

Introduction

Small holder mixed farming systems in sub-Saharan Africa are complex and diverse integration is key to intensification. These systems are of enormous importance to poor livelihoods in that, beyond food production they form a major component of agricultural economy.

In Kenya small holder crop livestock systems are characterised by low use of external inputs. In these systems, crops and livestock complement each other by crop residues being used as livestock feed and in return manure as crop fertilisers.

Both physical and socio economic factors coupled with farm specific endowments, determine the ability of the farm to meet the farmers basic objectives of food security and household income.

Because of constraints to sources of capital, land sizes, cost and access of inputs, farmers are forced to make trade offs around their farming livelihood activities.

The aim of this study was to explore these trade offs in terms of food security, cash balances, nutrient balances and labour requirements and to analyse alternative land use strategies.

Data sources

- Study conducted in Meru (central highlands-1480m), Mbeere (eastern province) and Vihiga (Western province)
- Data from four representative case study farm used.
- Main activities: Maize (food crops), tea and coffee (cash crops) and livestock (cattle, sheep, goats and chickens)
- Data collected through questionnaires and resource flow maps.
- IMPACT tool (Herrero et al., 2005) used to provide baseline analyses of income, food security and partial N and P balances.
- Alternative management options and trade-offs analysed with a linear programming household model.



Figure 1, Main sources of energy and protein

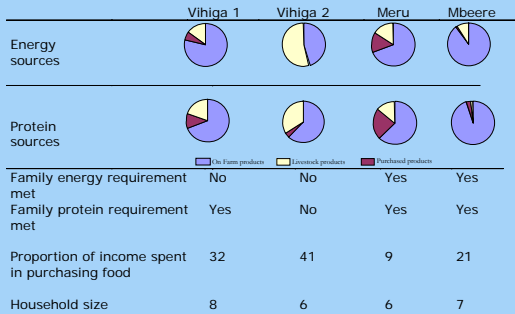


Table 2a Scenario used in exploring trade offs around farming livelihood activities

Management options	description
Current	1 No change on current family annual energy and protein and land use
Changing land use	2(a) Family annual energy and protein demand throughout the year met at 70% WHO requirement and household model selected the best land-use activities based on current crop management options.
	(b) Expansion of the area under maize to a third of the farm total farm area at the expense of other crops
	(c) Expansion of the area under the most profitable crop to a third of the total farm area at the expense of other crops
	(d) The current area under fodder crop was doubled at the expense of food and cash crops
Changing Labor	3(a) Household model selected the best land-use activities based on available family labor only
	(b) Household model selected the best land-use activities based on available and ability to hire labor during planting weeding and harvesting period
	(c) Household model selected the best crop livestock enterprise combination with labor cost increased by 25%
Sensitivity sale price	4(a) Household models selected the best land use options based increase in the sale price of grain by 25%

Figure 1b, Main sources of income and expenditure

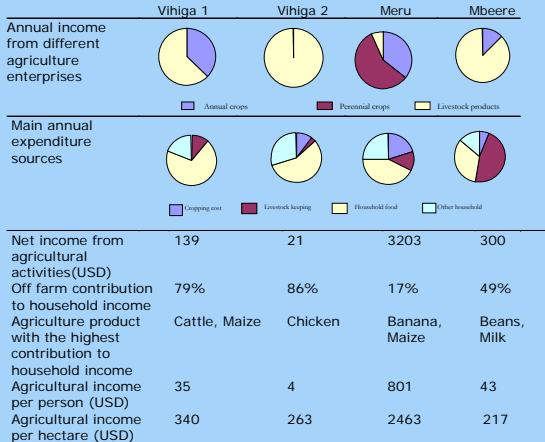


Table 2b	Baseline	Change in land use				Change in labour			Sensitivity to price
scenario	1	2a	2b	2c	2d	3a	3b	3c	4a
Vihiga 1									
Food security	60%	+	+	+	+	+	+	+	+
Cash income	446	+	+	+	+	-	+	+	+++
N balance	446	++	++	++	++	+	+	+	++
P balance	3	+	+	+	+	+	+	+	+
Vihiga 2									
Food security	51%	+							
Cash income	116	-							
N balance	18	-							
P balance	19	-							
Mbeere									
Food security	70%	+	+	+					+
Cash income	691	++	++	++					++
N balance	75	++	++	++					++
P balance	328	+	-	-					+
Meru									
Food security	70%	+	+	+	+	+	+	+	
Cash income	2911	+	+	+	+	+	+	+	++
N balance	80	+	++	+++	+++	++	+	++	++
P balance	56	-	+	+	+	+	-	-	-

Note: Food security in reference to WHO requirements, Cash income is in US\$, Nutrient balances expressed in Kg⁻¹ha and + or - implies negative or positive impact.

Result

- Change in land use, with more emphasis on high yielding and valuable crops help achieve food security in farms that were below WHO food requirements e.g. in Vihiga
- Farms that had already achieved food security, change in land use led to an increase in net income.
- Low N and P levels and small land sizes were constraints to production.
- There was a high sensitivity to maize price in all farms.
- Increase in income, pay for the increased labour demanded by intensive farm enterprises

Conclusions

- There is scope to increase production and farm income through reallocation of existing resources, for example land use.
- High yielding and high value labour intensive enterprises could boost farm income and engage idle labour.
- There is a need to sensitize farmers about intensive land use strategies which could earn higher income using the available resources.