



Characterization of Livestock Production Systems and the Potential of Feed-based Interventions for Improving Livestock Productivity in Konoin Division Bomet County (Kenya)

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Introduction

Kokiche Dairy Cooperative is located Location, Konoin Division, Bomet County with 2116 registered members. It was started in 2009 and its membership is spread in Konoin, Kimulot and Cheptalal Divisions and the following locations; Maset, Simot, Mogogosiek, Boito, Cheptalal, Sotit, Kiptenden and Koiwa. Currently, the cooperative collects 2200 liters of milk

The Feed Assessment Tool (FEAST) was used to characterize the feed-related aspects of the livestock production system in Konoin, Kimulot and Koiwa Divisions. This was done to help design feeding system interventions that are specific to this area. The Participatory Rural Appraisal (PRA) exercise was in November 2014. Feedback of the results to the Producer Organization management was done in March 2015. This was carried out by East Africa Dairy Development project (EADD-P) in collaboration with the Ministry of Agriculture, Livestock and Fisheries and Kokiche dairy extension staff.

The main objectives of this study were;

- i) to get an overview of the farming systems
- ii) Identify major feeds and feeding related production problems, existing opportunities and potential interventions.

The Information collected would inform the estimation of the feed gaps in the area to enable the management develop an implementation plan that will address dry season feed gaps and improve livestock production and productivity.

Methodology

Sampling method

Farmer representatives both male and female were selected from each of the eight locations (Maset, Simot, Mogogosiek, Boito, Cheptalal, Sotit, Kiptenden and Koiwa) to participate in the PRA Focused Group Discussions (FDGs). The selection was done based on the size of land holding. Two FDGs were undertaken, one in Koroitik village 21 (11 male, 10 female) farmers and another one in Chongenwa village having 20 (12 male, 8 female) farmers. From each category of land holding size in the discussion groups, key informant farmers were purposively selected and individually interviewed in the seven Locations. These were 6 farmers, 2 from each category of land holding small, medium and large scale.

Data collection

Qualitative and quantitative methods of data collection were used. They included focused group discussions (FDGs) and interviews using a structured questionnaire. Issues discussed during the FDGs included; farm sizes, household sizes, farm labour availability, annual rainfall pattern, irrigation availability, types of animals raised, general animal husbandry, access to credit, access to farm inputs, problems issues and opportunities within the livestock system. The questionnaire administered to the six key informants owning small, medium and large scale farms included topics such as; dominant breeds, types of food and cash crops grown, how the crop residues are utilized, types of fodder crops grown and how much each feed resource contributes to the diet.

Data Analysis

The qualitative information gathered during the FDGs was examined and reported. The quantitative data collected from individual key informant farmers were entered into the FEAST excel template (www.ilri.org/feast) and analyzed

Key Findings

Farming system

The area has a mixed crop – livestock farming system with tea being dominant in the cropping system. Land size varies across households. It ranges from 0.04 to more than 1.6 ha (Figure 1). The majority of farmers fall in the small-scale category. The average family size in the area is 6 people per household.

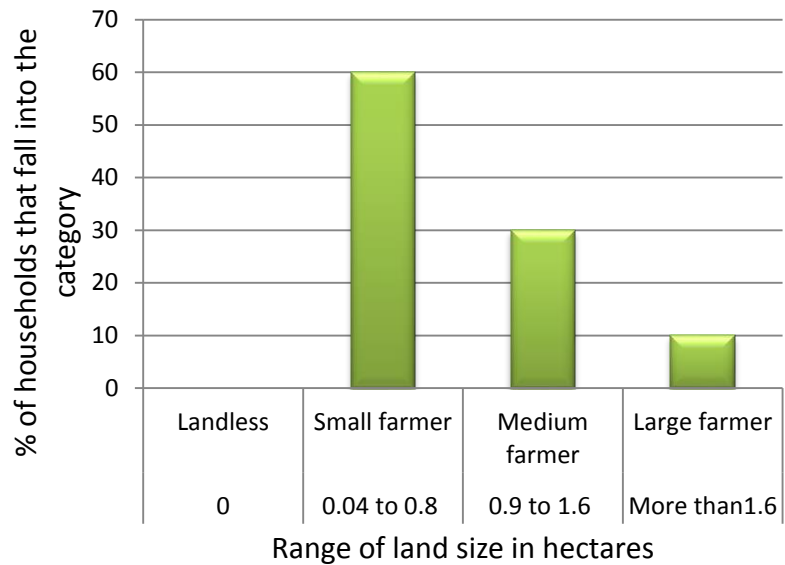


Figure 1: Average land sizes owned by farmers in various categories

The area experiences two rainfall seasons favorable for crop production (Table 1). The long rain season occurs from March to June while the short rains begin from August to October. Maize, beans and tea are planted during the onset of the long rainy season. Land is utilized for more than one crop per season whereby beans are planted again in August during the onset of short rains

