

Characterization of the livestock production system and potential for enhancing productivity through improved feeding in Sabatia sub-County of Vihiga County, Kenya

F.N. Muyekho², B.A. Lukuyu¹, A.J. Duncan¹, D. Siamba², H. Agevi² and S.A. Etiang²

¹ International Livestock Research Institute

² Masinde Muliro University of Science and Technology

³ Sabatia sub-county Livestock Production Department, Kenya






March 2014

© 2014



This publication is licensed for use under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported Licence. To view this licence, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>. Unless otherwise noted, you are free to copy, duplicate, or reproduce and distribute, display, or transmit any part of this publication or portions thereof without permission, and to make translations, adaptations, or other derivative works under the following conditions:

-  **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by the publisher or the author(s).
-  **NON-COMMERCIAL.** This work may not be used for commercial purposes.
-  **SHARE ALIKE.** If this work is altered, transformed, or built upon, the resulting work must be distributed only under the same or similar license to this one.

ilri.org
better lives through livestock
ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: +254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

Acronyms

AI	Artificial Insemination
CP	Crude Protein
DM	Dry Matter
EAPP	East African Productivity Project
ECF	East Coast Fever
FEAST	Feed Assessment Tool
FGD	Focused Group Discussion
GDP	Gross Domestic Product
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency syndrome
ICIPE	International Centre for Insect Physiology and Ecology
KARI	Kenya Agricultural Research Institute
ME	Metabolisable Energy
PRA	Participatory Rural Appraisal

Abstract

The Feed Assessment Tool (FEAST) was used to characterize the feed-related aspects of the livestock production system in Sabatia, sub-County, Vihiga County of Kenya. The assessment was carried out through focused group discussions and completion of short questionnaires at 3 sites representing peri-urban and typical rural setup. At each site, 27 farmers at Chavakali (representing peri-urban/access to tarmac road) and 20 at Wodanga Wards (typically rural) attended group PRA, followed by nine key farmers at each site (consisting of 3 each) representative owning small, medium and large-scale farms. The study was carried out on December 4th of 2013. The following are the findings of the assessment and conclusions for further action. Sabatia sub-County is characterized by smallholder mixed crop-livestock production systems on approximately less than one hectare (2.5 acres) of land. Dairy and food crops are the primary sources of household income. Farmers in Chavakali Ward have improved dairy cattle while those of Wodanga mainly keep local cattle. Improved dairy production is constrained by inadequate feeds, high cost of disease control and poor breeds. Unorganized milk marketing is also a constraint. To mitigate these constraints farmers (and other stakeholders) will be required to (i) lease land and expanding the area under fodder crops with more fodder crops tolerant to Napier grass stunt disease, (ii) improving access to animal health and AI facilities to ensure farmers can rapidly upgrade the genetic merit of their cattle holdings, (iii) access to credit facilities to enable farmers invest in livestock production enterprises and also milk marketing strategies.

General introduction and background

Livestock farming contributes significantly to the economies of Western Kenya (Ojowi et. al., 2001 and KARI Kakamega annual report 2006) through the generation of tangible and intangible products (World, 2005). Within the region, most of the milk produced is marketed informally and is thus an important source of employment and income in rural areas from production at the household level to informal transporters and retailers in the urban centres (EAPP Final Document 2014). In addition, a regular supply of milk improves nutritional security for many rural poor families, provides affordable nutrients to improve the well-being of those suffering from HIV/AIDS and generates more regular household income and jobs than many other farming enterprises in Eastern Africa (Nicholson et al., 2003).

The western region is considered a high dairying region because of the favourable climatic conditions and soils (Jaetzold et. al., 2009), but the productivity of its herd is much lower compared to similar regions like Central Kenya and the North Rift Valley because of its poor dairy genetic resources kept by farmers. According to estimates by Waithaka et al. (2002), only 13% of the households are keeping improved dairy cattle. There is a potential to improve production and productivity to attain the levels of other regions with similar climatic conditions. Another major constraint to increase dairy productivity in the highly populated regions of Western Kenya is the inadequate quality of livestock feeds (KARI Kakamega annual 2006 and Ojowi et. al., 2001). This is particularly critical during the dry season when dairy herds are forced to rely on low-quality feed resources, which are nutritionally deficient in energy, nitrogen, minerals and vitamins with minimal or no supplementation. Most dairy farming in this region is practised by smallholder farmers in densely populated holdings. These conditions force farmers to allocate most of the available land to food crops leaving very little for planted pasture/fodders and natural grazing. With increased crop productivity dairy cattle are therefore fed on crop residues and Napier grass (*Pennisetum purpureum* Schumacher), planted on lands averaging less than 0.2 hectares. However, Napier stunt disease caused by phytoplasma has since mid-1990's caused forage yield reductions of up to 90% (Mulaa et al., 2007). This is currently the biggest threat to forage production and the dairy sector in the region.

According to Mr Sagala of Heifer international Western Region (Personal Communication), there has been a milk yield reduction of 20-40% caused by the lack of feeds, mostly due to the stunt diseases.

The challenges call for a combination of interventions. There is a need to improve animal productivity through more intensification and utilization of crop-livestock interactions, and promotion and adoption of genetically diverse, high yielding, and climatically adapted grasses that are tolerant to diseases. Therefore, in order to design site-specific strategies for sustainable feed supply and utilization, the current survey was conducted with the following objectives:

- To assess feed resource availability and utilization using the FEAST tool, within the context of the overall dairy value chain, at four specific sites in Western Kenya
- To determine the potential of site-specific feed interventions in selected areas

Background of Vihiga County

Sabatia is one of the four Sub-Counties in Vihiga County. It is made up of six wards; Wodanga, Busali, Sabatia West, North Maragoli, Lyaduywa and Chavakali covering a total area of 110.9 km² with an arable land of 101.9 km² (Figure 2.1). There are eight locations and 31 sub-locations in the sub-County.

The sub-County is dominated by the Upper Midland 1 (UM1) covering 80%, followed by Lower Midland 1 (15%) and Upper Midland 2 (UM2) which is only 5% of the land area. It receives a bimodal rainfall pattern which ranges from 1800 to 2000 mm per year. The long rains are received between March and July while the short rains are received from September to November. The months of January to February are relatively dry. Temperatures range from 18°C to 26°C and the soils dark reddish-brown friable ferro-nitrile sandy loam.

Sabatia sub- County has a population of 129,678 (males 61,439 and female 68,239). There are 28,700 households and a density of 1,250 people per km² according to the 2009 National population and household census. Average family size is 8 members and average farmholding is 0.34 hectare. The major economic activities of the residents include; retail and subsistence small scale mixed farming and buying and selling agricultural produce.

Methodology

Study sites

The study was carried out in Sabatia (Vihiga County) which are within the sub-humid zone of Western Kenya. The specific sites included Chavakali and Wodanga wards representing a typical rural setup and peri-urban communities.

Participant selection and data collection

Participants were selected by the research team comprising of local agricultural/livestock production officers, a research scientist from Masinde Muliro University of Science and Technology, and local administrators. At each site, 18 to 25 farmers were involved in the Focus Group Discussions (FGD) to provide an overview of the farming system and to identify constraints and opportunities for improving livestock production at the site. Subsequently, 9 farmers were selected from the FGD to take part in the individual interviews.

