	0.5	3.8	10.3	79.6	86.3	75.8	48.5	9.4	3	14.6	34.6	0.7	0.38	0.475	0.4
Slaughtering	1.4	0.8	1.2	3.7	95.5	95.2	81.2	66.7	0.9	0.8	3	1.9	0.575	0.6	2.425	0.475
Deciding when to sell	7	1	6.2	1.1	73.4	91.6	69.8	49.8	17	5.4	13	47.4	0.65	0.38	2.775	0.45
Tethering	6.2	1.6	4.7	43.7	39.6	24.5	36.5	14.7	9.9	7.3	2.7	21.1	11.075	16	13.85	5.15
Shepherding	1.8	0	1.8	35.6	38.7	22	42.1	26	2.2	1.7	2.4	23.3	14.1	16.2	13.43	3.775
money from animal sale	9.3	0.5	12.8	6.3	67.1	92.8	62.2	57.5	20	6.2	13.5	35.2	0.9	0.13	2.875	0.225
Milking	3.9	1.2	-	60	64.4	74.4	-	20	3.9	12.2		20	6.95	2.9	--	0
Food preparation	2.3	0	5.1	0.8	8.8	3	16	3.1	74.8	94.5	72.4	74	3.525	0.63	1.4	5.5

Spending decisions from the sale of animals was also for the males. Only 20.0%, 6.2%, 13.5% and 35.2% of females in Gambia, Mali, Ghana and Benin respectively took part in deciding how money from animal production should be spent (Table 6).

Few studies have demonstrated that women are an integral part of the farming structure, especially in Sub-Saharan Africa (Boserup, 1970; Saito and Spurling, 1992; Gladwin, 1997). To ensure their active participation will require gender equality as a crucial element for agricultural development and the attainment of the Millennium Development Goals (MDGs) .Typical of farming systems in developing countries, males in the study areas dominated in terms of production roles. This is why the Food and Agriculture Organization's (FAO) State of Food and Agriculture 2010–2011 highlighted the need to close the gender gap in access to agricultural resources, education, extension, financial services, and labor markets; to invest in labor-saving and productivity-enhancing technologies and infrastructure to free women's time for more productive activities; and to facilitate women's participation in flexible, efficient, and fair rural labor markets. The World Development Report 2012 also stresses that gender equality can lead to productivity gains such that women's increased control of household resources can improve outcomes for the next generation, and that empowering women as economic, social, and political actors can result in more representative decision making.

Land Ownership and Tenure system: Land administration in developing countries is still not well defined. Land ownership is of different dimensions making accessibility and ownership difficulty. In the study areas, the most common land tenure system was ownership without titled deed (Table 7). About 65.7%, 78.2%, 59.8% and 38.8% of male respondents in Gambia, Mali, Ghana and Benin respectively owned land but had no titled deeds. This was not different for females such that 85.7%, 76.4%, 50.0%, and 48.4% of females in Gambia, Mali, Ghana and Benin respectively owned land but had no title deed. This system of ownership explains the numerous land conflicts in Sub-Sahara Africa. It does not also help in attracting investment into the sector since land ownership cannot be guaranteed. Only a fraction of lands in these countries were under the control of government and is termed public lands. Only 2.4%, 3.3%, 7.4%, 0.5% of male respondents in Gambia, Mali, Ghana and Benin had land from the public land system. The percentage in Ghana is slightly higher than the other countries due to the passing of the land administration bill into law which seeks to control land ownership and access. This explains why about 32.2% of female respondents in Ghana had land with title deed (Table 7). Strengthening the land administrative processes through legislative instruments will help regulate land access and ownership and lead to a sustained integrated farming system in West Africa.

Respondents in the study areas are not only facing the challenge of having land without title but also declining soil fertility. The continuous destruction of forest in these countries as a result of mineral mining, bushfires, overgrazing, and high cost of inorganic fertilizers resulting in low fertilizer use has caused rapid soil fertility decline. Respondents therefore rated the productive nature of their lands as average. About 56%, 48.5%, 49.6, and 41.3% of male respondents in Gambia, Mali, Ghana and Benin respectively rated the productivity of their lands as average. This was not different for the female respondents such that 52.4%, 49.3%, 54.2%, and 45.1% for Gambia, Mali, Ghana and Benin. Despite this average rating of soil fertility in these countries, a soil fertility management option like fallowing was not an option. This was due to the scarcity of land as a result of urbanization and other economic activities like mineral extraction.

Average land under cultivation for males in Gambia, Mali, Ghana and Benin was 2.54ha, 2.67ha, 2.59ha and 2.22ha respectively. That of Ghana indicates an increase from less than 2ha (Chamberlin, 2007). The primary use of land in these countries was for crop production such that 98.1%, 98.3%, 73%, and 81.7% of male respondents in Gambia, Mali, Ghana and Benin agrees to this fact. The female acceptance of this fact was even much stronger such that about 100%, 99.2%, 70.2% and 91.3% in Gambia, Mali, Ghana and Benin respectively were of this view (Table 7).

CONCLUSION

The influence of gender in ensuring an effective crop small ruminant integrated value chain in West Africa has been established in this study. Gender diversity in crop production and animal rearing, level of integration, activity roles and land ownership and tenure are the critical elements in ensuring a gender balanced crop small ruminant integrated value chain. To achieve maximum benefits from this system requires a proper understanding of gender issues in the integration process and how to mainstream these issues into the system. Women play a significant role in production and marketing within the system. Their ability to benefit from the system however depends on the scale of involvement and their role in decision making and access to economic resources. Improving their capacity and strengthening their resource base will enable them to play an active role and achieve maximum benefit from the integration process.

The number of farmers who are educated from the study is still relatively low. This cut across all the countries and has implication on technology adoption and productivity in the system. To improve the system will require partnership with the non-formal educational systems in these countries to provide some level of education to farmers through adult learning. This will help them to appreciate issues better and be willing to adopt improved technologies and practices.

Crop production from the study takes dominates over animal production. That is why even in Mali which is noted for high level of animal production had most respondents indicating crop production was their main occupation for both males (97.5%) and females (92.3%). The trend was the same across the four countries were crop production was the main occupation. Evidence of economic returns from animal production is very important in an attempt to get farmers to take up animal production as the primary occupation. Provision of

incentives for animal production which is gender focused will also be an innovative way to develop the animal production system which is gender sensitive and focused.

An enhance crop small ruminant value chain system which is gender focused, sensitive and balanced will be the best way to achieving food security and improved incomes. To achieve this will mean improved women participation in production and marketing, ownership to economic resources including land, capital, access to education for effective technology adoption and having a voice in decision making most especially on the use of funds from production and marketing from the system.

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