



Research Article

# Comparison of Socio-Economic Factors Associated with Shift from Pastoral to Agro-Pastoral Farming Systems in Transmara West District of Narok County- Kenya

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## ABSTRACT

The study sought to compare pastoral and agro-pastoral based livelihoods for socio-economic factors of the farming systems associated with the shift from pastoralism to agro-pastoralism among the Maasai community in Trans-Mara West district of Kenya. The shift from pastoral to agro-pastoral farming system is on-going among the Maasai community in Trans-Mara West district of Kenya. This community has had a long time history in pastoral livelihoods, but are increasingly engaged in the shift, in spite of the Kenyan Government efforts to set up co-operative societies for marketing livestock and livestock related products. Essentially, these co-operatives are supposed to trigger extensive expansion in livestock production which in turn could have implication on natural resource conservation. Despite this effort, pastoralists in the area are not sufficiently responsive as evidenced by the ongoing gradual shift. The shift from pastoral to agro-pastoral farming systems by the Maasai community brings to question the underlying socio-economic drives which are not well understood. The socio-economic drives are diverse, but the key determinant at play among the Maasai community of TransMara are unknown because the issue has received less research attention in the recent past. Comparison of socio-economic factors associated with the shift, may explain the rationale of observed behavior and inform development strategies for such areas. Stratified proportionate random sampling procedure was used to get the appropriate sample. Data were collected from a sample of 130 households through interview schedule. Data were subjected to chi square and t-test statistics. The findings indicated that agro-pastoral households were older farmers with declining farm size, stronger in social capital and more inclined to diversification of livelihoods and increasing agricultural productivity. The agro-pastorals had better access to credit facilities and extension services however, education levels remained low even with the shift, a fact that can be attributed to poor infrastructure and much time spent by young men in herding besides past history of incessant movements on their parts before the Kenyan Government prohibited cross-border movements.

## INTRODUCTION

Globally arid and semi arid areas (ASALs) excluding deserts, are a home to more than 32 percent of the world's population, and cover more than 34 percent of the world's land surface. In Eastern and Central Africa, dry lands cover approximately 61% of the terrestrial surface. These lands are characterized by low and highly variable levels of rainfall and fluctuating rangeland production. Highly uncertain productivity is found in rangelands with a coefficient of variation of annual rainfall exceeding 33%. In Eastern Africa, this includes areas with less than 1000mm rainfall per year. There are over 200 million pastoralists in the world. In Kenya almost 8 million people who depend on livestock and dry land Agriculture reside in these dry zones. The rangelands are a home to at least 30% of the world's cultivated plants and livestock diversity (Fratkin, 2003; Safriel and Adeel 2005.; Ellis 1998; FAO, 2001).

Africa's agricultural production has always been influenced by climate variability. In response to this, pastoralists in the traditional setting have developed multiple coping mechanisms to deal with drought. Such mechanisms are herd and income diversification (COMESA, 2009 ; Galvin, 2009 ; Galvin, 1992 ). Traditionally, pastoral lands have been known to maintain large indigenous herds of livestock and it is not known whether these large herds exist in agro-systems. The large indigenous herds are likely to be of increasing value in the face of climate variability (WISP, 2008; Cavatassi *et al.*, 2006).

The livestock sector in Kenya contributes about 38% of agricultural production, 90% of employment and significantly to the national economy besides environmental conservation (Arunga *et al.*, 2006; WIBD, 2005; ILRI, 2006). Estimates show that pastoralists in Kenya own 70% of the national livestock herd valued at over US\$ 1.55 billion. However, constraints such as poor infrastructure, weak banking institutions, besides pests and diseases are major threats to pastoralists, which contribute to some of them living in poverty (Fineline systems management limited company, 2010).