The study was conducted in Sabatia sub-County of Vihiga County to characterize the livestock production system, with a special focus on dairy cattle, and its potential for enhancing productivity through improved feed and feeding interventions. A two-step Feed Assessment Tool (FEAST, version from 15 June 2012 by Duncan et al.) was used to characterize the livestock production system and feed-related aspects. The FEAST tool is a rapid and systematic method that combines PRA (Participative Rural Appraisal) with individual farmer interviews. The first step of the PRA involving focus group discussions provides an overview of the farming system, focusing on the livestock production system. It also helps to identify major challenges, issues and opportunities within the livestock production system. The individual farmer interviews, which is the second step, gather both quantitative and qualitative information from the farmers, based on the relative land size owned. The assessment was carried out through two structured group discussions and completion of short questionnaires by key farmer representatives in Chavakali and Wodanga administrative Wards (Figure 2.1). Chavakali is traversed by Chavakali-Kapsapet tarmac road and Kakamega Kisumu road, while Wodanga is a typical rural area only accessed by an earth road. The composition of the groups is shown in Table 2.1. Participating farmers were chosen by the sub-County Livestock Production Officers (PDO) Sabatia sub-County and the Ministry of Agriculture and Livestock. Overall, 31 persons participated in the group discussion in Chavakali Ward, 20 in Wodanga 35 (Table 2.1). From each PRA group, 3 representatives of different wealth classes (Table 2.3) were chosen for the individual interviews. The following are findings of the assessment and conclusions for further action.

Data Analysis

The quantitative data collected during individual interviews were analyzed using the FEAST excel template (www.ilri.org/feast), a feed assessment tool that has been developed to help to design site-specific strategies for feed supply and utilization. The data were presented in tables, graphs, pie and bar charts. The qualitative data collected using the PRA group discussions were synthesized and summarized.



Figure 2. 1: Map of Vihiga County with Sabatia sub-County

Table 2. 1. Group composition of farmer representatives in Sabatia sub-County, Vihiga County Kenya; the number of individual interviews in parentheses

Site	Men	Women	Total
Chavakali Ward (Chavakali Location) ¹	15 (5)	12 (4)	27 (9)
Wodanga Ward (Vokoli Location) ¹	20 (4)	15 (5)	35 (9)

¹Sub-County administrative Wards (brackets for the Wards indicate the venue of PRA and farmers that participated in individual interviews)

Results and discussion

The results presented and discussed below are an integrated analysis of the secondary information and the primary data using the FEAST.

Food crop production

The high and reliable rainfall coupled with moderate temperatures and good soils makes Sabatia sub-County suitable for growing crops. About 92% of the sub-County is arable. The food crop enterprises of importance are maize and beans which form staple food for the people of Sabatia. Other food crops grown on small units of land include sweet potatoes and cassava, bananas and sorghum (Table 2.2). Tea is the only cash crop grown in the sub-County. The sub-County is food insecure with a deficit (Table 2.2) being met by the importation of dry maize and beans from neighbouring sub-Counties of Nandi, Kakamega and Trans Nzoia. Local farmers also lease land in Lugari and Nandi to grow maize and beans.

Table 2. 2. Crop production statistics in Sabatia sub-County for 2013

Crop	Achieved area (Ha)	Achieved yields (tonnes)	Annual consumption (tonnes)	Deficit (tonnes)
Maize	1,220	36.0	151.02	115.02
Beans	1,220	7.28	41.61	34.33
Sorghum	-	-	0.28	-
Sweet potatoes	-	-	7.67	-
Cassava	-	-	16.00	-
Bananas ²	-	-	80,50	-
Tea	-	-	0.28	-

²Bananas are in bunches and not in tonnes

Both Chavakali and Wodanga wards are dominated by small-scale farming households with less than 0.8 hectares of land (Table 2.3 and Figure 2.2). Wodanga had a larger diversity of crops grown (10) compared to Chavakali (8) according to the individual interviews. Tea was the dominant crop Chavakali followed by Maize/beans intercropped and kales, whereas in Wodanga maize/beans followed by assorted vegetables and bananas were the most dominant crops (Figure 2.3). Households in surveyed areas are composed of approximately 7 persons on average at all the sites.

Cropping seasons

The long and short rainfall season from March to July and from September to November is referred to as 'Igudu'. The main dry season is called 'Kemeyi' and takes place from January to February, with almost no precipitation. Finally, 'Chuvai' refers to the harvesting season from July to August and December and these months are characterized by very low rainfall (Table 2.3).

All agricultural activities are rain-fed except for < 1% who practice drip irrigation and <20% who practice bucket irrigation. The irrigation is used on vegetables during the dry season and practised by farmers who live near the river or other water sources. Labour is generally available and is mostly required in the rainy season for land preparation. Labour costs KES 3000 (\$37.5) per 0.2 hectares and at a daily wage of KES 200 (\$2.5) per day (plus lunch), for planting, weeding and harvesting. Respondents indicated that labour cost has been increasing over time as potential workers seek other jobs like boda boda (motorcycle public transport), hairdressing and construction work in the nearby towns. Approximately 80% of youth leave the farms in search of alternative livelihoods as opposed to providing labour in the farms.