Table 1: Cropping Seasons in the area

Name of Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Long rains												
Short rains												
Dry months												

As indicated in figure 2, tea dominates the cropping system followed by maize with an average of 0.15 hectares per household. Other crops include Irish potatoes, common beans and bananas. Maize, beans and bananas are grown mainly for food while Irish Potatoes are grown both for income and food.

The area depends on rain fed agriculture with no irrigation taking place. Labor is easily available and is required mostly during the planting, weeding and harvesting seasons. The cost of labor is Khs2000 per acre for weeding both maize and Irish potatoes. Fallowing is not practiced in the area as land is in limited supply.

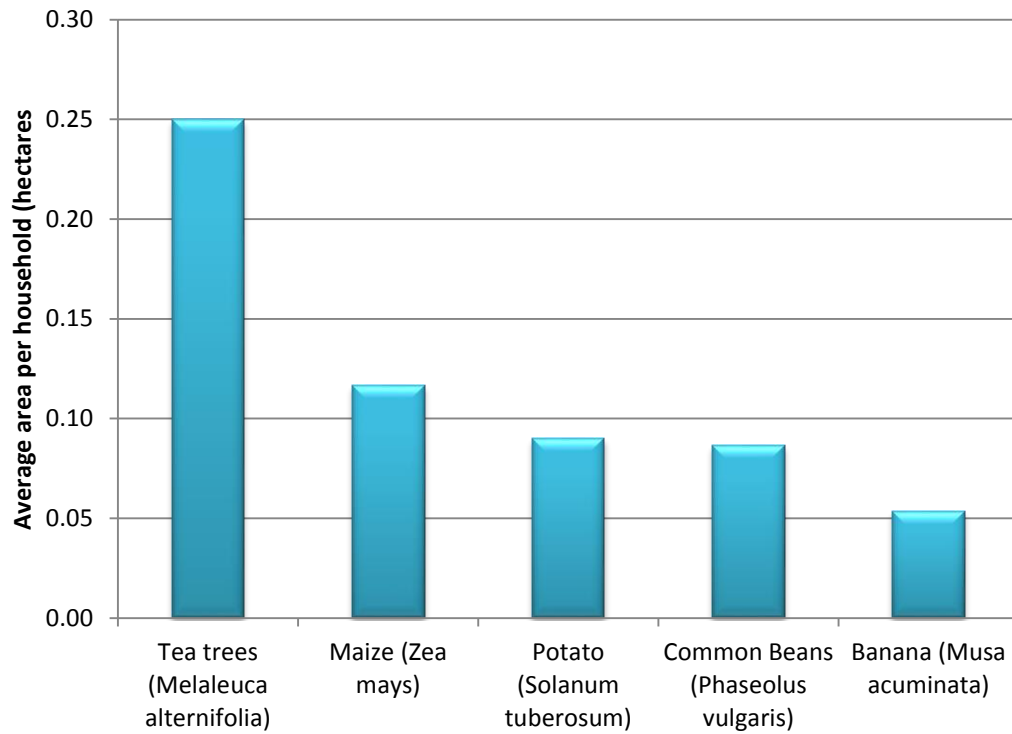


Figure 2: average area per major crops grown by farmers

Sources of income

Crop production is the main contributor to household income, contributing 52%. This is closely followed by livestock at 45% while off farm business contribute 3% (Figure 3).