Agro-pastoral land use systems are on the increase in Kenya (Gumbo and Maitima, 2007; Mwang'ombe *et al.*, 2009), but the socio-economic drivers behind these land use system are not well understood. Increased conversion of fertile range lands to commercial cultivation in Trans-mara West district has led to competition for land resource between livestock and crops. Remaining rangelands are themselves increasingly privatized through sub-division and allocation of rights for ranching and farming enterprises. Besides, high rates of population growth and in-migration have added to both real and perceived pressures on pastoral lands (Coast *et al.*, 2001; Coast *et al.*, 2006; Tangus, 2004; Akinwumi *et al.*, 1996).

Access to extensive public land, offering potential for grazing and water resources is key in pastoral

production system since it promotes pastoral mobility. Policies not in line with pastoral mobility increases pastoral vulnerability to drought and herd loss. Declining herd levels threatens the sustainability of the pastoral production system (Coast *et al.*, 2006; Mwangi, 2005). In response, many pastoral communities tend to diversify to agro-pastoralism (Binsbergen and Watson, 2008; Galvin, 2009; Freeman *et al.*, 2008).

Pastoralists usually view their animals as a store of wealth and value. This is associated with weak banking institutions in pastoral lands. Traditionally, the term pastoralism encompassed Shoats, Cattle and Donkey, but currently it has been observed, that most of the households in pastoral land adopt poultry as part of livestock. Poultry production was not part of the Maasai culture, neither was it part of their diet (WIBD, 2005; BurnSilver *et al.*, 2009).

In the past, livestock was viewed as solely 'natural capital' but currently there is a paradigm shift in view to accommodate financial and social capital (Morton and Meadows 2000). However, a major paradigm shift has been observed from pastoralism to agro-pastoralism in TransMara West district, which causes curiosity to the researcher (Mochabo *et al.*, 2006). Given the strong social and cultural value attached to large herds of livestock in TransMara District (Mageka and Osero, 2007), losing livestock can spell disaster for household livelihoods, nutrition and resilience in terms of economic benefits such as wealth and incomes. The Kenyan government in partnership with the private sector set up co-operative societies in TransMara West district, for marketing livestock and livestock products. Availability of ready market favours rearing of large herds of livestock in the area.

To mitigate some sustainability threats to pastoral livelihoods, the Kenyan government in partnership with the private sector promoted integration of pastoral economy into market economy (Morton and Meadows, 2000; Mochabo *et al.*, 2006). This has been through setting up of co-operative societies in TransMara district to open ready market for livestock and livestock products trading in order to accommodate financial and social capital. Availability of ready market could be associated with steady incomes and high turnover for pastorals. However, this development strategy has not been able to support sustainable pastoralism, evidenced by ongoing gradual shift to agro-pastoral based livelihoods (Morton and Meadows, 2000; Mochabo *et al.*, 2006). The drives behind the shift are many but the contribution of the key socio-economic determinants to the shift has not been well understood. Therefore, the study sought to compare the socio-economic factors associated with the shift from pastoral to agro-pastoral based livelihoods, so as to enhance better understanding of the household decision making process.

There is a rich literature on trade-offs, (Gerber *et al.*, 2009), have documented trade-offs between livelihoods and environment. However, few studies have

evaluated and quantified socio-economic trade-offs facing pastoralists in choosing pro-conservation land uses as opposed to, for example, conversion to cultivation (Griffiths, 2007). Little is known on household decision making and socio-economic trade-offs between pastoralist and agro-pastoralists (Ayantunde *et al.*, 2008; Freeman *et al.*, 2007; Freeman *et al.*, 2008; Gerber *et al.*, 2009; Herrero *et al.*, 2006) hence the study intended to fill this gap.

