

## Increasing the productivity of dual-purpose cattle in Nicaragua through the use of appropriate breed types and application of best husbandry practices

### Baseline report on the production systems in Camoapa and Matiguas

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## **Abstract**

In Nicaragua, 51% of the cattle are raised by farmers owning less than 10 hectares of land. The cattle reared are generally for both milk and meat production. Productivity levels per animal are low. This study was undertaken to obtain baseline information on the characteristics of dual purpose cattle production systems in two pilot sites of Nicaragua with a high potential for livestock production.

The study sought to generate gender disaggregated information that would be used to guide interventions addressing productivity gaps in the systems.

Data collected indicates that the average cattle herd size on the farms is variable depending on the quantity of land owned. Farmers however keep a minimum of five adult female animals for milk production irrespective of the quantity of land owned. Cattle are generally owned by men, even in women headed households. The cattle reared are of mixed breed types resulting from continuous crossbreeding. The most pre-dominant breeds are crosses with Brahman, Brown Swiss and a combination of other exotic breed-types. Most farmers raise a bull. The adoption of technologies for breeding, feeding and animal health management is low. Literacy levels of both men and women farmers are relatively high (>84%), however, involvement in community group activities by both men and women is quite limited.

Initial interventions should of necessity involve activities to enhance the engagement of farmers in joint activities for scalable impact on cattle production in the systems. Capacity enhancement on different aspects of selective breeding of cattle, reproductive management of female animals and the use of technologies such as AI would also be an essential catalyst for improved management.

A research in development approach will be used to guide interventions through a partnership team from the Universidad Nacional Agraria (UNA), the Centro Internacional de Agricultura Tropical (CIAT), the Universität für Bodenkultur (BOKU), Austria and the International Livestock Research Institute (ILRI).

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## 1. Introduction

In Nicaragua, the livestock sector is an important driver for income generation. Households that keep cattle obtain up to 75% of their incomes from the sale of milk. In 2011, the livestock sector provided 59.2% of the rural employment of the country (MAGFOR 2013). Fifty one percent of the national livestock herd is raised by small-holder farmers owning less than 10 ha of land. These farmers rear cattle for both milk and meat production. The milk produced per cow within a lactation is however low (typically 500 kg). There are very limited livestock improvement programs in place within the country. Information on the existing technical constraints and opportunities, and the organizations and institutions supporting dual purpose cattle production in the country is also limited.



Within the smallholder farms, women are reported to play an important role (Holmann et al., 2014). They monitor the grazing of animals around the homestead, milk the cows and produce artisan cheese from the milk. Their participation in meetings and activities off the farms to enhance their capacity in livestock improvement however is limited.

This study was undertaken to obtain baseline information on the dual purpose cattle production systems in two pilot sites of Nicaragua, identified as areas with a high potential for livestock production under the International Livestock Research Institute (ILRI) led Livestock and Fish CGIAR research program. It sought to generate gender disaggregated information on the characteristics of the dual purpose cattle production systems in Nicaragua in terms of key actors and their specific roles; service providers and the types of services available to support productivity; products derived from the livestock; breeds of animals reared, and the management practices adopted by different livestock keepers. Information generated through the study would be used to guide interventions addressing productivity gaps evident in the systems in order to improve incomes and enhance the livelihoods of the livestock keepers raising dual purpose cattle. Interventions would be implemented using a research in development approach by a partnership team from the Universidad Nacional Agraria (UNA), the Centro Internacional de Agricultura Tropical (CIAT), the Universität für Bodenkultur in Austria (BOKU), and ILRI.

## 2. Methodology

### 2.1 Study sites and sampling procedures

The baseline was carried out in Camoapa (Boaco) and Matiguás (Matagalpa), both located in Central Nicaragua. The sites are in areas of low to medium altitude, up to 1000 meters above sea level. They receive an average annual rainfall of 1400-1800 mm, and the ambient temperatures are greater than 26 degrees Centigrade. Five to seven months of the year are usually dry with no rainfall. The main crops grown are maize and sorghum, and coffee at the higher altitudes of 800 to 1000 meters above sea level. The areas have a large number of small and medium scale dual-purpose cattle production farms. The sites were selected following a situation analysis study of the L&F-CRP 3.7 sites, which provided an overview of the dual-purpose cattle keeping farmers and the associated actors in the value chains for milk and meat products in Nicaragua (Holmann et al., 2014).

Demographic information from the Nicaragua agricultural census in 2011 (CENAGRO, 2012) was used to determine the population distribution and classify farmers within the two municipalities based on their scale of production as illustrated in Table 1. Additionally, lists of farmers living within the areas were obtained from the main operating cooperatives, namely, Nicacentro in Matiguás and La Masiguito in Camoapa. A proportionate distribution of farms to be sampled as a baseline, ensuring requisite representation of the existing diversity in farming systems in relation to land and herd size was thus identified. Half of the participating households were selected randomly from the lists provided by the cooperatives, while the remainder were randomly selected from farmers not listed as members of cooperatives. This was important as a reference point, and for comparative evaluations on impacts of cooperative groups on cattle production in the dual purpose systems. Following the baseline study, it was anticipated that a significant proportion of the farmers contributing information at baseline would participate in the longer term cattle monitoring and improvement project.

Table 1. Characteristics of communities in Matiguás and Camoapa Municipalities based on Census data

Land Size (ha)	Average number of cattle owned per farm		Average number of milking cows per farm		% of farms to be included in Survey	Expected Number of farms to be included in Survey
	Camoapa	Matiguás	Camoapa	Matiguás		
1.8 to 7	8.2	6.6	3.9	3.1	15	38
7 to 14	14.9	12.7	7.3	5.6	25	63
14 to 35	32.1	25.9	14.9	11.5	35	88
35 to 70	64.9	57.9	29.3	24.4	20	50
70 to 140	102.3	99.1	42.3	42.6	5	11



## 2.2 Data tool and survey implementation

A gender responsive baseline survey tool was adapted for the Nicaragua context following visits to the different sites, workshops and consultations with various stakeholders of the Nicaragua cattle production value chain in 2013-2014. A “paperless” data collection format was adopted whereby the “Open Data Kit” (ODK) information technology platform (<https://opendatakit.org/>) was used to enable data entry from each household in an electronic format to a central database at ILRI. These tools save on time for data collection and reduce the number of secondary errors usually associated with manual data collection.



Information obtained from the farmers included a description of the household characteristics (people and assets owned), the types of livestock reared, land resources available for their use, and the sources of water. Information was also collected on the herd structure of cattle, ownership of cattle, and the management practices implemented in relation to the different cattle categories. The data collected was disaggregated by gender in order to enable an understanding of the different roles and responsibilities of the men and women in the sites in relation to the cattle ownership and management practices. The gender disaggregated data also allows better targeting of interventions to improve productivity of animals in the dual purpose production systems. Data was collected through enumerators working with the Universidad Nacional Agraria (UNA) who were trained on how to include and incorporate information and responses from women within households. The baseline study aimed to obtain information from a minimum of 500 households, and was carried out from October 2014 to January 2015.

In the process of implementing the survey, it was evident that there were discrepancies in the population demographics provided through the national census as some of the farmers listed were no longer practicing livestock production. In some instances households characterized as small holder farmers were actually large scale farmers owning more than 300 head of cattle. Some of the smallholder households that had been excluded in the initial sampling were therefore used to replace a number of larger scale farms found in the sites.



## **2.3 Data analyses**

Information collated from the two sites was analysed using both quantitative and quantitative methods. The statistical packages of SPSS (version 20; SPSS, 2014) and Genstat (Payne et al., 2015) were used to obtain information on the variation in different factors. This report presents descriptive statistics on differences in the production environment for cattle in the two municipalities differentiated by the gender of the household head.