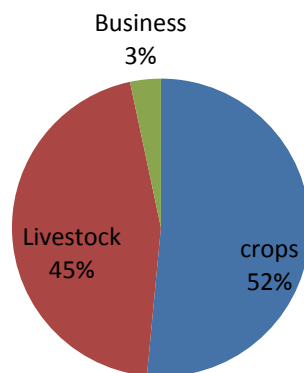


Figure 3: Contribution (%) of livelihood activities to household income

Livestock production system

Livestock kept in the area include, improved and local dairy cattle, local poultry and sheep. As shown in figure 4, improved dairy cattle are the dominant breed. All these are primarily used as a source of food and income. Other uses are; manure and payment of bride price.

Farmers reported that a majority of households do not house their livestock at night. In addition to this, 80% practice open grazing, 15% practice semi zero grazing while 5% practice tethering. Those practicing reported that the semi zero grazing is mainly grazing and, supplementation with Napier grass, dry maize stovers, Rhodes hay, sweet potato vines and Fodder trees (*Calliandra calothyrsus* and *Sesbania sesban*). The most common form of feed processing practiced in the area is chopping and sprinkling with salts. The dry maize stover is chopped using a pulverizer.

Although Veterinary services are easily available, farmers reported that they are unaffordable. East Coast Fever (ECF) treatment cost ranges from Ksh3000 to Ksh6000. Artificial insemination cost ranges from Ksh 1200 and Ksh 6000.

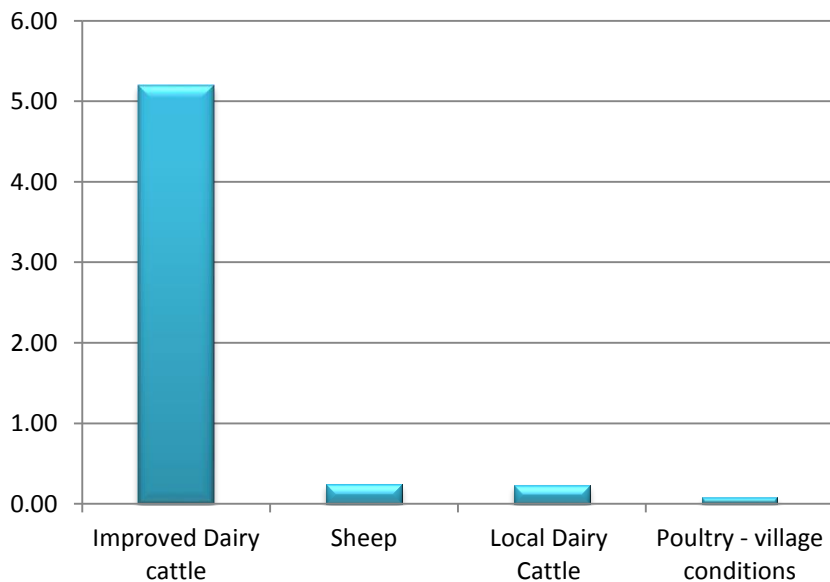


Figure 4: Average livestock species holdings per household in Tropical Livestock Units

Feed resources availability and feeding

Cultivated fodder crop residues, natural pastures, and naturally occurring weeds are the main feed resources in the area. Cultivated fodder is the highest contributor to total daily diet contributing 62% Dry matter (DM), 63% Metabolizable Energy (ME) and 78% Crude protein (CP), (Figure 7, 8, and 9). However farmers reported that they experience severe feed shortages during the months of January to March. Grazing is practiced all year round and contributes 22% dry matter (DM), 23% Metabolizable Energy (ME) and 13% crude protein (CP). Grazing land is normally around the homestead with some farmers setting aside paddocks. Naturally occurring weeds are mostly available during the rainy season (figure 5) and they make a contribution of 4% Dry Matter (DM), 3% Crude Protein (CP) to the total diet. Farmers also reported that only 20% of the households utilized crop residue as livestock feed. The rest either burn or leave it as mulch on the farm