## MATERIALS AND METHODS

### Study Area

The study was conducted in TransMara West District of Narok County. The area was selected for exemplifying the ongoing shift in livelihoods among a community with traditionally strong cultural attachment to livestock assets and pro-conservation practices. It is an area where Government support to development of livestock market opportunities have been less successful in sustaining livestock based livelihoods. To mitigate some sustainability threats to pastoral livelihoods, the Kenyan Government in partnership with the Private Sector promoted integration of pastoral economy into market economy by setting up co-operative societies to open ready market for trading of livestock and livestock products (Morton and Meadows, 2000; Mochabo *et al.*, 2006).

$$n = \frac{(Z_{\alpha/2})^2 p^* q}{E^2}$$

Where;

n = Sample size,

Z= confidence level (95% in this case)

$$Z_{\alpha/2} = 1.96$$

P\* = proportion of the population

q = 1 - p\*

E= allowable error

In computing n, P\* = x / N

Where x is the population (households) involved in pastoralism and agro-pastoralism, N is the total population (households) in the eight locations in Kirindoni and Lolgorian divisions. From consultation with the extension service providers in the area and according to

$$n = 0.08459 * 0.91541 * \left[ \frac{1.96}{0.05} \right]^2 = 118.9 \approx 119$$

An additional 11 respondents were included to cater for none and invalid responses that are common with cross

The district lies on the south-western part of Rift Valley Province between Latitude 0° 50' and 1° 50' South and Longitude 34° 35' and 35° 14'. The topography of TransMara West district comprises three major categories:- the highlands which lie between 2,200m and 2,500m above sea level, the plateau which rises from 1524 to 2200m above sea level and the lowland which lie below 1524m above sea level. The lowland receives 1000mm of rainfall per year.

The district has seven divisions covering an area of about 2,846.40 square kilometers with an estimated population of 170,591 (1999 census), growing at a rate of 2.23% and has a population density of 60 people per square Kilometer (MOFAP, 1999) with an estimated poverty index of about 40% (MOFAP, 1999).

The study area is estimated to have 14,517 households (in the eight locations of interest) with an average household size of 5 people (MOFAP, 1999). Settlement patterns in the district correspond to land use, land tenure and urbanization. Settlement is sparse where large stocks of livestock are reared, but comparatively denser in areas where crop farming is practiced and small stocks of livestock reared.

### Sample Size Determination

The needed sample size was calculated from the approach of Anderson *et al.* (2007):

the DAO's office, x was determined to be 1228 and N to be 14517 (MOFAP, 1999). The proportion (p\*) (x/N = 1228/14517) is thus 0.08459. With the desired margin of error (E) set at 0.05, the sample size needed was estimated at 119 from

sectional survey interview administration. Consequently, a sample size of 130 respondents was used.

### Sampling design

The study used stratified proportionate random sampling procedure. Within TransMara district, the divisions were stratified according to agro-ecological zones. Kirindoni and Lolgorian divisions were selected because of having prominent pastoral and agro-pastoral farming households within the same agro-ecological zone. 8 locations among the two divisions were randomly selected. The locations were further stratified into two namely:- pure pastoralism and a mixture of pure pastoralism and agro-pastoralism. Lastly, random selection of the respondents within the locations was made proportionate to the population of each location to obtain the required sample size. The needed proportionate sample in a location was computed from the households in a location divided by sum of all households in eight locations then multiplied by the needed sample estimate of 130 households.

### Data Collection

Data collection used interview schedule. Both large scale and small scale farmers were contacted. Secondary data such as the number of households in the area and the total population per location was collected from the Divisional and District Agricultural Extension Offices and the District Development Office in TransMara West district.

Data requirements for analysis of the factors included:-household characteristics (age, family size, off-farm sources of incomes, gender and education level), institutional factors (land tenure system, extension services, farmer trainings, access to credit, group meetings), physical factors (distance to market and watering points, asset owned) and farm factors (herd size, farm size).