### 3. Results

#### 3.1 Household Characteristics

##### 3.1.1 Demographic characteristics

A total of 541 households participated in the survey (279 from Camoapa, and 262 from Matiguás). In both municipalities, more households were headed by men than women as illustrated in Figure 1 and in Table 2. On average, the female headed households comprised 19% of the total households interviewed.

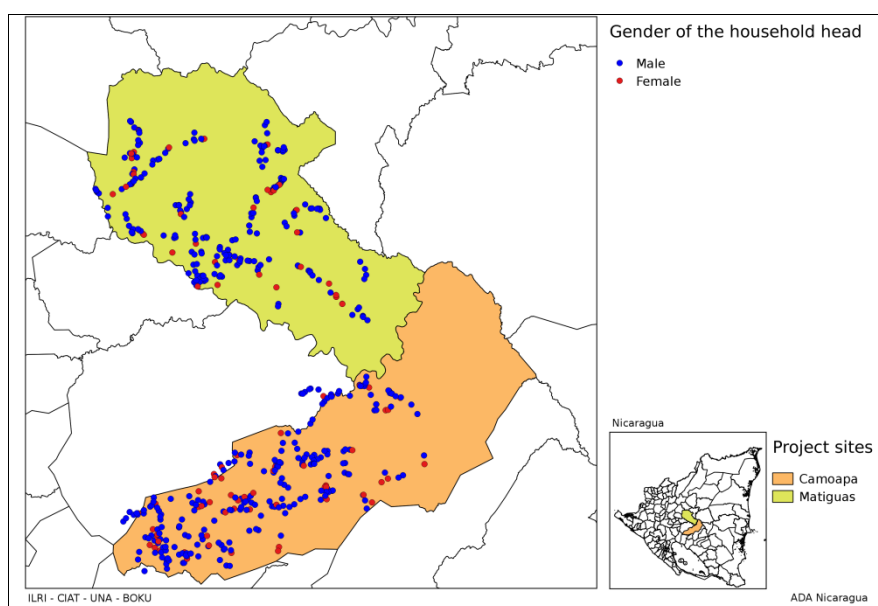


Figure 1. Distribution of households and the gender of household leaders that provided information in the baseline survey carried out in Camoapa and Matiguás

Table 2 Number and percent of households headed by men and women that participated in the survey within the two municipalities

Gender of household head	Camoapa		Matiguás	
	No of households	%	No of households	%
Female	59	21.1%	46	17.6%
Male	220	78.9%	216	82.4%
Overall number	279		262	100.0%

Household level characteristics were obtained to get an indication of the impact of dual purpose cattle population on livelihoods. In Camoapa, 91% of the households and in Matiguás all but one provided details on the household composition. Generally households comprised a higher proportion of adult men (older than 16 years of age) than adult women, with a female: male ratio of 0.75:1 in Camoapa and 0.63:1 in Matiguás. In both municipalities, fifty percent of the household members were under the age of 25 years (Figure 2), while eleven percent of the household members were older than 55 years of age.

The mean age of the household head was higher in Camoapa ( $50.3 \pm 0.9$  years) than in Matiguás ( $47.9 \pm 0.83$  years) irrespective of gender. Though the women who headed households were on average older than the men who headed households in both municipalities ( $51.0 \pm 1.06$  vs  $50.2 \pm 1.35$  and  $48.3 \pm 1.22$  vs  $47.8 \pm 1.33$  years for men and women respectively in Camoapa and Matiguás), the differences in age by gender were not significant.

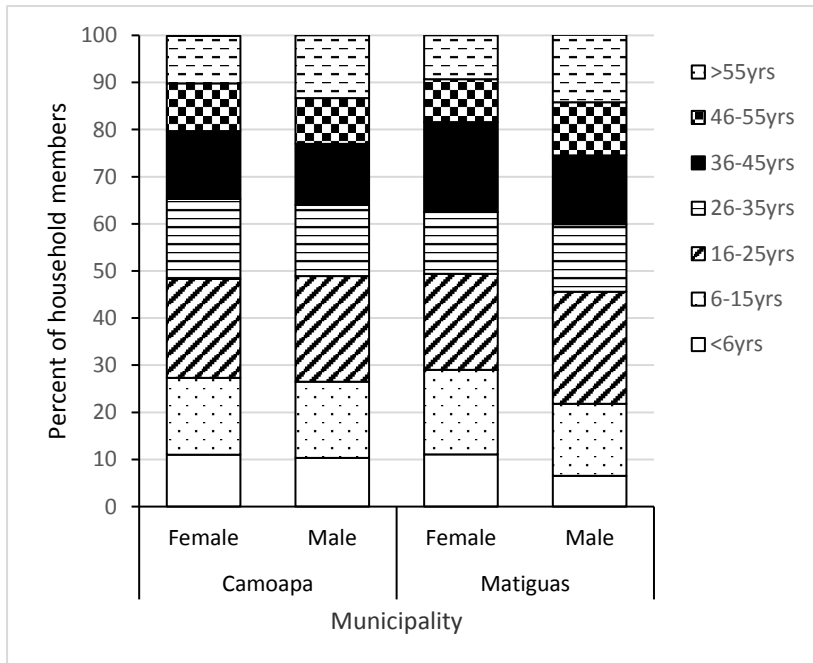


Figure 2. Proportional composition of households by age groups and gender in the two municipalities

### 3.1.2 Literacy levels for adults by gender

Among the households sampled, more than 84% of the adults could read and write (Table 3). 80% of the adult members in a household had at least a primary level of formal education, while 5.6% of them had no formal education but were able to read. Differences in the education of adults within a household by gender were not significant.

Education Level	Adults in households of Camoapa		Adults in households
	Number	Percent of T <sub>1</sub>	Number
No formal and illiterate	128	14.5%	109
No formal but literate	36	4.1%	53
Primary School	421	47.6%	326
High/Secondary School	197	22.3%	161
Tertiary	103	11.6%	50
Total (T)	885		699

When considering the education level of the household head alone, there were some differences depending on gender as presented in Table 4. In both municipalities, a majority of the household heads had only a primary level of education. A significantly higher proportion of the men who headed households had a tertiary level of education compared to the women in Camoapa ( $p < 0.01$ , Table 4), while more men who headed households in Matiguás had a secondary school education (Table 4).

Table 4. Proportion of Household heads (HH) within each gender with different levels of education in the two municipalities

Gender	Level of Education	Camoapa		Matiguás	
		No of HH	% of Total in Gender group	No of HH	% of Total in Gender group
Female	No formal education	13	26.5%	13	30.2%
	Primary School	27	55.1%	25	58.1%
	High/Secondary School	7	14.3%	2	4.7%
	Tertiary	2	4.1%	3	7.0%
	Total	49	100%	43	100%
Male	No formal education	54	26.3%	59	27.1%
	Primary School	96	46.8%	109	50.0%
	High/Secondary School	26	12.7%	36	16.5%
	Tertiary	29	14.2%	14	6.4%
	Total	205	100%	218	100%

### 3.1.3 Engagement in economic activities by gender groups

Cattle farming for both milk and meat production was the main economic activity practiced by the farmers. Household members engaged in different activities depending on their age and gender as illustrated in Figure 3. In both municipalities, a higher proportion of the males in a household were engaged in cattle farming activities (51% in Camoapa and 58% in Matiguás) than the females (18% in Camoapa and 26% in Matiguás). A very small proportion of the population (<3%) were engaged in the rearing of livestock species other than cattle and poultry. Female members of the households were more engaged in domestic work relative to other activities.