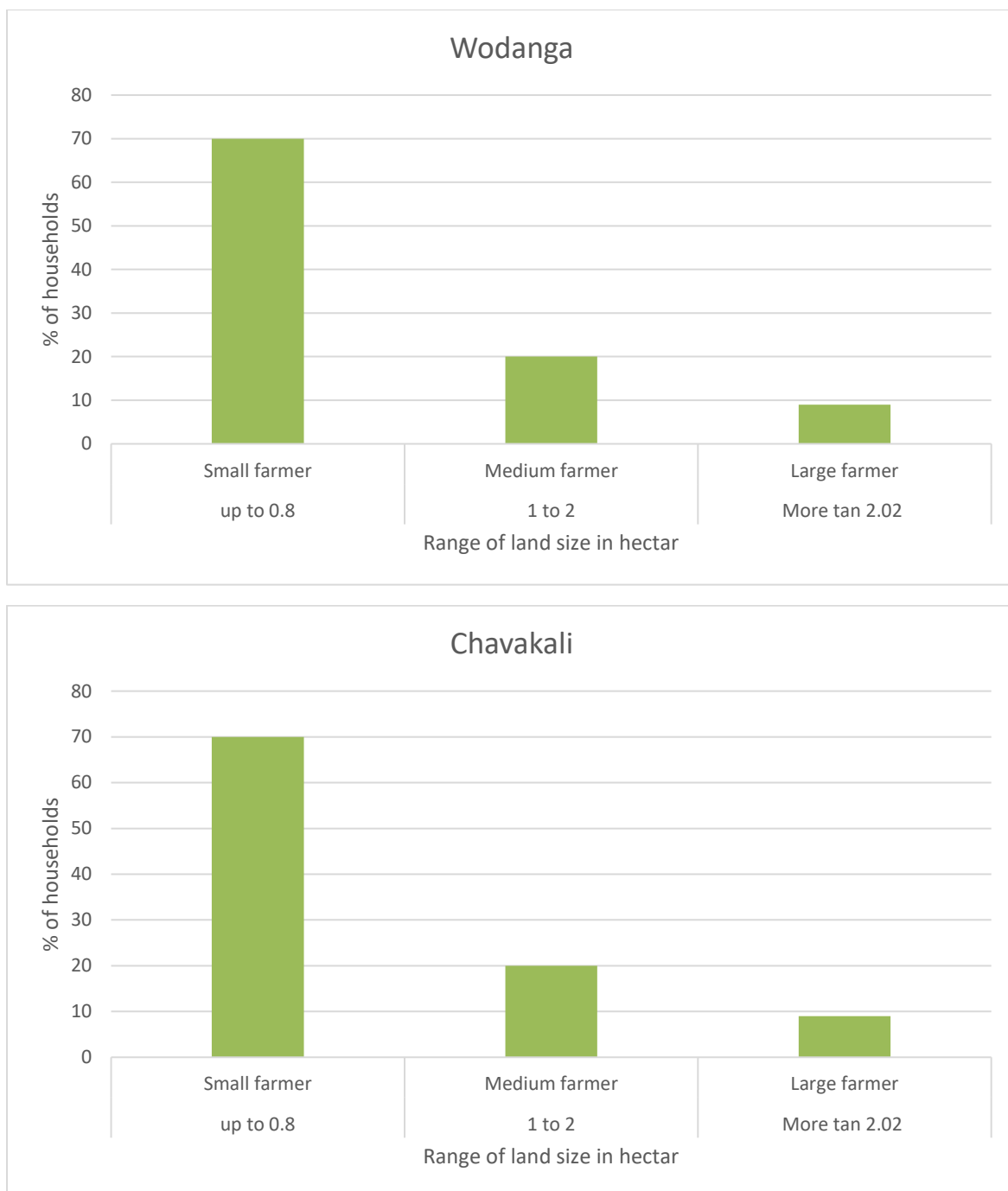


Figure 2. 2. Average landholdings in Wodanga Ward and Chavakali Ward, Sabatia sub-County

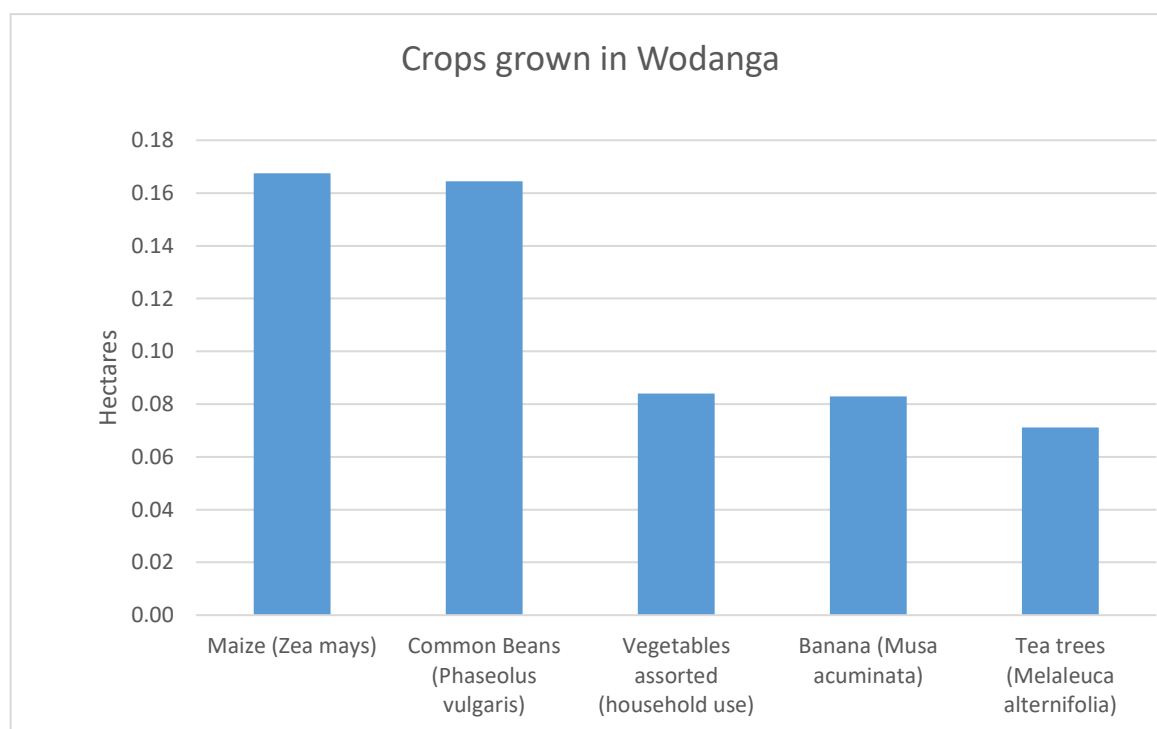
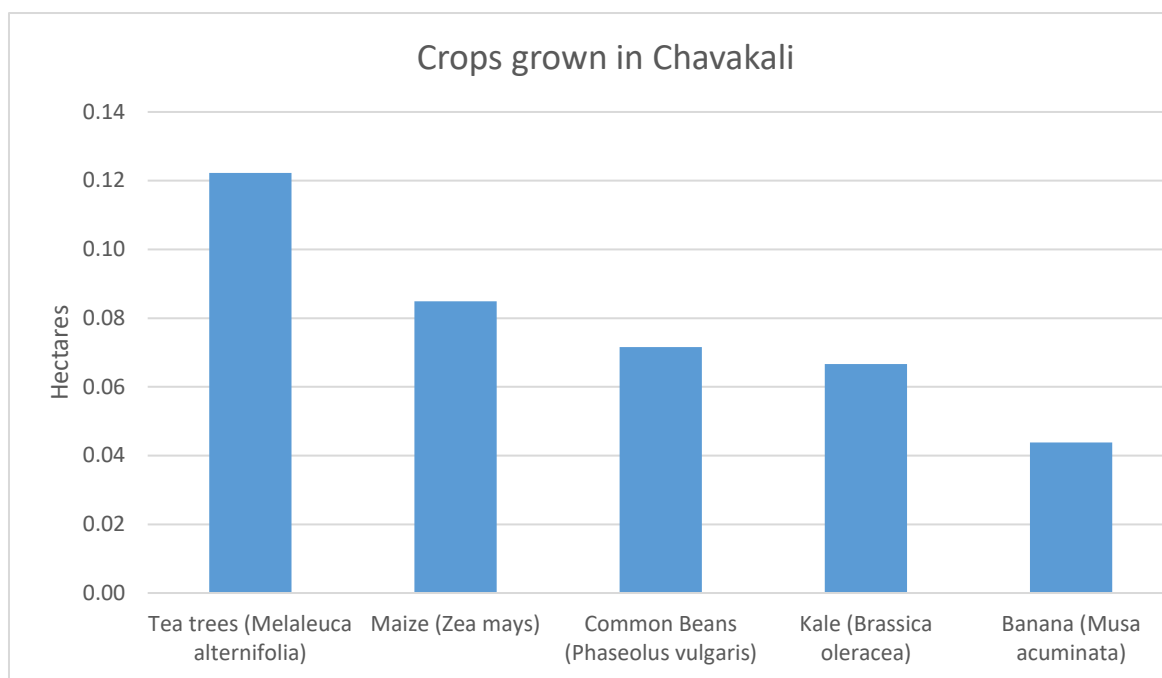


Figure 2. 3: Average area (ha) per household of dominant arable crops Chavakali ward And Wodanga ward, Sabatia sub-County

Table 2. 3. Cropping seasons occurring in Sabatia sub-County

Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Igudu (planting & weeding)												
Chuvai (harvesting)												
Short rainy season												
Chuvai (harvesting)												
Kimiya (dry season)												

Livestock production

Different livestock species kept for various purposes forms an integral part of livelihood strategy of the farmers and almost every farming household keep ruminants and/or indigenous chicken. The major livestock species kept, their uses, the proportion of households that own the species and mean herd/flock sizes of each ward are presented in Table 2.5. Both improved and local dairy cattle provide milk, manure and are sold as meat to supply substantial income when the need arises, and to pay dowries. The improved cattle are also sold as breeding stock. Majority of the farmers (90-100%) keep poultry for eggs, meat, manure and sale for income; local goats (60%) for income sales, meat and manure (Vihiga Department of livestock annual reports (2009 to 2013). Approximately 26% of the cattle population are improved dairy cattle and 14% in 2010 to 2013 were dairy goats with a slightly high population in 2009 Table 2.4). Indigenous chicken is the predominant enterprise in the sub-County comprising of 90% of all the different types of poultry. However, the sub county remains a huge animal product deficit area. The deficit ranges from 52% for milk to 99% for honey in terms of annual consumption (Table 2.5). According to the 2013, Vihiga County livestock annual report and confirmed by the respondents, milk and meat deficits were bridged through the importation of raw milk and live animals for slaughter from neighbouring sub-Counties of Nandi and Uasin Gishu. Eggs were imported mainly from Uasin Gishu.