## RESULTS AND DISCUSSIONS

### Comparison of socio-economic characteristics between pastoral and agro-pastoral households

**Table 1: Comparison of socio-economic characteristics of Pastoral and Agro-pastoral households using t-test**

Characteristics	Pastoral households (n=53)	Agro-pastoral households (n=77)	t-test
Age (Years)	41	44	1.991**
Household size (n)	6	7	2.172**
Off-farm income (Ksh.)	4109.17	5893.72	2.066**
Farm size (Acreage)	48.67	34.14	2.037**
TLU's units	101	102	0.084
Farmer trainings (n)	1	2	4.389***
Group meetings (n)	0.8	1.8	3.562***
Number of extension visits per year (n)	0.7	1.6	3.593***
Distance to market (Hrs)	1	2	-1.633
Time taken to reach water points (Hrs)	0.8	1.6	4.011***

Means are significant at: \*\* 0.05; \*\*\* 0.001, probability levels

Table 1 presents the socio-economic characteristics of the sampled households. The agro-pastoral households were older ( $P < 0.05$ ) with larger family, smaller farm size and were having more frequent group meetings and extension services compared to pastoral households. Agro-pastoral households do live sedentary life with strong social capital (Abele *et al.*, 2009) which they derive

from group meetings. For these households (agro-pastoral), land ownership is important for farming and a larger family is essential for provision of the needed farm labour (Rana *et al.* (2000). In sedentary farming, the need to apply production technologies in farming is higher for increasing productivity and value of agricultural production, which explains greater interaction with the

extension services, as previously noted by Alakpa and Onemolease (2009).

Compared to pastoral households, the agro-pastoral household had higher off-farm income ( $P < 0.05$ ), which can be associated with diversification of livelihoods portfolios (Liyama, 2006). In this sample, farmlands were smaller ( $P < 0.05$ ) for agro-pastoral households though livestock units kept were not different ( $P > 0.05$ ). A possible explanation for this observation is that agro-pastoral households have embraced private land ownership tenure system and can prove direct ownership unlike the

pastoral households still practicing communal land ownership, for which there is no direct claim to land by the individual households.

Access to watering points was better ( $P < 0.05$ ) for pastoral household because water is important for their livestock, though access to market was not different ( $P > 0.05$ ) between agro-pastoral and pastoral households. The common water sources in the area included seasonal rivers and water pans constructed in the pastoral areas for livestock.

**Table 2: Comparison of socio-economic characteristics between pastoral with agro-pastoral households using chi-square test**

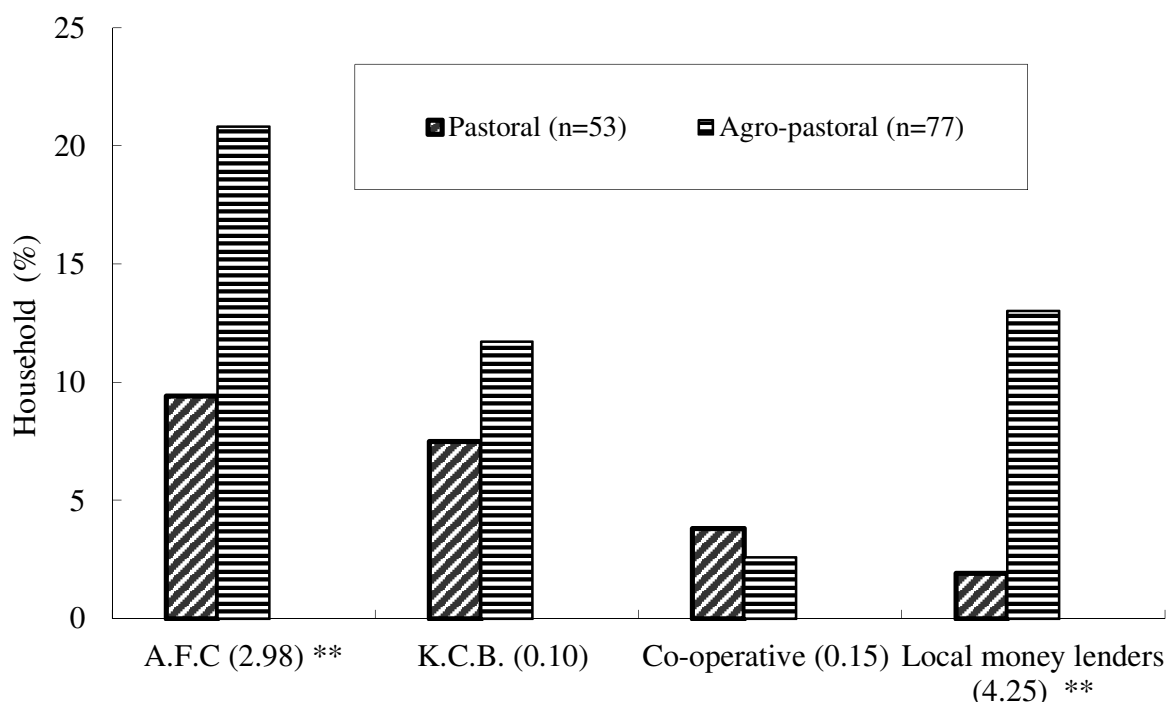
Characteristic	Frequency (%) of pastoral households	Frequency (%) of agro-pastoral households	Chi-Square test value
Gender			
Male	88.7	94.8	1.75**
Female	11.3	5.2	1.66**
Education level			
None	34.0	26.0	2.33**
Primary	45.5	50.9	0.58**
Secondary	11.3	22.1	3.57
Tertiary	3.8	3.9	0.00
University	0.0	2.6	1.40**
Credit access			
Yes	22.6	48.1	8.63**
No	77.4	51.9	8.63**
Livestock is a source of wealth			
Agreeing	80.1	84.4	0.49**
Neutral	17.0	13.0	0.74**
Disagreeing	1.9	2.6	0.70