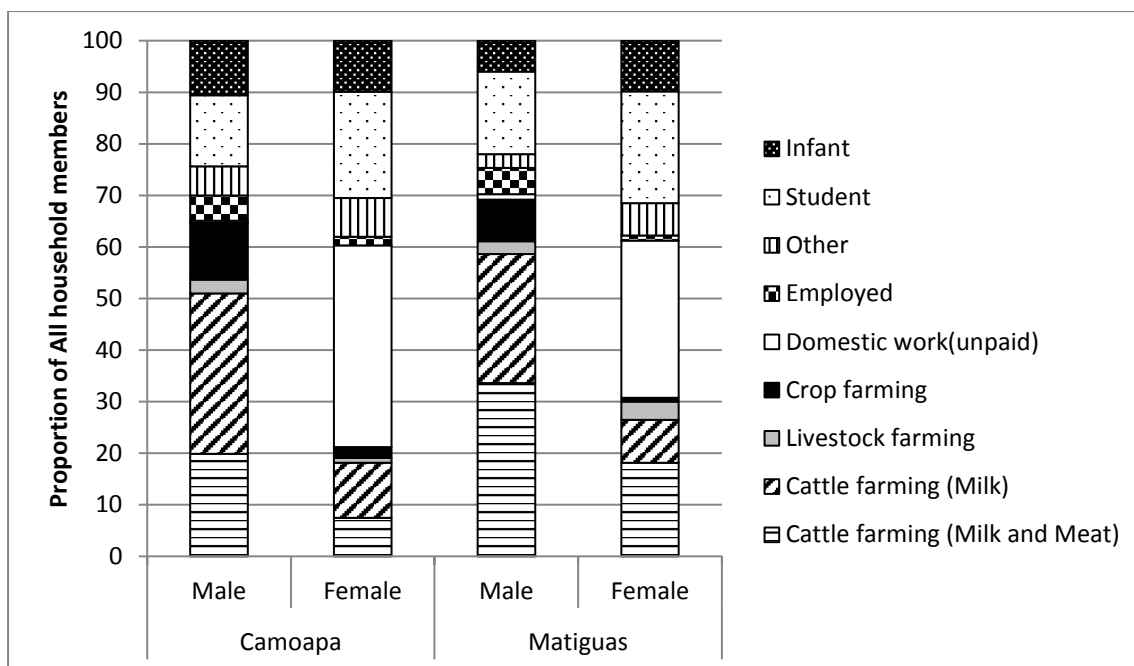


Figure 3. Proportion of male and female members of households engaged in different socio-economic activities within the two Municipalities

The level of engagement in different activities was quite different for the household heads (Figure 4). More than 65% of the men and women who headed households were engaged in cattle production activities. It was only in Camoapa where a significant percent of the women heading households (18%) were reported to be actively engaged in unpaid domestic work.

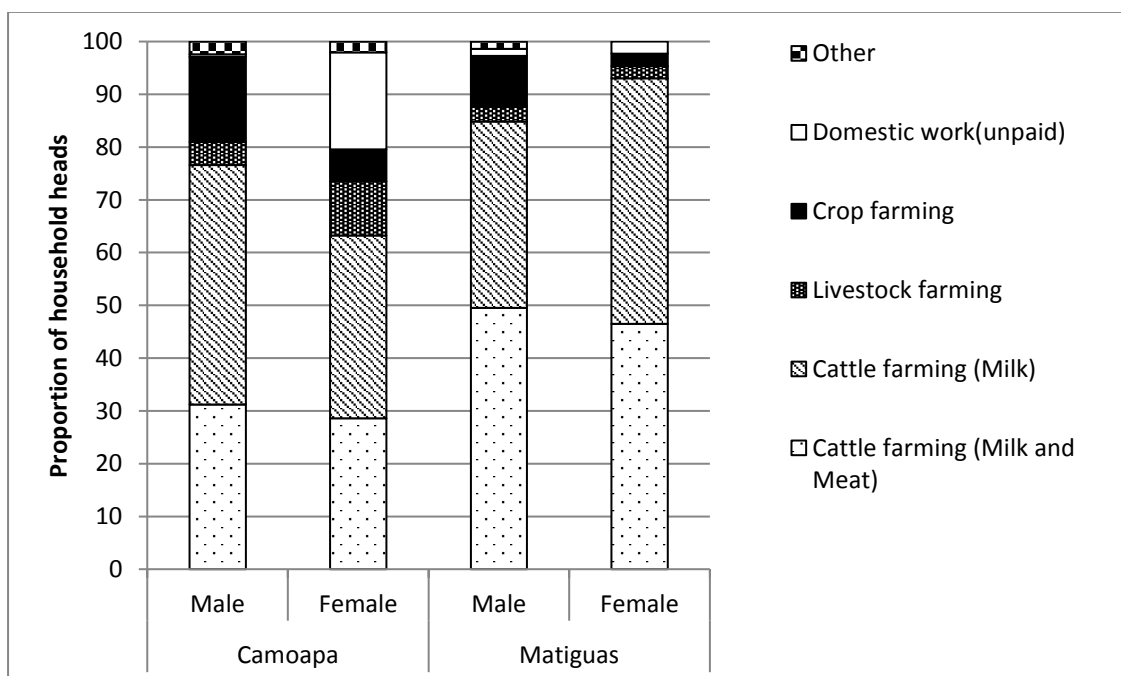


Figure 4. Proportion of male and female household heads engaged in different socio-economic activities within the two Municipalities

### 3.1.4 Household asset ownership

Ownership of household assets depending on the gender of the household head are illustrated in Figure 5. In both municipalities, households headed by men owned more assets than those headed by women.

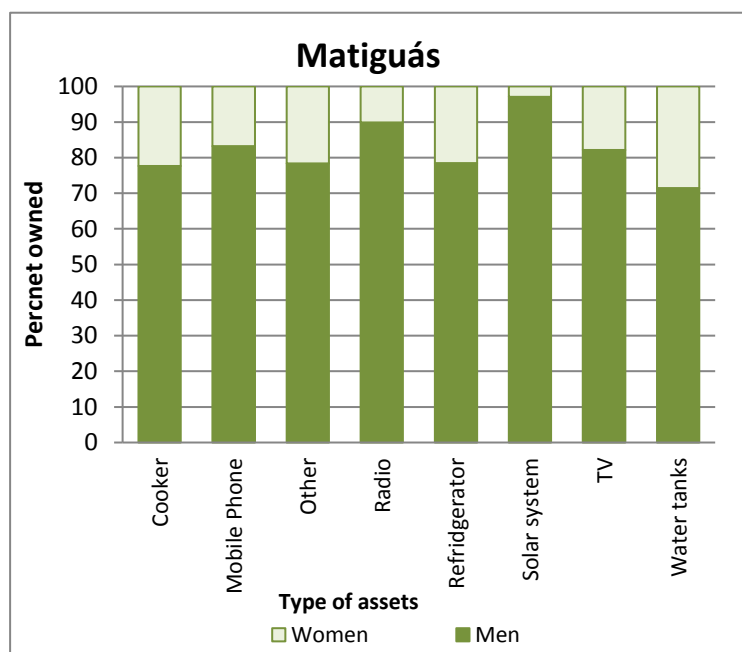
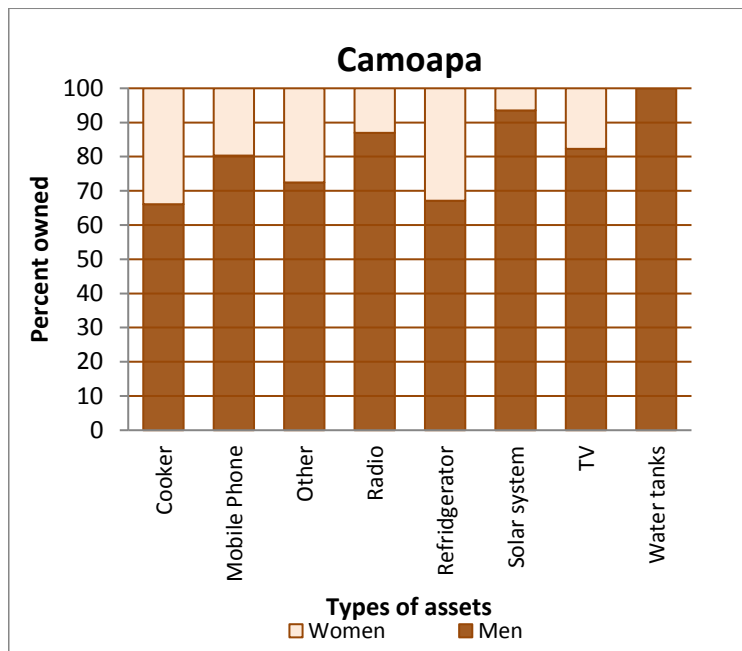


Figure 5 Proportionate differences in ownership of household assets depending on gender of household head (Men= Male headed households; Women = Female headed households)



A small number of the farmers indicated that they owned animal drawn carts (11 households), horses (14 households) and trucks (3 households) for transporting farm products.