In terms of livestock improvement, most of the farmers use locally available bulls of low genetic pedigree for breeding purposes. There is only three artificial inseminations (AI) providers in the sub-County and the cost of insemination is high, ranging from KES 1200 to 1500 (USD 15 to 18.75). AI service providers are majorly in Chavakali town and the distance leads to delays in insemination (requiring repeats) which increase the cost of the service. The sub-County also does not have a milk cooling plant which constraints marketing for the few enterprising dairy farmers. However, there are two working coolers operating below capacity in the neighbouring sub-counties of Hamisi and Emuhaya within Vihiga County.

Majority of the farmers (80%) in Chavakali keep an average of 1-2 improved dairy cattle per household, while those of Wodanga mostly keep local cattle (80%) (Table 2.7). On average, Chavakali farmers keep 1.2 TLU per household while those in Wodanga keep 0.8 improved TLU per household (Figure 2.4). Majority of the farmers selected for individual interviews were those in common interest groups and many of them had received initial support from various donor-supported projects including Heifer International “Give a cow” programme, Njaa Marufuku Kenya (GoK), Western Kenya Community Driven Development and Flood mitigation (WKCCD-FMP) and National council of people with Disability (NCPWD). Dairy goat production was also higher in Chavakali than in Wodanga for the same reason. Note that data in the charts is from primary data, while the data in table 2.7 is from secondary data as given by livestock officers for the whole sub county.

In the last three years, 2010 to 2014, Njaa Marufuku (GoK programme), Western Kenya Community Driven Development and Flood Mitigation Programme (WKCCD-FMP) and National Council of People with Disability (NCPWD) have supported programmes on capacity building on AI, provision of dairy breeds and fodder establishment that the CGIAR humid programme on dairy could build on the sub-County (Table 2.6)

Table 2. 4. Livestock population trends

Species		2013	2012	2011	2010	2009
Cattle	Grade/Crosses	7,240	7,180	6,850	6,820	6,740
	Zebu	24,900	24,930	25,970	26,100	19,400
Goats	Local (meat)	6,900	6,980	6,880	6,830	3,240
	Dairy (Grade)	1,250	1,200	1,100	1,090	1,080
Sheep	Hair	1,730	1,920	2,070	2,080	3,970
Poultry	Indigenous chicken	102,600	102,440	99,840	98,360	73,000
	Layers	3,050	2,500	4,550	6,500	3,500
	Broiler	0	2,400	2,250	2,500	1,500
	Ducks	320	400	450	560	1,650
	Turkey	410	650	805	1,150	1,070
	Geese	200	205	210	270	260
Pigs	-	125	106	97	70	48
Bee Hives	KTBH	108	110	110	140	130
	Langstroth	460	450	400	400	340
	Long hives	35	20	20	20	35
Rabbits	-	6,900	6,980	6,880	6,830	2,240
Emerging Livestock	Quails	400	495	430	450	420

SOURCE: Vihiga Department of livestock annual reports (2009 to 2013)

Table 2. 5. Livestock products consumed in comparison to production levels in Sabatia sub-County in 2013.

Livestock product	Annual consumption	Annual production	Deficit	% Deficit	Product requirements estimates/person/year
Milk (Litres)	12,655,463	6,074,620	6,580,843	52	91
Meat (kg)	4,99,840	1,626,200	3,366,640	67	36
Eggs (Numbers)	21,635,640	5,590,880	16,044,760	74	156
Honey (kg)	2,496,420	18,500	2,477,920	99	18

Source: Vihiga County Department of livestock annual reports (2013)

Table 2. 6. Dairy production projects in Vihiga sub-County 2010 to 2013

Funding agency	Group funded	Locality	Type of project	Funding level (KES)	Funding year	Remarks
Njaa Marufuku Kenya (GoK)	Mukingi Self Help Group	Lyaduywa	Dairy goat	150,000	2010/11	4 does and 1 boar purchased in 2011
Western Kenya Community Driven Development and Flood mitigation (WKCDD-FMP)	Chofumbo A/V	North Maragoli	AI banking	5,000,000	2013/14	On-going
	Bukulunya CDDC	Bukulunya	Dairy cattle	1,500,000	2012/13	26 cows purchased for farmers
	Demesi CDDC	Demesi	Dairy cattle	1,080,000	2012/13	28 cows purchased for farmers
			Napier production	1,080,000	2011/2012	0.25 hectares planted per recipient farm
National council of people with Disability (NCPWD)	Busali East physically disabled	Busali East	Dairy cattle	1,000,000	2013/14	15 heifers purchased

SOURCE: VIHIGA COUNTY DEPARTMENT OF LIVESTOCK ANNUAL REPORTS (2013)

Table 2. 7. The proportion of farmers owning different species of livestock, average herds per household (HH) and use in Sabatia sub-County (secondary data)

Livestock species	Use	Chavakali Ward		Wodanga ward	
		HHs owning the species (%)	Animals per HH (average no.)	HHs owning the species (%)	Animals per HH (average no.)
Improved dairy cows	Milk, manure and breeding stock sale (income)	80	2	<20	1-2
Local dairy cows	Milk, manure, meat, sale for income and dowry	30	2	80	1
Sheep	Meat, cultural rituals and sale for income	10	6	<10	2-3
Local Goats	Meat, manure and sale for income	90	4	<20	3
Dairy goats	Milk, Sale as breeding stock for income and manure	40	7	<1	2
Pigs	Pork, manure, traditional rituals and sale for income	10	6	<1	2-3
Indigenous poultry	Eggs, meat, manure, sale for income and social activities	100	20	90	5-10
Commercial poultry	Eggs, meat, manure and sale for income	20	30	<1	50-100
Quails	Meat, cultural and Sale for income	-	-	<2	50-60
Turkeys	Meat and sale for income	10	7	<1	2-5
Geese	Meat, manure and sale for income	-	-	<1	2-3
Rabbits	Milk, manure	30	6	20	10

Source: Vihiga County Department of livestock annual reports (2013)