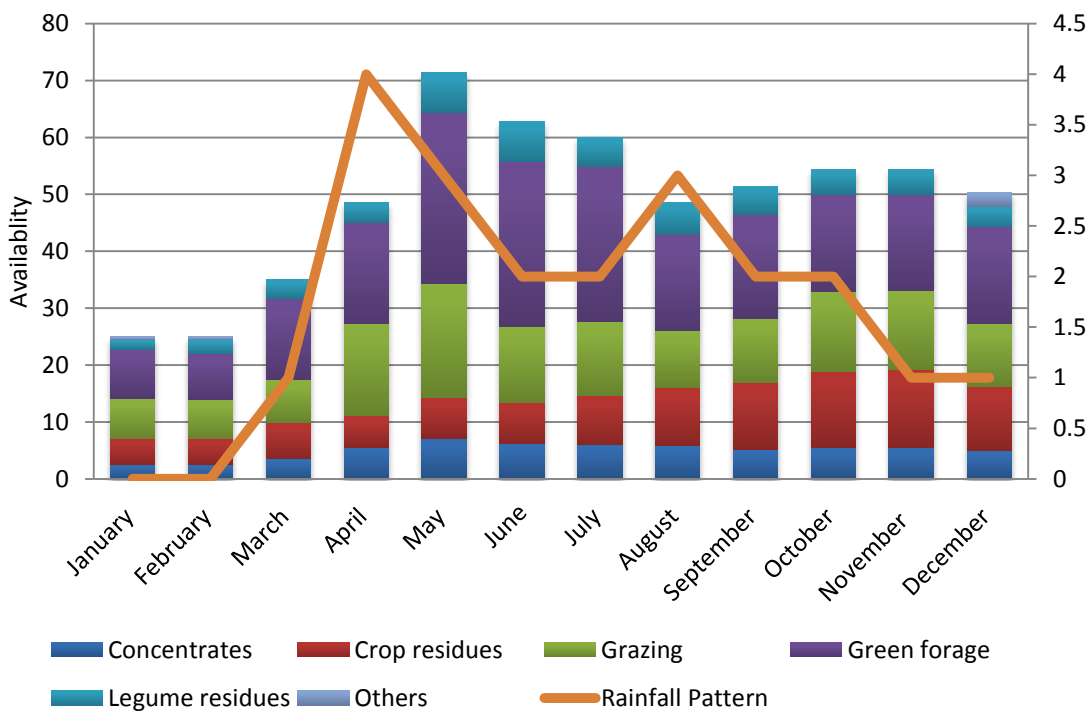


Figure 5: The composition of the livestock diet throughout the year in relation to the rainfall pattern

Napier grass is the dominant fodder crop grown in the area followed by sweet potato vines, fodder trees and several paddocks of kikuyu grass (Figure 6). The area under Napier is an average of 0.016 hectares per household.