Means significant at: \*\* 0.05 probability level.

Table 2 shows household and institutional characteristics of the pastoral and agro-pastoral households. The Chi-Square tests showed a significant difference ( $P < 0.05$ ) in education levels, but over 75% of household heads had not attained post primary education, while 26% to 34% had no formal education among either pastoral or agro-pastoral households. This low education levels could be attributed to the tradition of young Maasai males engaging in fulltime livestock herding, because livestock is a key source of wealth as indicated by the majority of respondents (over 80% in Table 2) and the community's strong cultural attachment to livestock. Moreover, provision of education facilities in the area could be constrained by poor infrastructure and non-sedentary life style (Coast, 2002).

Gender distribution indicated dominance of the males in both pastoral and agro-pastoral households, though females were fewer ( $P < 0.05$ ) in the agro-pastoralist households. Some studies have suggested that gender is an important parameter in livelihood diversification (WIBD, 2005; Freeman, 2008; Simtowe, 2009), which could apply to this sample population.

Household that had accessed credit were over 2 times higher ( $P < 0.05$ ) among agro-pastoral compared to pastoral households. This provides evidence of a difference in an institutional factor to link with the shift to agro-pastoralism. In the area, majority of households sourced credits from Agricultural Finance Corporation (AFC) and a few from Kenya Commercial bank, Cooperative Bank and local money lenders (Figure 1). attracted many farmers (Jayne and Nyoro, 1999).



**Figure 1: Household preferences for credit sources by pastorals and agro-pastorals (in brackets are Chi square values with \*\* $P < 0.05$ ; ns  $P > 0.05$ )**

## CONCLUSIONS

From the study, it was found that some households shifted to agro-pastoralism out of necessity, whereas others shifted by choice. For some of these households, the shift was a means to reduce risk, while for others it was a reflection of changing cultural, dietary habits and social norms.

Agro-pastoral and pastoral households exhibited differences in their socio-economic characteristics. Agro-pastoral households were older farmers with declining farm size, stronger in social capital and more inclined to diversification of livelihoods and increasing agricultural productivity. They accessed credit facilities better together with extension services but education levels remained low even with the shift from pastoral to agro-pastoral livelihoods. Low education levels in the area could be attributed to poor infrastructure and much time spent by young men in herding besides past history of incessant movements on their parts before the Kenyan Government prohibited cross-border movements.

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