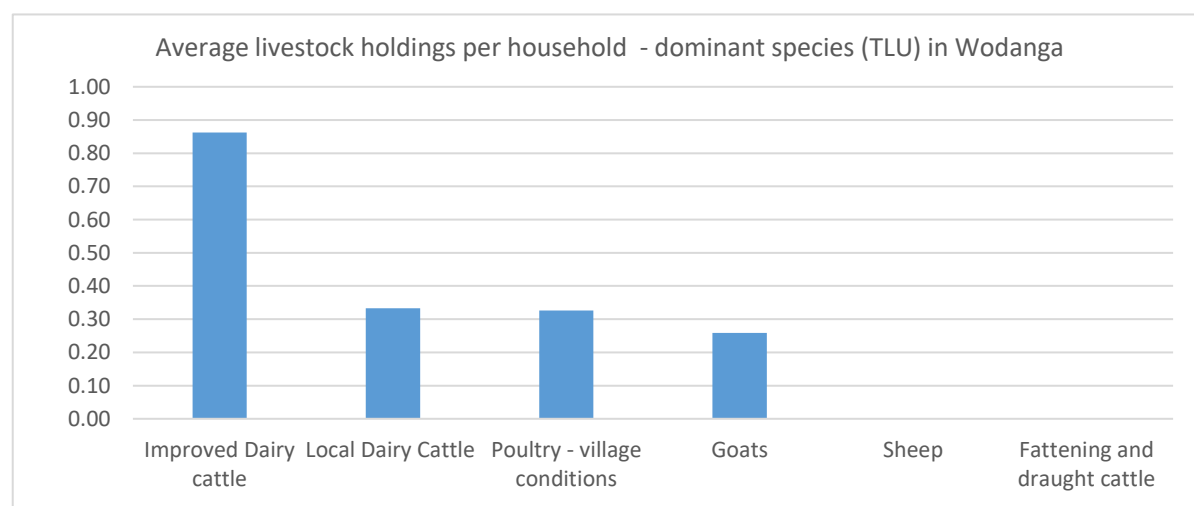
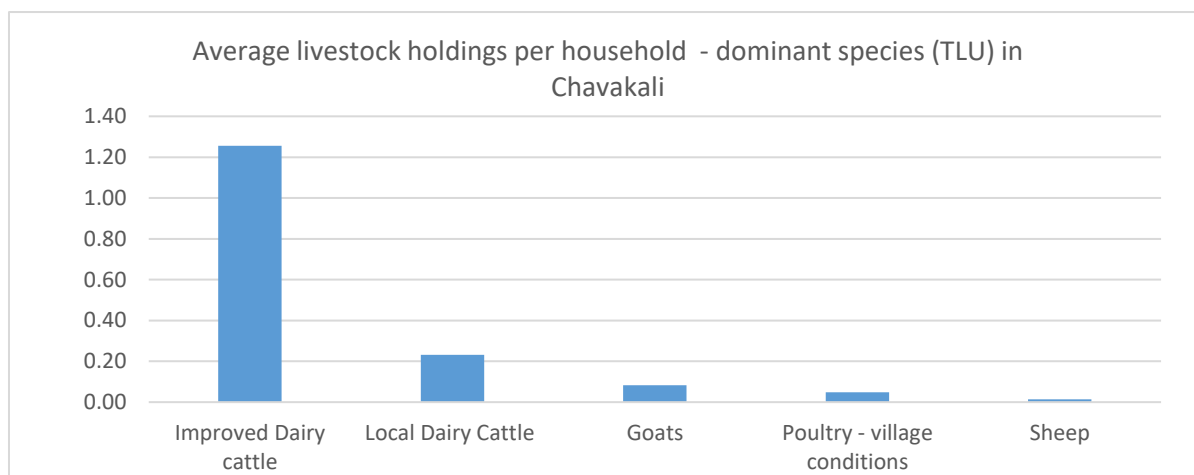


Figure 2. 4: Average livestock holdings per household - dominant species (TLU) Chavakali Ward and Wodanga , Sabatia sub-County

Generally, livestock input services, such as feeds and veterinary drugs, are available but were reported by farmers to be costly. Government veterinarians are mainly involved in vaccinations but are unavailable for animal health services. Private veterinary services are generally expensive for most farmers. For example, treating East Coast Fever (ECF) costs farmers KES 4,000 (\$50) per treatment and KES 250 (\$3.12) per deworming per animal. In addition, farmers incur costs through airtime for phones and transport. The most common diseases are ECF, mastitis and internal parasites (worms).

Artificial Insemination (AI) services are available from private service providers in Chavakali. The cost for a single insemination is KES 1,000-1,500 (\$12.5-18.75) per insemination for semen from Kabete; KES 3,500 to 5,000 (\$43.75 to 62.5 for uni-sexed and KES 6000 to 12,000 (\$75 to 150 sexed imported semen. Farmers incur additional costs of 50% per repeat insemination/ cow and are a common complaint from the farmers. Improved bulls cost KES 300-500 (\$3.75-6.25) per service but the breed quality and risk of disease transmission is a concern to the farmers. Therefore, the high rates of repeats together with high costs is a major constraint in improving dairy production in the sub-County.

Agricultural and livestock inputs (farm implements, crop seeds, fertilizers, herbicides, pumps, acaricides, feed supplements) are available from agro-vets within the sub-county. Credit facilities for crop or livestock production are available from commercial and micro-finance institutions; table banking and merry-go-round (especially for women), upcoming youth and women enterprise fund, and SACCO (SACODEV, MFATE) within Sabatia sub-County and Vihiga County. However, many farmers do not access loans from commercial banks and microfinance institutions because of the high interest rates, collateral requirements, long loan processing period and defaulting by group members. Continuous partitioning of land into small pieces and lack of title deeds contribute to the lack of collateral to access loans.

Feed types, sources and feeding systems

According to group PRA, 30% of farmers in Chavakali who keep improved dairy cattle have constructed recommended zero-grazing units, as opposed to only 10% of the farmers in Wodanga. However, farmers with dairy goats have recommended housing structures in the two wards. Majority tether the animals in the compound for security reasons and bring feed to the animals during the day. The cut and carry fodder are manually chopped with a 'panga' (local machete) and a few farmers use motorized choppers. Feed for the improved animals is often supplemented with commercial concentrates such as dairy meal, maize bran and minerals, but not in adequate amounts because of the high cost.

Napier grass is the dominant forage and planted on small land sizes due to the limitation of land (Figure 2.5). Napier stunt disease is reported to be a major constraint to the herbage productivity per unit land. Rhodes grass (*Chloris gayana*), Calliandra (*Calliandra calothyrsus*), desmodium (*Desmodium intortum* and *D. uncinatum*) and sweet potato were reported to be the feed resource base but are grown on small land areas, and does not meet supplementary feed needs for the dairy animals. Fresh Napier grass is again the predominantly purchased feed in all the Wards (Figure 2.6). Commercially mixed ration form only a small proportion (2-5%) of the purchased feed.