In Camoapa, 33% of the animal drawn carts were owned by women. This was the highest proportion of transport assets owned by women in Camoapa. A small proportion of women in Matiguás owned horses (15%), trucks (3%) and animal drawn carts (11%) as a transport asset. More women in Matiguás owned horses than in Camoapa (2% women own horses). Bicycles, cars and motorcycles were owned by men only in Matiguás while in Camoapa a smaller proportion of women owned these assets (bicycles, 4%; cars, 13% and motorcycles 3%).

### 3.1.5 Group membership

Only 11% of the households in Camoapa and 2% of those in Matiguás indicated that they belonged to a group of any kind. The main type of group that the farmers participate in is a livestock producer group. In both municipalities it was mainly the men who were registered as group members. In Camoapa, 9 households (representing 28% of those participating in groups) indicated that women belonged to the producer group. Through discussions with community members it was evident that women tended to be less involved in cooperatives and other groups because of structural sociocultural gender norms that limit their participation in public spaces.

## 3.2 Resource endowment of the communities

### 3.2.1 Land and water resources

The number of households owning different sizes of land differentiated depending on the gender of the household head, and the average cattle herd size kept on the land holdings are presented in Table 5. Even on small land holdings irrespective of the gender of the household head, the farmers kept at least 5 cattle, with the number of cattle owned increasing as the land size increased. In Camoapa, farmers owning between 15 and 35 hectares of land reared more cattle than indicated in the agriculture census of 2011 (Table 5 vs Table 1). In both the municipalities 98% of the households indicated that the land they used was owned by the household head. Renting of land and sharing land for planting different crops is not a common practice.

Table 5. Percent of households owning different sizes of land segregated by the gender of the household head, the average cattle herd size and the total livestock holding for households (HH) in the survey

HH gender	Land Size (hectares)	Camoapa				Matiguás			
		No of HH	% of HH	Cattle herd size (Mean±SD)	Total Livestock holding (Mean±SD)	No of HH	% of HH	Cattle herd size (Mean±SD)	Total Livestock holding (Mean±SD)
Male	<8	16	7.3%	13.4±9.6	10.5±6.6	23	10.7%	7±3.9	5.8±3
	8-14	19	8.6%	21.8±10.1	16.8±7.6	32	15.0%	15.8±9	12.8±6.5
	15-35	73	33.2%	49.3±34.6	37.8±25.8	80	37.4%	32.4±15.4	25.1±11.4
	36-70	63	28.6%	67.1±39	49.3±27.5	50	23.4%	58.6±30.1	44±21.4
	71-140	40	18.2%	100.4±50.5	73.7±35.4	23	10.7%	114.9±45.5	84.7±31.6
	>140	9	4.1%	191.9±167.5	138.7±115.6	6	2.8%	120.2±106.8	86.6±74.5
	subtotal	220	100.0%	64.5±60.4	47.9±42.8	214	100.0%	44.6±43.2	33.7±31
Female	<8	14	23.7%	9.2±7.5	7.3±6.1	8	17.4%	7.6±4	5.9±3
	8-14	5	8.5%	21.4±4.8	17.3±4.3	10	21.7%	12.9±6	10.5±5
	15-35	20	33.9%	25.3±13.7	19.7±10	15	32.6%	24±6.4	18.1±4.8
	36-70	10	16.9%	58.6±44.8	44.5±30.1	5	10.9%	35±18.1	28.4±11.5
	71-140	8	13.6%	89.1±34.8	64.9±25.7	8	17.4%	123±78.3	90.5±57.7
	>140	2	3.4%	80±28.3	57.6±22.1	0	0.0%		
	subtotal	59	100.0%	37.3±36.3	28.2±25.9	46	100.0%	37.2±51.6	28±38.1

The main sources of water that was used both for domestic purposes and for the animals are illustrated in Figure 5. In both municipalities, water was mainly sourced from boreholes and wells for domestic use. Water used for livestock production was mainly from rivers and from boreholes. Access to water is critical for any livestock production enterprise as the key products (meat and milk) comprise a high percent of water (milk >85%, beef >50% water).

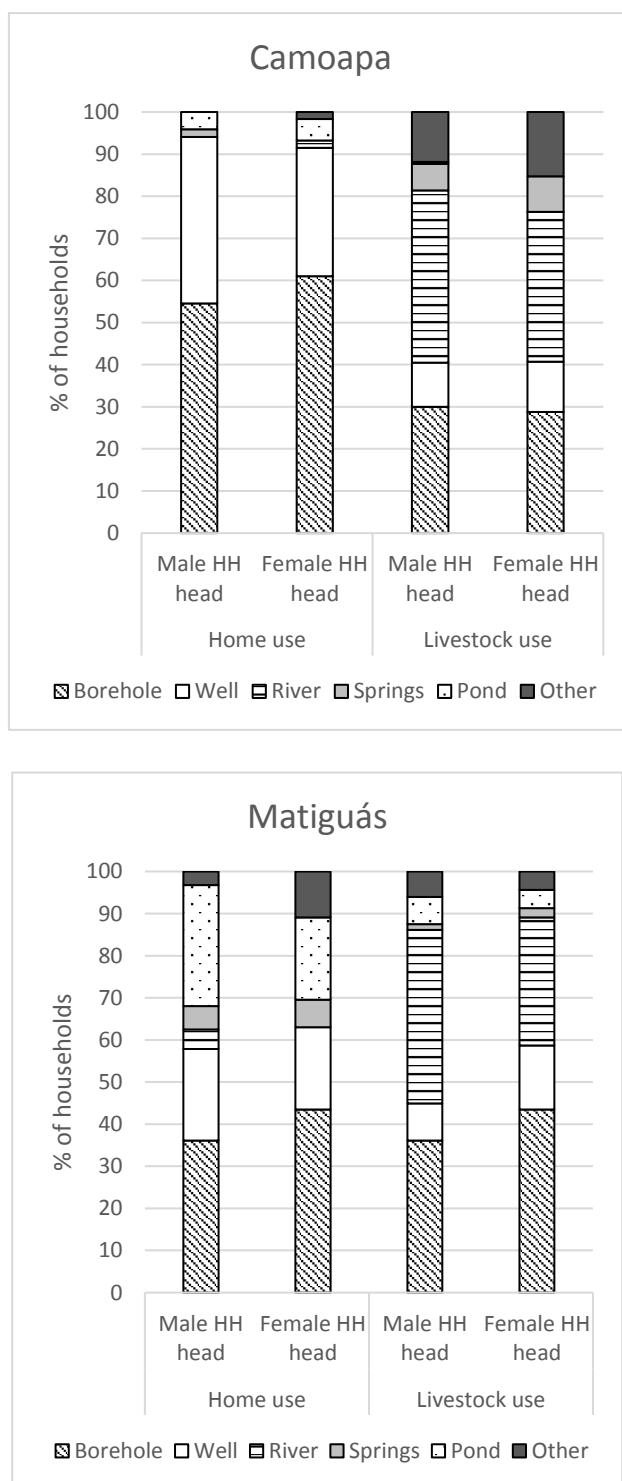


Figure 6. Main sources of water and the proportion of households using the water from different sources either for home use or for their livestock enterprise depending on the gender of the household head

The main constraint in accessing water for livestock was the long distances to watering points. This was indicated as a constraint by 69% and 70% of households in Camoapa and Matiguás respectively. Other constraints to access of water for both livestock and domestic use noted in the two municipalities were; poor quality of water (20% of the households) and seasonality in supply (10% of the households). Water for both domestic use and for the livestock was mainly transported by male members of the households.