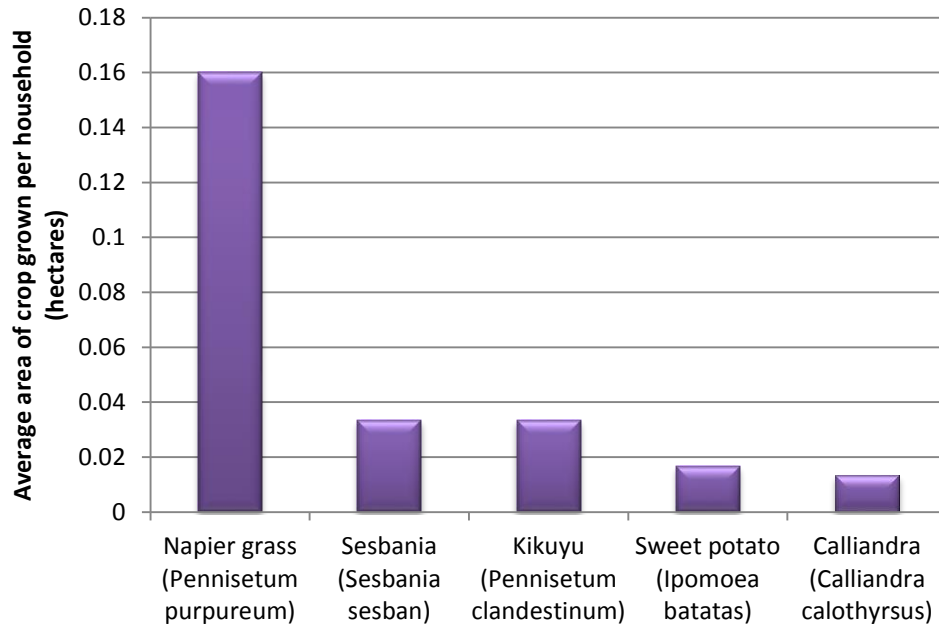


Figure 6: Dominant Fodder crops grown in the area

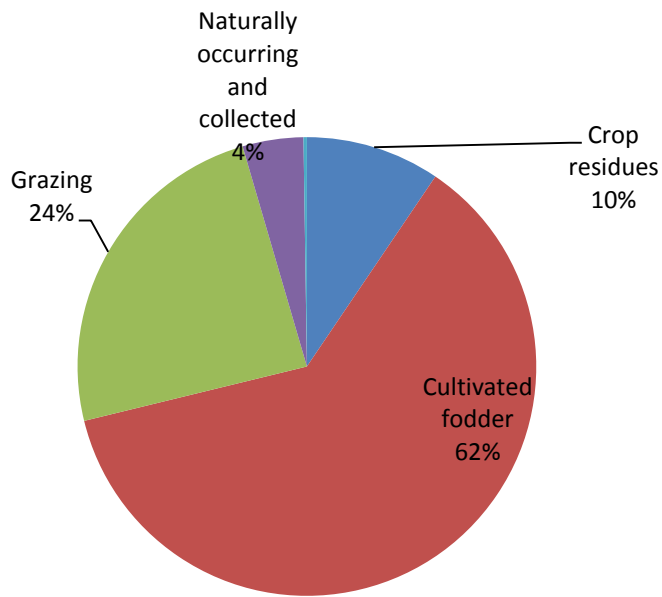


Figure 7: Dry Matter Content of total diet

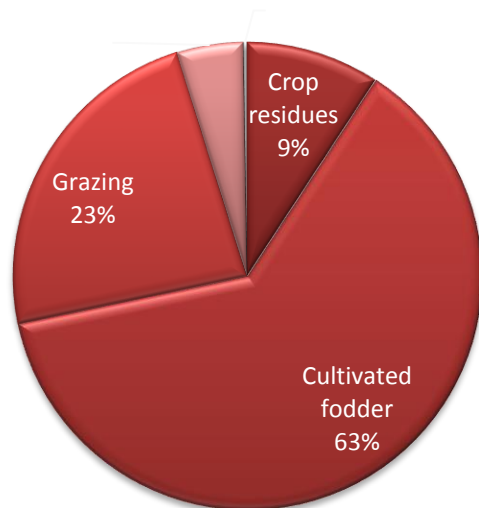


Figure 8: ME content of total diet

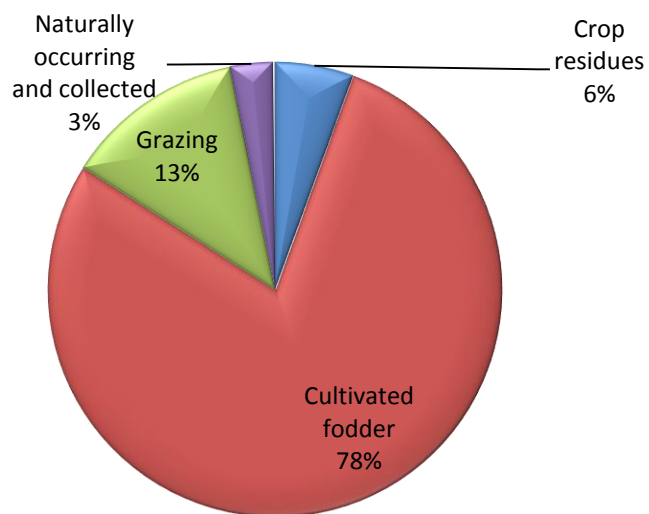


Figure 9: CP content of total diet

Problems, Issues and opportunities

Table 2: Problems, issues, proposed solutions by farmers and key areas of intervention from the feedback session

Problem Rank	Identified constraint	Proposed solution by farmers	Proposed Key interventions from the feedback session
1	High cost of and fluctuation in quality of concentrates	Kokiche Dairy to bulk source from a reliable manufacturer	Establish sustainable working relationship with concentrate manufacturers
2	Unavailability of pasture seeds	Kokiche dairy to source for seed and stock in the agro vet shops	<ol style="list-style-type: none"> 1. Establish sustainable working relationship with seed manufacturers 2. Recruit Volunteer farmer trainers to host demonstrations, train group members and bulk pasture seeds
3	Inadequate knowledge on feed ration formulation	Trainings on feed ration formulation	Trainings on fodder establishment and demonstrations on on-farm formulation
4	High cost of feed processing equipment	Kokiche dairy to provide through check off	Create working relationship with input suppliers for farmers to access inputs through check off
5	Inadequate feed during the dry season	<ol style="list-style-type: none"> 1. Training on farm feed planning 2. Kokiche to stock hay for sale during dry season 	<ol style="list-style-type: none"> 1. Training on establishment of other fodder varieties, and how to conserve. 2. Establish contracts with fodder suppliers for hay to be stocked in the agrovets