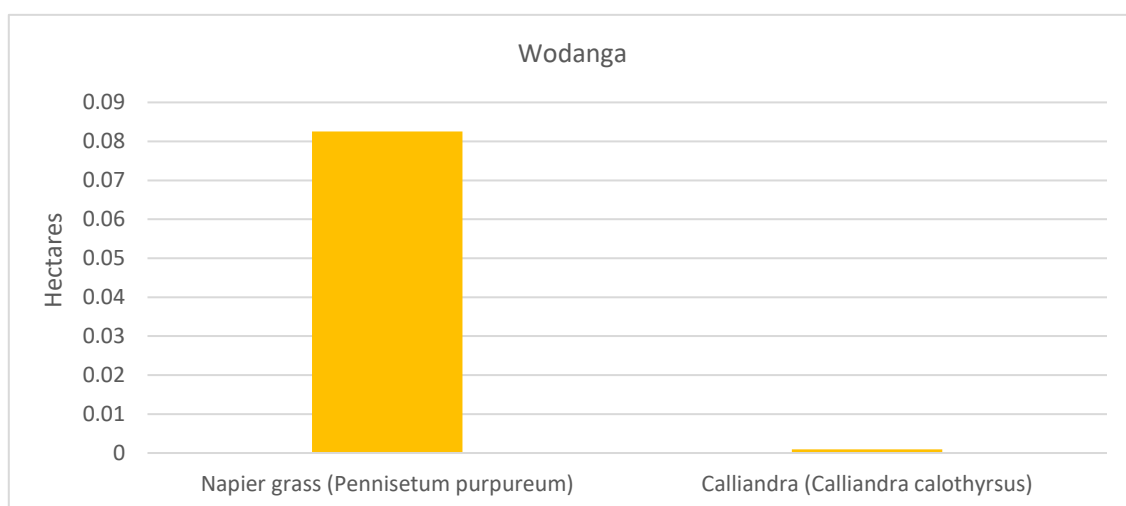
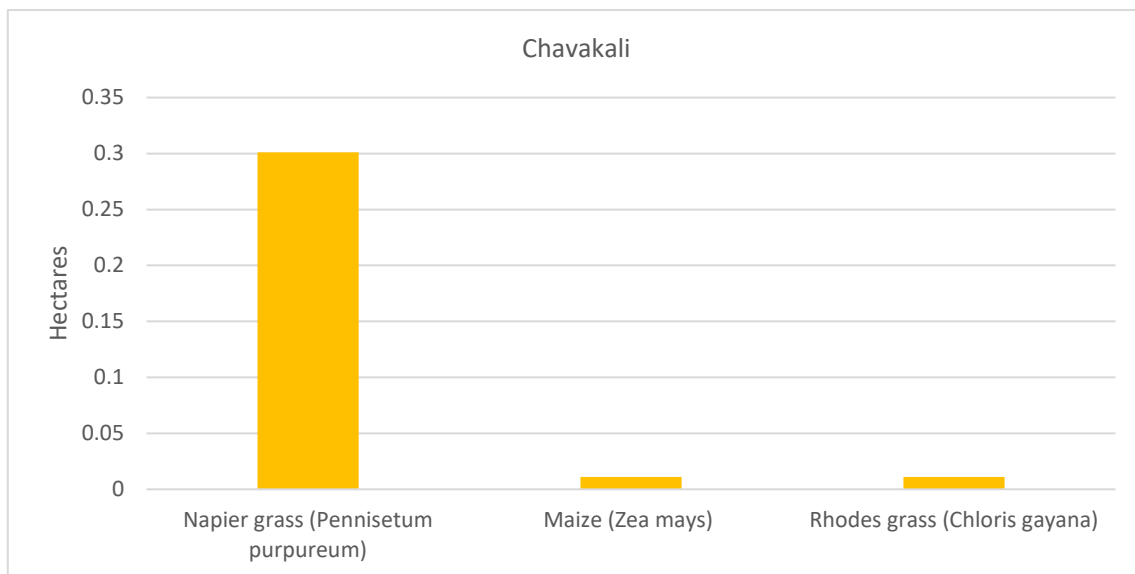


Figure 2. 5: The dominant fodder crops grown in Chavakali Ward (left) and Wodanga Ward (right), Sabatia sub-County

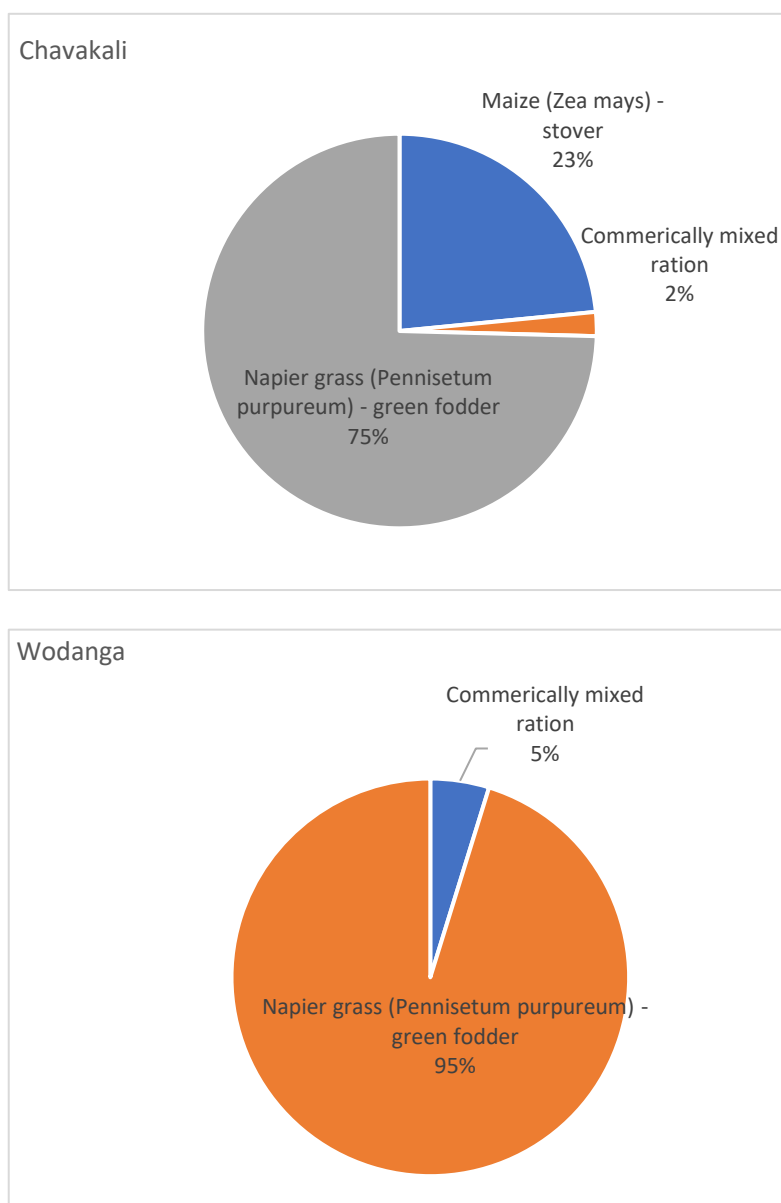


Figure 2. 6: Quantity of feed purchased over a 12 month period grown in Chavakali Ward (left) and Wodanga Ward (right), Sabatia sub-County

Cultivated green feed and collected naturally occurring forages especially weeds from farms are the primary component of the feeds in Sabatia sub-County since planted fodder is not adequate due to the small farm sizes. Grazing contributes more to feed availability in Chavakali than in Wodanga possibly due to the slightly large average farm sizes in Chavakali which drastically reduce during the dry season, January to February. In Wodanga, crop residues form a significant portion of the feed resource base and this includes all crop residues ranging from vegetable, banana pseudo-stems and residue after harvesting to maintain the cattle since farmers cannot grow enough fodder due small farm sizes per household. Farmers also purchase significant amounts of fodder especially Napier grass to supplement cultivated and collected feeds.

Cultivated (planted) forage contributes the largest proportion to DM (40-41%) and ME (30-33%) followed by naturally occurring and collected feeds at 30-36% in the total diet of Chavakali and Wodanga (Figures 2.8 and 2.9). Cultivated forage refers to Napier grass, Rhodes grass (*Chloris gayana*), Calliandra (*Calliandra calothyrsus*), desmodium (*Desmodium intortum* and *D uncinatum*) and fresh crop by-products e.g. sweet potato vines, maize thinning and leaf defoliate, Banana pseudo

stems collected from the farms. According to the FEAST data, although planted on small hectares, they were high in nutritive value compared to the naturally occurring grass. Due to the small farm sizes in both wards, grazing contributes only to 21-25% DM and 18-22% ME to the diet. Grazing is mainly around the homesteads and at the farms after crop harvest. The highest proportion CP comes from cultivated fodder in Chavakali (52%) and is also high in Wodanga, while naturally occurring and collected contributes to 29% in Chavakali and was higher in Wodanga (32%). Purchased feeds contribute only to 2% CP to the total diet of both Wards (Figure 2.10).