### 3.2.2 Livestock species reared and their ownership

The different species of animals kept by the households headed by either men or women and the estimated number of each species owned in the two municipalities are presented in Table 6. Besides cattle which were reared by all the households, 53% of all the households in Camoapa and 74% of those in Matiguás also kept donkeys and horses, however, the number of these animals owned was low. A higher proportion of households headed by women kept poultry in both municipalities. The rearing of sheep, goats and pigs was not common in the communities studied (Table 6).

Table 6: Number and the relative proportion of different species of livestock kept by households headed by men and women in the two sites

	Livestock Species	Male Headed Households (HH)			Female Headed Households (HH)		
		No of HH	% of HH	Number of animals	No of HH	% of HH	Number of animals
Camoapa	Cattle	220	100%	14136	59	100%	2200
	Sheep & Goats	8	4%	104	1	2%	11
	Poultry	46	21%	1279	12	20%	273
	Pig	43	20%	154	8	14%	34
	Donkeys/Horses	124	56%	687	26	44%	141
Matiguás	Cattle	214	100%	9556	46	100%	1709
	Sheep & Goats	7	3%	79	0	0%	0
	Poultry	89	41%	1786	17	37%	313
	Pig	75	35%	212	12	26%	38
	Donkeys/Horses	164	76%	554	30	65%	85

In both municipalities, livestock were mainly owned by men in the households. Men owned more than 73% of the cattle, donkeys and horses in Camoapa and more than 77% of those in Matiguás. Women were reported to be owners of these animals in less than 10% of the households. It was more common for the women to be joint owners of the animals than the sole owner. The tendency of women in societies to have greater control over the smaller livestock was evident in the ownership pattern of poultry in the two sites. In Matiguás, poultry were mainly owned by women (52% of households), while only 5% were owned jointly. In Camoapa, a higher proportion of the poultry were owned by men (48% of HH), while in 21% of the households the poultry were owned jointly by the men and the women.

### 3.3 Cattle management practices

The main enterprise on all the farms was cattle production, either as a dairy enterprise, or for both milk and meat production.

### 3.3.1. Breeds of cattle reared and the herd composition

The cattle reared in the two municipalities (>98%) were reported to be crosses of different breed-types. The main sire breed-types used in the two municipalities depending on the gender of the household head are illustrated in Figure 8 while the main dam breed-types reared are illustrated in Figure 9.

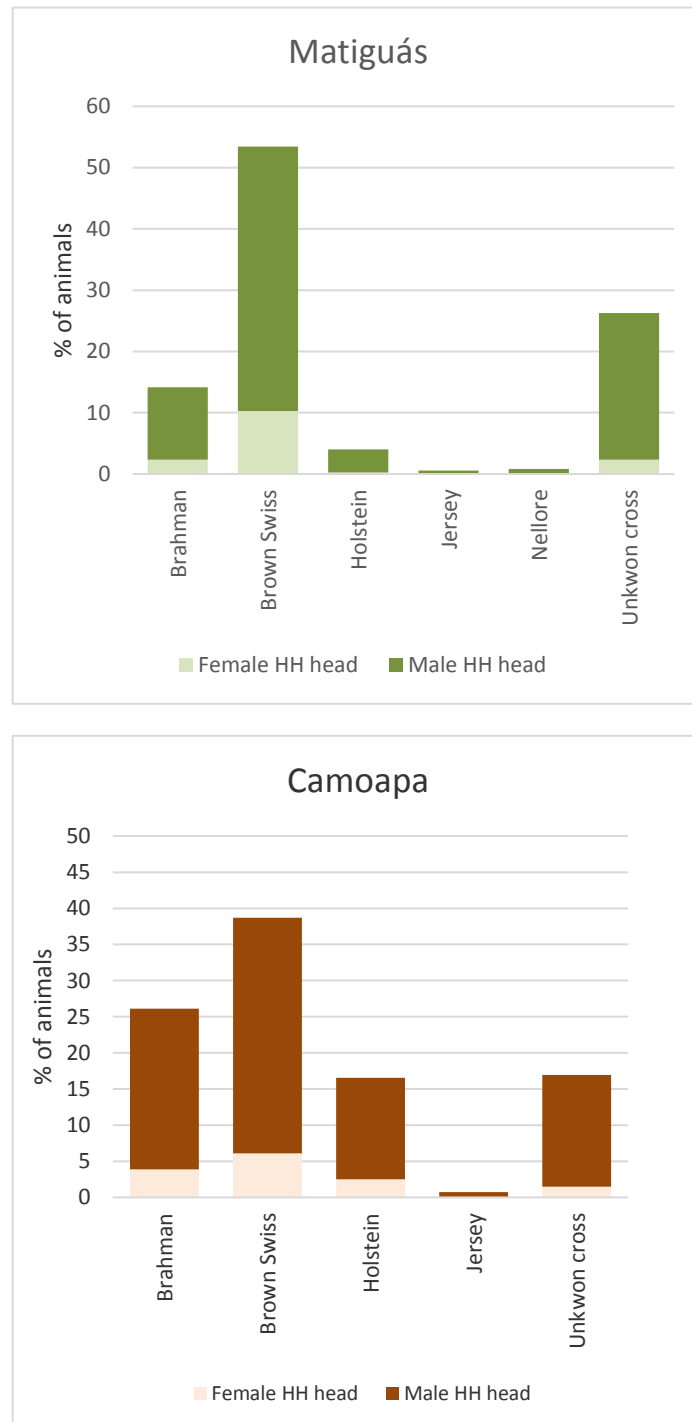


Figure 7: The relative percent of different sire cattle breed types kept by the male and female headed households in Camoapa and Matiguás