Existing Opportunities

From the results, majority of the households in Kokiche dairy fall under small scale holdings with land size ranging between 0.04 to 0.8 hectares. The major feed resource base in the area is cultivated fodder with Napier being the dominant fodder crop at an average of 0.16 hectares per household. Training of households on Napier and maize silage making is a possibility in this area. There is also need to broaden the feed resource base in the area by introduction of other forage varieties like Forage sorghum, Columbus grass, Rhodes grass, Nandi setaria, Vetch, Fodder oats, and forage legumes.

Results also indicated that only 20% of the household's utilize crop residue as livestock feed. It is chopped, mixed with Napier and sprinkled with salt. This indicates an opportunity for training on crop residue handling, treatment and utilization since crop residue is low in nutritive value and digestibility.

Farmers reported inadequate feed during the dry season arising from the small land holdings that cannot produce enough. They noted that they do end up purchasing hay as far as Litein town which is located about 20km from Konoini. This can be an opportunity for Kokiche dairy to either rent land and establish Rhodes grass for sale as hay or contract large scale farmers to produce on their behalf.

It also came out clearly that the average number of fodder trees per household was 100. For a farmer to benefit from fodder trees all year round, they need to establish at least 500 trees per cow (Wambugu 2001).

Way Forward and Key areas of Intervention

A feedback session of the PRA results and the Feed gap estimation with the Producer Organization management, Bod and extension team was undertaken and the following key areas of intervention were identified.

Technological interventions

1. Introduction of other feed resources like forage sorghum, Columbus grass, Nandi setaria, fodder trees and forage legumes like Vetch and lucerne.
2. Training of crop residue handling, processing and utilization
3. Training on feed conservation and simple feed stores construction (silage and hay making)
4. Training on feed formulation

Institutional interventions

1. Identify volunteer farmer trainers to host demonstration, train group members and bulk pasture seeds.
2. Strengthen the existing extension system by recruiting more extension staff.
3. Establishing sustainable working relationships with input suppliers to enable stocking of the agro-vet with improved pasture and fodder seeds, high quality commercial concentrates, simple feed processing equipment (pulverizers and brush cutters),
4. Explore best ways of having hay stocked in Kokiche agrovets; either by contracting hay producers or the Producer organization renting land to produce its' own.

Annex 1: Feed gap Estimation Results

Current situation; average milk production= 4.5liters/cow/day (EADD baseline report 2014)

Target production = 11.4 liters/cow/day

Estimated number of cows in the area 14683

Total Dry matter deficit from the feed gap estimation = 112563 kg DM

Assumptions:

1. Assumed 6kg DM/ bale of hay,
2. Total yield of 200 bales/ care /year
3. For Grazing, a cow is able to picks only 5kg DM/day

Feed Resource	Dry Season Gap (DM kg)	Rhodes DM (Rhodes+ Naturally occurring)	Estimate bales	Estimate Acres under Rhodes	Estimate acres under other forages (takes a percentage of the area under grazing)
Rhodes	77928	84113	140118	70.09	
Naturally occurring collected	6185				
Grazing	28450				
Purchased	-				
Estimated area under grazing to meet the above (61277) DM requirement	5690 acres				5 % of 5690 acres

List of References.

Duncan, A., York, L., Lukuyu, B., Samaddar, A. and Stür, W. (2012). Feed Assessment Tool (FEAST) Questionnaire for Facilitators (Version 5.3); A systematic method for assessing local feed resource availability and use with a view to designing intervention strategies aimed at optimizing feed utilization.

Wambugu, C. (2001) Calliandra calothyrsus: Nursery Establishment and Mngement, A Pamphlet for Farmers and Extension Staff, Nairobi: International Centre for Research in Agroforestry.