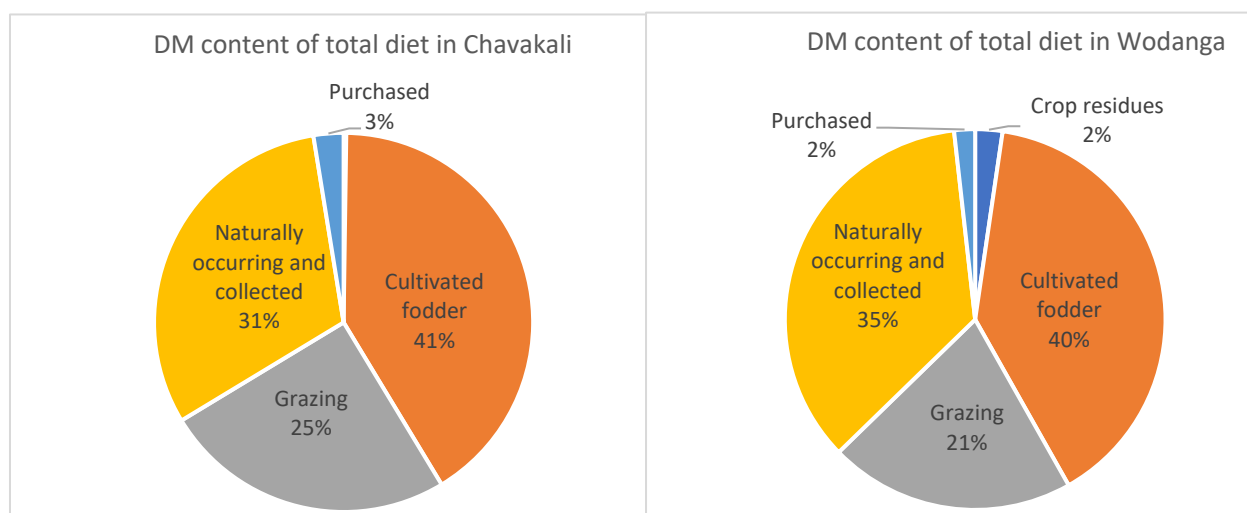


Figure 2. 7: Proportion of dry matter (DM) content in the total diet Chavakali (left) and Wodanga (right), Sabatia sub-County

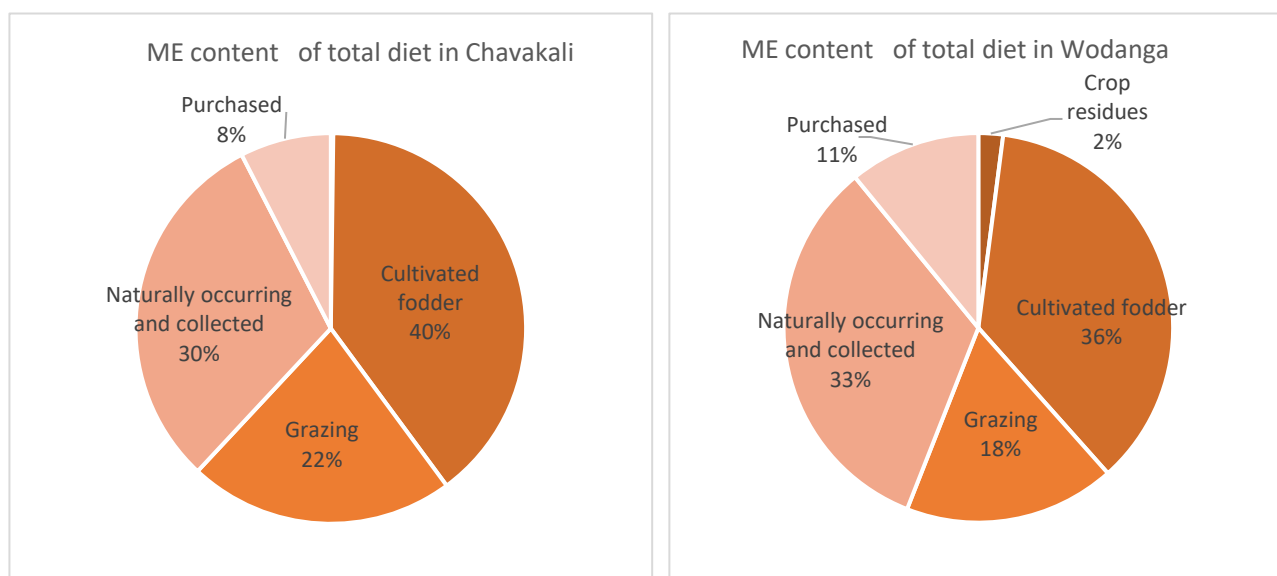


Figure 2. 8: Proportion of crude energy (ME) content in the total diet Chavakali (left) and Wodanga (right), Sabatia sub-County

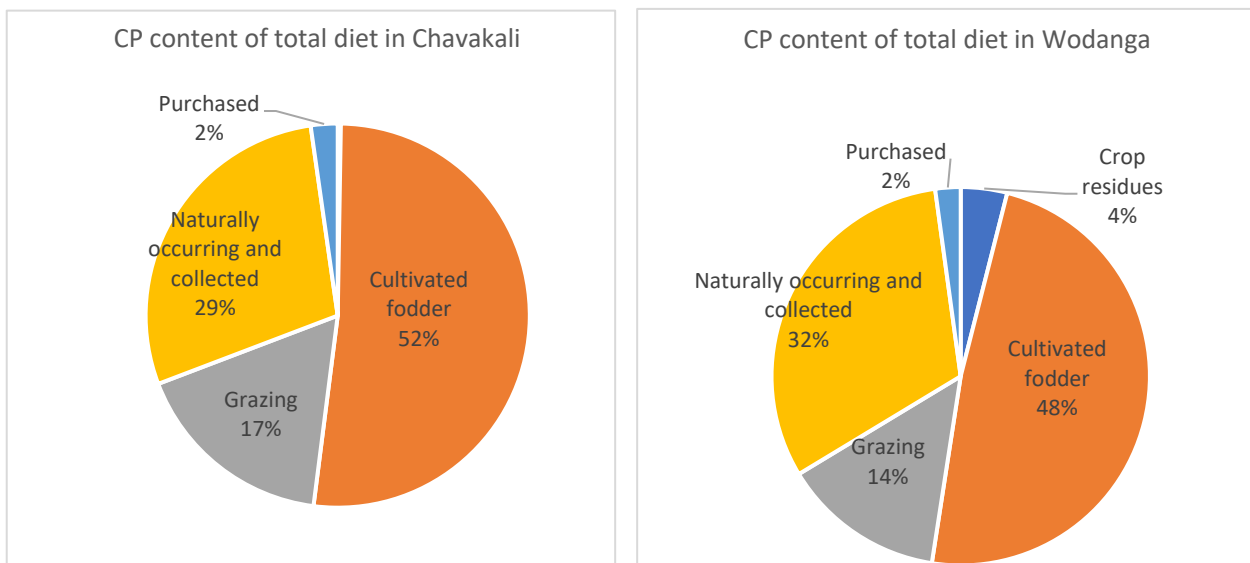


Figure 2. 9: Proportion of crude protein (CP) content in the total diet Chavakali (left) and Wodanga (right), Sabatia sub-County