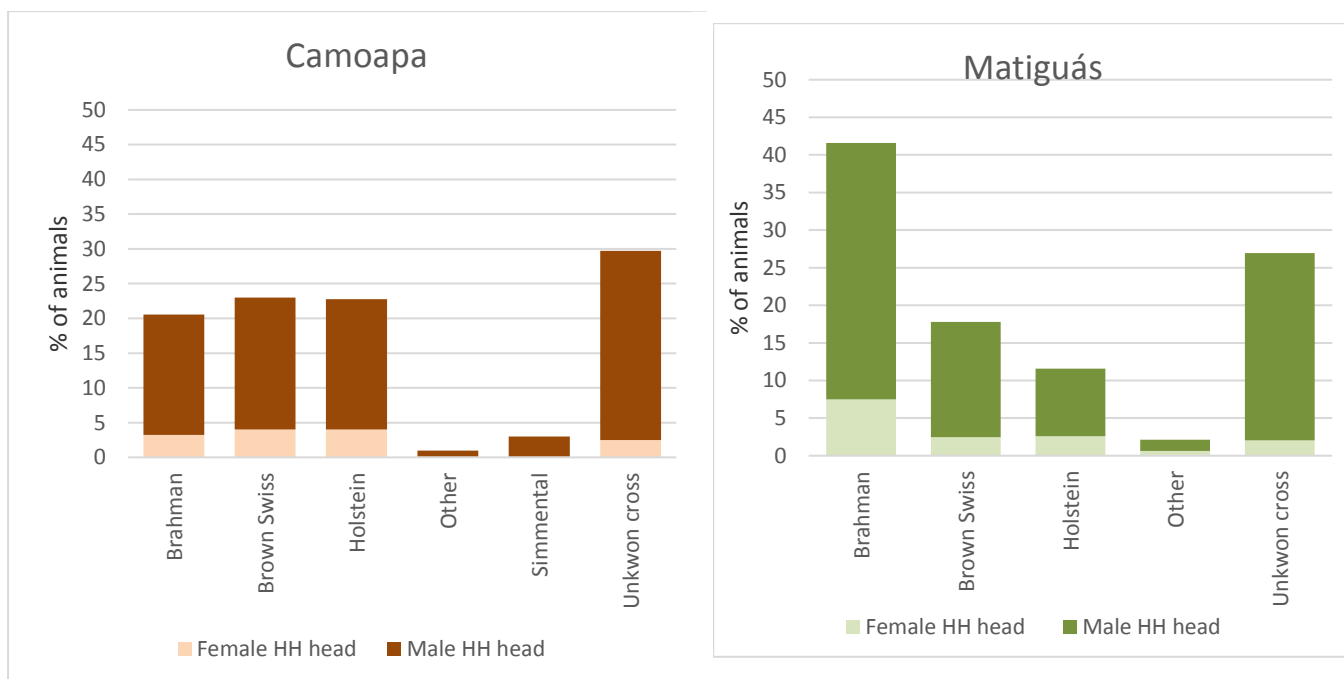


Figure 8: The relative percent of different dam cattle breed types kept by the male and female headed households in Camoapa and Matiguás

Use of crossbreeding in the farming systems was evident. The main sire breed used on the farms was rarely the same breed as the main dam breeds reared. In both municipalities, the main breed used as a sire breed was a Brown Swiss cross. In Matiguás the main dam breed was a Brahman cross, followed by animals of mixed breed-types grouped as unknown crosses. Camoapa had more dams of unknown mixed breed types in addition to Holstein Brown Swiss and Brahman crosses.

The proportion of cattle kept by the farmers categorized into age classes are presented in Table 8. In both sites, irrespective of the gender of the household head, the farmers had significantly more female than male animals ( $P < 0.001$ ). Though male calves were comparable in number to female calves, the number of male animals in the herds drastically changed once the animals attained one year of age. The practice by most farmers was to rear male animals for one year, then sell them to other farmers who would grow and fatten them for beef production. Crossbred animals were popular because of the good qualities when sold for beef. The proportion of mature bulls within the population was kept at less than 3%. The farmers implemented some form of stringent selection of bulls to be used in their herds.



Table 7 Proportion of different categories of animals found in the herds on farms headed by men and women in the two municipalities

Gender of Household head	Camoapa		Matiguás	
	Female	Male	Female	Male
Cattle Category	% of herd	% of herd	% of herd	% of herd
Bulls	2.44	3.46	2.81	2.38
Oxen	0.09	0.2	0.29	0.82
Immature males (1-3 years old)	3.62	3.24	5.85	2.75
Male Calves (<1 year)	14.71	14.33	14.8	13.05
Mature Cows	40.51	41.04	42.95	45.01
Heifers (1-3 years old)	20.68	20.09	16.03	20.69
Female Calves (<1 year)	17.95	17.64	17.26	15.3

### 3.3.2 Mating practices adopted for cattle

In both municipalities, more than 90% of the farmers used their own bull for serving their cows. The remaining farmers used a bull from another farmer, and in few cases (5% in Camoapa and 2% in Matiguás), male headed households used Artificial Insemination (AI).

Though the farmers indicated that they were aware of AI, its use was very limited. Only 14% of the farmers in Camoapa and 22% of those in Matiguás indicated that they would prefer to use AI, while 5% and 2% of the farmers in Camoapa and Matiguás respectively indicated that they actually used AI. AI when used was obtained from private service providers contacted directly by the individual farmers.

The decision on whether to use natural mating or AI was mostly made by men in the household irrespective of the gender of the household head.

### 3.3.3 Cattle health management practices

Use of animal health measures was not noted to be a common practice within the two municipalities. Only 21% of all the farmers in Camoapa (17% men and 4% women) and 23% of all the farmers in Matiguás (20% men and 3% women) indicated that they use different measures of disease control. The main disease control practices were tick control, deworming and vaccination. The differential use of measures of disease control among the farmers who indicated that they use disease control, and the main service providers are presented in Table 13.

Table 8. Main service providers and the proportionate use of different disease control measures by men and women farmers who indicated that they use disease control measures within the two municipalities

Municipality	Source of service	Percent of farmers using different disease control measures					
		Deworming		Tick Control		Vaccination	
		Men	Women	Men	Women	Men	Women
	Gender of household head						
Camoapa	Agrovet	--	--	2%	--	--	--
	Community dip	3%	3%	2%	3%	4%	2%
	Self/ Neighbor with professional advice	33%	6%	34%	8%	37%	2%
	Self/ Neighbor without professional advice	42%	13%	40%	12%	39%	13%
	Government Vet	--	--	--	--	2%	--
Matiguás	Agrovet	3%	--	2%	--	2%	--
	Self/ Neighbor with professional advice	21%	4%	21%	3%	31%	7%
	Self/ Neighbor without professional advice	59%	13%	61%	13%	50%	7%
	Government Vet	--	--	--	--	2%	--

Irrespective of the gender of the household head, the decision on which animal health service (tick control, vaccination and deworming) to use was made by men in the households 80% of the time in both municipalities. Men in the households generally had more access to information on animal health than the women. The division of gender roles within the households generally enabled men to spend more time in the public space where they could have greater access to information on different service providers, whereas women spend most of their time in their homes (private space).

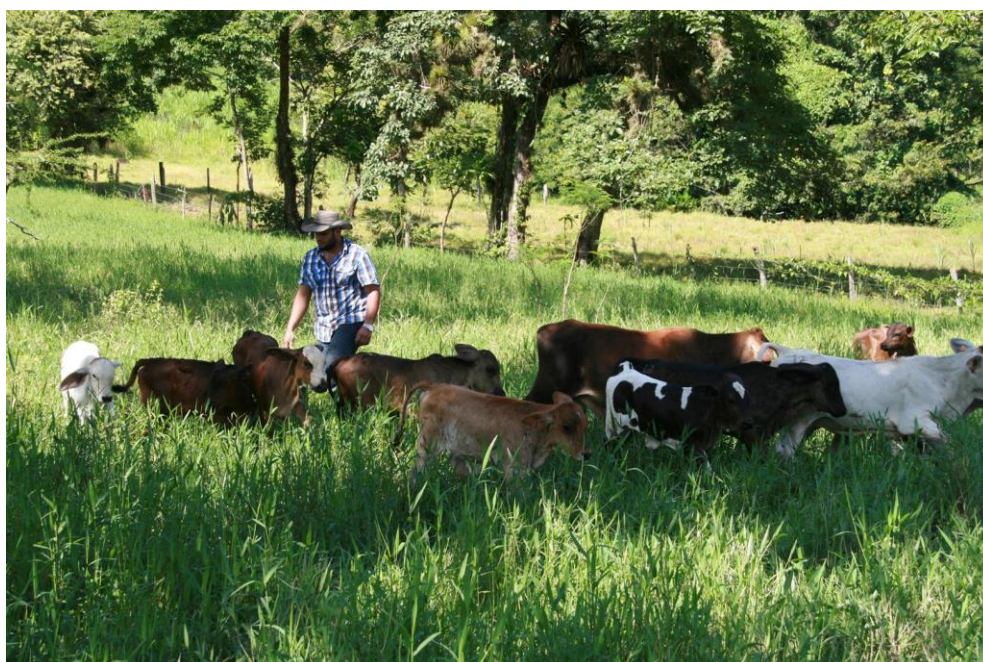
### 3.3.4 Cattle feeding practices

The main system used for feeding the cattle irrespective of the gender of the household head was grazing (free range or tethered) in both municipalities (83% and 84% of households headed by women in Camoapa and Matiguás respectively, and 74% and 79% headed by men in Camoapa and Matiguás respectively). The remaining farmers generally used a system where animals were grazed and provided with some stall feeding. Very few farmers only in Camoapa practiced a feeding system where animals were confined in stalls (5% of the women headed households, and 2% of the men headed households). No farmers in Matiguás indicated that they used mainly stall feeding. The main fodder types used are presented in Table 9. Less than 5% of the farmers indicated that they used crop residues as livestock feeds in both municipalities. The availability of pastures over the year was said to be a challenge by most of the farmers.

In Camoapa, 56% of the households headed by both men and women indicated that they provided additional concentrates for cows in milk, while in Matiguás, 33% of the households headed by women and 46% of those headed by men indicated that they provided concentrates for cows in milk. Mineral blocks were available for all the animals reared in both municipalities.

Table 9: Main Fodder types grown and the method used to avail them to the animals by farmers in the two municipalities

Form of feeding	Type of pasture grown	Percent of households headed by different gender groups implementing feeding practice			
		Camoapa		Matiguás	
		Women	Men	Women	Men
Cut and Carry	Pennisetum grasses	58	47	44	47
	Planted grasses (Rhodes grass, Brachiaria grasses, Panicum grasses)	--	2	2	2
	Naturalized grasses. (Hyparrhenia, Panicum)	--	--	2	--
	Fodder maize	2	--	--	1
Graze in situ	Pennisetum grasses	2	--	--	--
	Planted grasses (Rhodes grass, Brachiaria grasses, Panicum grasses)	24	44	39	35
	Naturalized grasses. (Hyparrhenia, Panicum)	15	7	14	15



### 3.3.2 Cattle herd dynamics

#### Cattle entry onto farms

Within a year, 14% of the cattle on farms in Camoapa and 9.5% of the cattle on farms in Matiguás came into the herds as new animals. Most of the new animals were born on the farms (Figure 9). Male headed households had a higher proportion of new animals than female headed households. The farmers indicated that most animals born were crossbred, however the breed-types of the new animals were not documented. Farmers also noted that they sought to retain most of the female calves born on their farms.

Within the two municipalities, a few of the farmers (5% in Camoapa and 1% in Matiguás) were specifically engaged in buying immature male animals from different farms and raising them for sale as beef animals (Table 10).

Households involved in raising animals for beef were mainly male headed households. The number of male animals purchased differed significantly ( $X^2$ ,  $p < 0.001$ ) between the two municipalities with more animals being bought in Camoapa than in Matiguás.

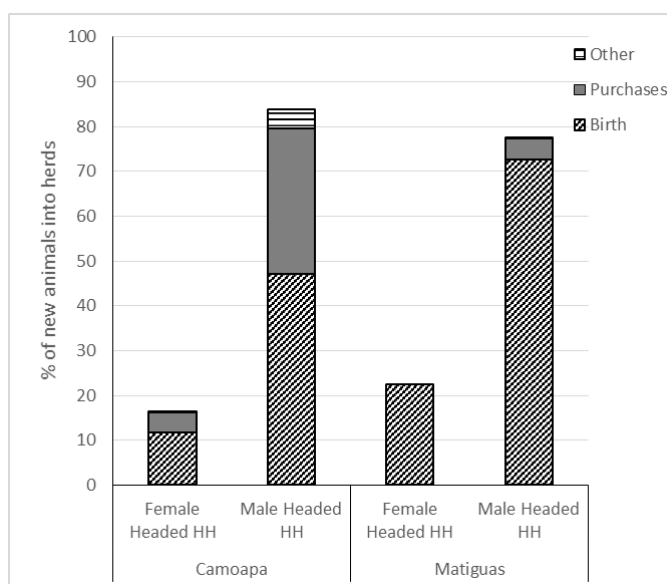


Figure 9. Percent of new animals entering herds within a municipality via different means

Table 10 Percent of animals of different categories purchased by households (HH) headed by men and women in the two municipalities

	Camoapa				Matiguás	
Total number of animals sold in Municipality	841				51	
Gender of household head	Female		Male		Male	
Animal Category	Number of HH	% of all animals bought in Camoapa	Number of HH	% of all animals bought in Camoapa	Number of HH	% of all animals bought in Matiguás
Bulls	1	0.24	9	2.85	1	1.96
Immature males	5	10.94	16	48.86	2	43.14
Cows	1	0.12	15	11.06	1	7.84
Heifers	2	0.12	16	24.02	2	41.18
Female Calves	1	0.48	1	1.31	2	5.88

The reasons given by farmers for buying and selling different categories of animals are presented in Table 11. In both municipalities farmers purchased most animals from other farmers (>55% of animals purchased). Immature male animals were either purchased directly from another farmer, or through a livestock trader. It was notable that bulls for breeding were not purchased from livestock

traders, but either directly from other farmers who specifically breed bulls for sale, or from neighbouring small scale farmers. Farmers in Camoapa indicated that they bought animals mainly for fattening in order to sell as beef animals, and to improve milk production in their herds. Farmers in Matiguás indicated that they bought animals mainly to improve their milk production. More farmers in Camoapa thus bought animals from cattle traders, while farmers in Matiguás bought animals either from other smallholder farmers, or from cattle breeders

Table 11 Reasons given by farmers for buying and selling different categories of animals

	Camoapa					Matiguás				
	Animal Category									
Reason for Purchase	Bull	Immature male	Cows	Heifers	Female Calves	Bull	Immature male	Cows	Heifers	Female Calves
For Fattening	■	■					■			
To sell later	■	■	■	■	■					■
For reproduction	■		■	■	■		■			
Improvement of milk production	■		■	■				■	■	■
Replace an animal that died	■							■		
Reason for Sale										
Culling sick animal	■	■								
Culling Unproductive			■							
Livestock trading as a business	■	■	■	■	■		■	■	■	■
Meet emergency household expenses	■	■				■	■	■	■	
Meet planned household expenses	■	■			■	■	■	■	■	

### Cattle exits from farms

Involuntary losses of animals reported on the farms over a 12 month period were low (<2%). The main reason given for involuntary loss of animals was death. In both Camoapa and Matiguás, the highest proportion of animals that died were pre-weaning male animals. Mature cows were reported to have died by 8 farmers in Camoapa and only 2 farmers Matiguás. A few animals on some farms were given away, or exchanged with other farmers.

A higher proportion of animals were reported to have been sold by the farmers than those lost involuntarily. In Camoapa, 8.2% of all the animals found on the farms were reported to have been sold, while 4% of those on farms in Matiguás were reported to have been sold. In both

municipalities, farmers sold mainly immature male animals (Figure 10). More animals were sold by male headed households than by female headed households. Mature cows were mainly culled as unproductive animals in Camoapa, while in Matiguás these animals were sold to meet household expenses (Table 11, Figure 10).

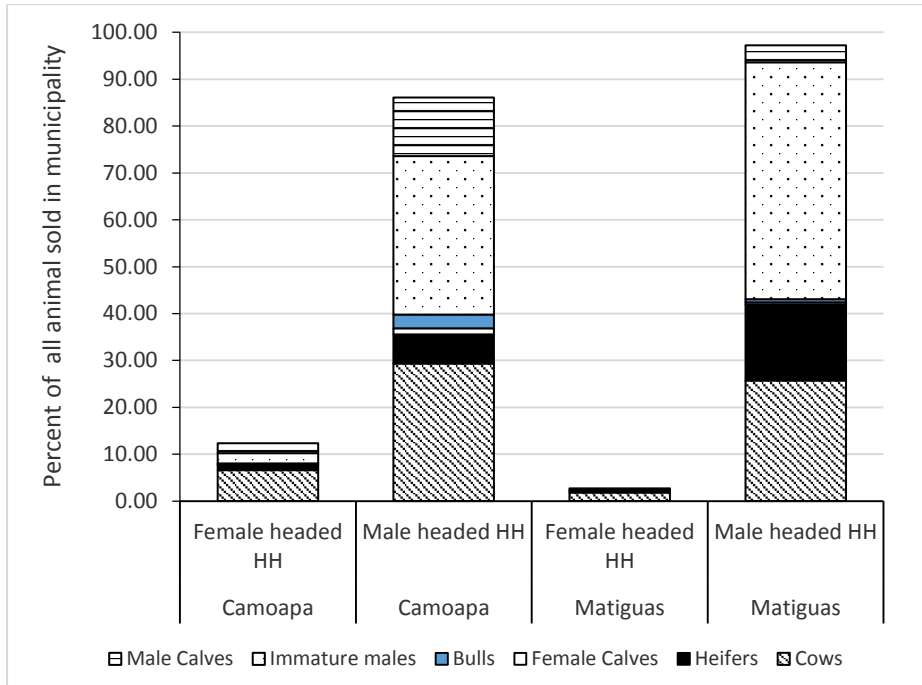


Figure 9. Percent of animals of different categories sold by farmers in Camoapa and Matiguás

The proportion of animals of different categories sold through different channels is presented in Table 12. In both municipalities, irrespective of the gender of the household head, most animals were sold to cattle traders (Table 12). Abattoirs in Camoapa received 33% of the animals sold directly from the farmers. Only male headed households sold animals directly to abattoirs.



Table 12. Proportion of animals of different categories sold through different channels depending on the gender of the household head

Gender of household head		Camoapa				Matiguás			
		Female		Male		Female		Male	
Channel for Sale	Animal Category	N	% of N	N	% of N	N	% of N	N	% of N
Abattoir					32.9				8.2
	Bulls			20	1.7				
	Cows			124	10.6			20	4.7
	Immature males			241	20.6			15	3.5
Feedlots			2.4						
	Immature males	3	1.8						
	Pre-weaning males	1	0.6						
Other Farmers			15.9		14.8				2.3
	Bulls			13	1.1				
	Cows	26	15.9	16	1.4				
	Heifers			55	4.7				
	Immature males			66	5.6			10	2.3
	Pre-weaning males			23	2.0				
Traders			81.7		52.3		100		89.5
	Bulls	4	2.4	27	2.3			3	0.7
	Cows	62	37.8	251	21.5	8	66.6	93	21.8
	Heifers	14	8.5	28	2.4	2	16.7	71	16.6
	Immature males	26	15.9	144	12.3			197	46.1
	Pre-weaning females	1	0.6	17	1.5			2	0.5
	Pre-weaning males	27	16.5	144	12.3	2	16.7	16	3.8
	Total sold	164		1169		12		427	

N= Number of animals

### 3.4 Labour

Only 34% and 30% of the women headed households in Camoapa and Matiguás respectively indicated that they used hired labour, while this was the case for 46% and 39% of the men headed households in Camoapa and Matiguás respectively. In Camoapa, 64% of the labourers were working on permanent employment terms, while in Matiguás, 78% of the labourers were on permanent terms. Most of permanent labourers were men in both municipalities (74%). In households headed by women, labourers who were hired on a casual basis in both municipalities were generally men.

## 4. General Discussion

The rearing of dual purpose cattle in the farming systems found in Camoapa and Matiguás was mainly carried out by households headed by men in the communities. The ratio of men to women headed households was 3.7:1 in Camoapa and 4.7:1 in Matiguás. Fifty percent of the members within the households involved in the baseline were under the age of 25. Literacy levels of both men and women farmers in the two municipalities are relatively high (>84%), however, involvement in community group activities by both men and women in the two sites was quite limited.

The main economic activity undertaken by all the farmers was cattle production. However, men and women in the households tended to be involved in different activities as illustrated in Figure 3. The roles undertaken are in line with the traditional gender roles prevalent in the rural areas of Nicaragua (Mora Benard, Personal communication) where men assume the role of farm manager and provider, whereas women undertake roles focused on household tasks.

Land ownership was by individual households. The number of animals reared varied in proportion to the quantity of land owned. The average cattle herd size kept on the different land holdings did not differ significantly with the gender of the household head. It was however notable that no female headed households in Matiguás owned more than 140 ha of land.



Cattle are raised for both milk and meat production, and are mainly raised in field grazing systems with some provision of additional feeds in troughs. Most animals in both municipalities (>73%) were owned by the men in the households. The cattle on any one farm had different combinations of breed-types that were often not known. The Brown Swiss and Brahman breeds of animals were popular across all the production systems. It was notable in both sites that the main sire breed used on the farms was rarely the same breed as the main dam breeds reared. Crossbreeding was a common practice. However, aside from just ensuring that the animals had a combination of Brahman and other exotic breed-types, the crossbreeding within the herds was quite haphazard. Crossbred male animals had desirable attributes for beef production, however, resultant female animals though kept for milk production were said to produce relatively low quantities of milk. Farmers thus strived to keep a minimum of five mature cows in order to ensure a regular supply of

milk. Documented measurements on growth rates of animals of different breed types and milk production levels of cows were however scarce.



Natural mating using locally reared bulls was the main method used for reproduction. The practice of AI though familiar to the farmers was not popular as it was perceived to result in a high number of repeat services. Most decisions on breeding of animals were made by men in the households irrespective of the gender of the household head. In a bid to increase the milk production of their herds, some households, notably those headed by men introduced Holstein-Friesian bulls.

Within the herds, most animals were mature cows. Most new female animals on the farms were born there. The farmers noted that the young male animals born on the farms, if not earmarked for use as breeding bulls, would be sold to other farmers who specialized in rearing immature males for beef production. These farmers were more often men who were involved in both fattening and marketing of animals for beef production. Although the farmers sold animals from the farms through livestock traders, bulls for breeding were specifically purchased directly from other farmers and not through livestock traders.

There were notable differences in the objectives for rearing animals in the two sites. In Matiguás farmers placed a greater emphasis on animals for dairy production, while in Camoapa, dual purpose animals were more desirable. The choice of breeds purchased either to expand the herds, or for use in breeding to obtain replacement animals was thus quite different in the two municipalities. In Camoapa, more farmers were also engaged in purchasing young male animals to rear for beef production than in Matiguás.

The greatest challenge in rearing cattle was noted to be the availability of pastures, especially in the dry season. Diseases were not said to be a big hindrance, and animal health measures were not extensively implemented. Most measures for disease management revolved around the control of worms, and some vaccination against notifiable diseases. These were generally managed directly by the farmers without much professional advice. Mortality rates of animals on the farms per annum were reported to be low (<2%).



## 5. Recommendations

From the information generated through the baseline, it is evident that the farmers are rearing animals with a desire to improve the overall herd productivity, but with no clear strategy on what level of productivity to target. Use of reproductive technologies to change the herds is shunned from a perspective of negative previous experiences. The farmers tended to operate in an individualistic manner, rather than harnessing the potential of the community through group activities. Engaging farmers in groups, and facilitating co-learning and development of a shared agenda for breeding cattle could be one pathway in beginning to unlock the potential of the existing cattle herd for both milk and meat production.

The farmers were quite clear on the traits they considered important in their animals, however, they indicated that they were not able to achieve what they desired.

Capacity enhancement of the livestock keeping communities on different aspects of selective breeding of cattle, reproductive management of female animals and the use of technologies such as AI could catalyze a change in the breeding strategy. Through group activities, criteria for selection of young sires for breeding need to be determined, and opportunities for using shared sires within a given locality explored.

The involvement of the younger generation in livestock activities needs to be given careful attention when implementing various activities as this would support longer term outcomes in a selective breeding program.



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