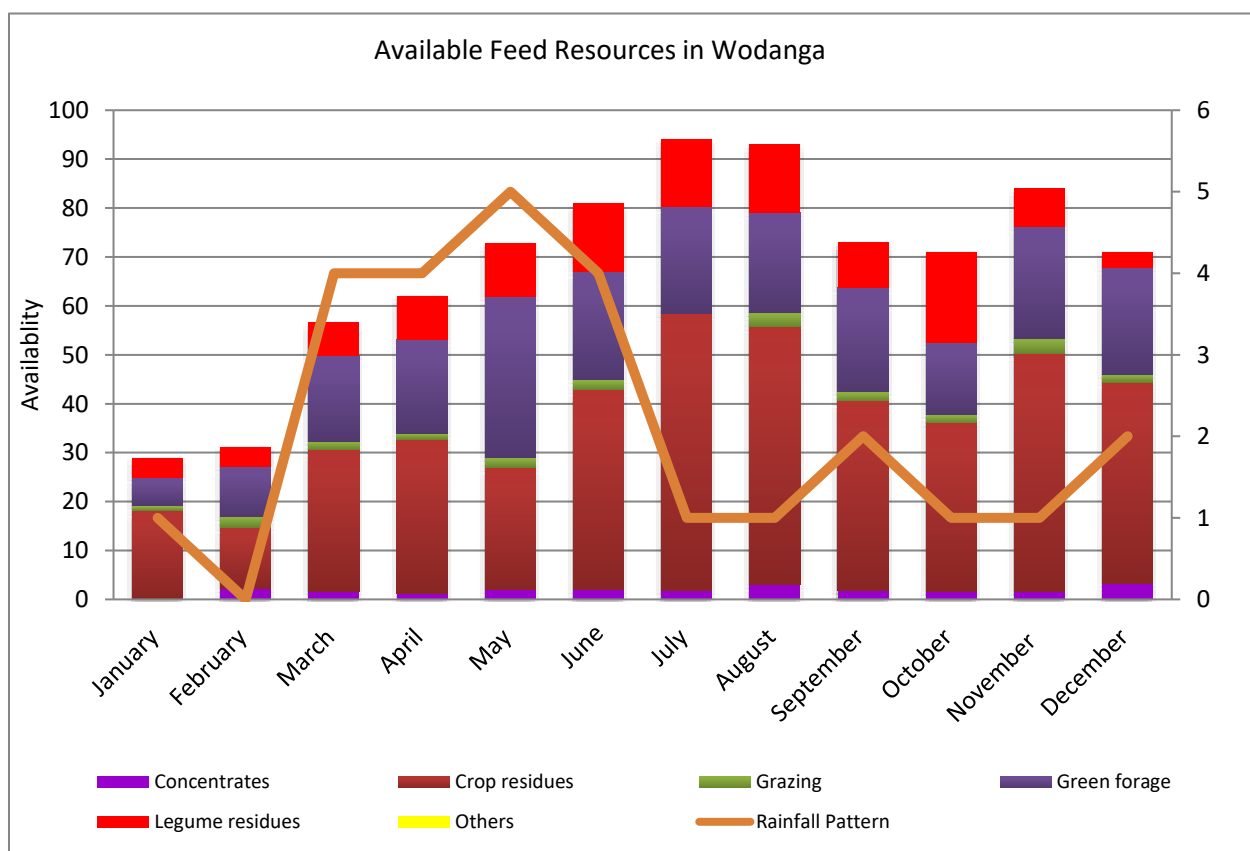
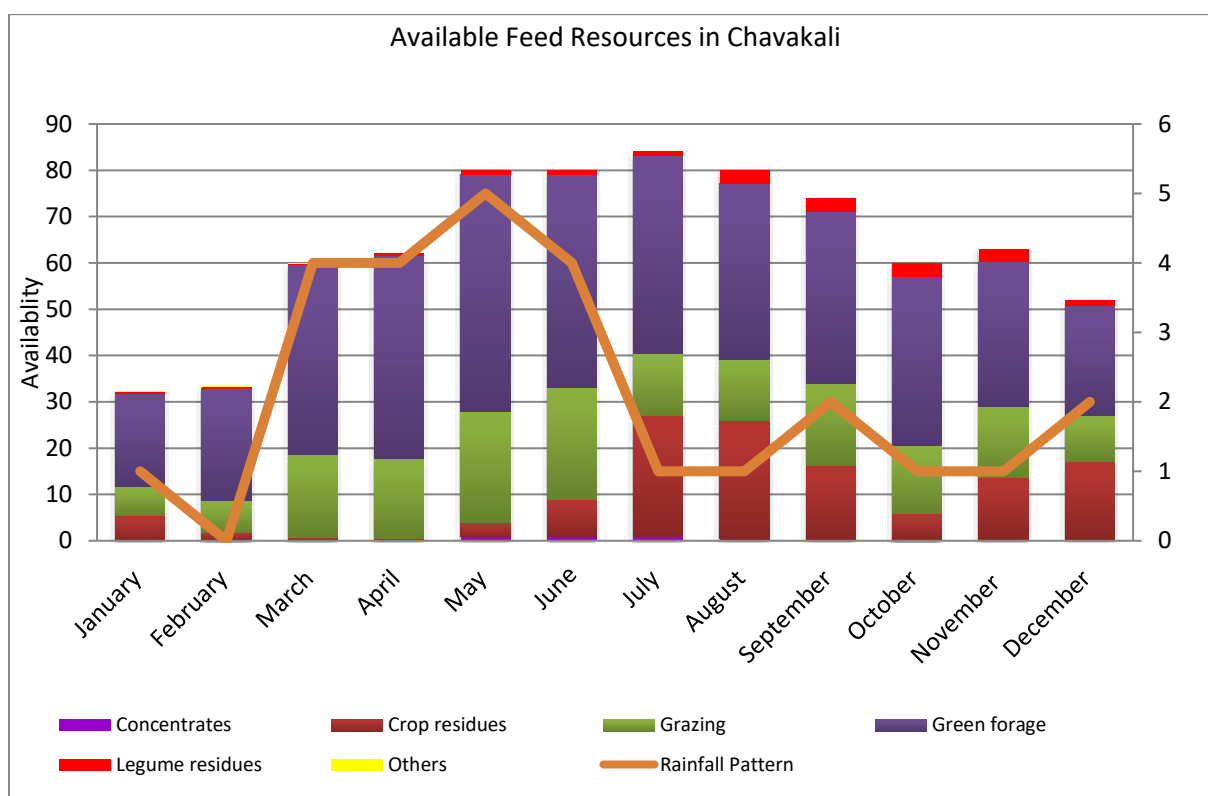
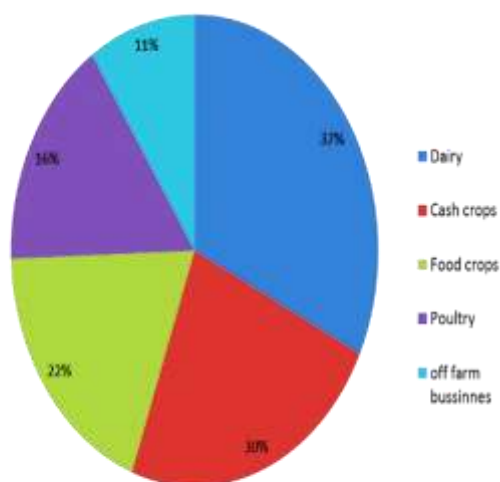


Figure 2. 9. Variation of feed availability throughout the year in Chavakali (left) and Wodanga (right) Wards in Sabatia

Major income sources

In Chavakali, respondents reported that the main contributors to household income are dairy (37%) and cash crops (30%) (tea). In Wodanga, major income was from food crops and cash crop (tea), while dairy only generates 10% (Figure 2.11). In Chavakali, more participants get income from food crops (22%), followed by poultry (16%). In Wodanga, poultry meat contributes to 25%, followed by remittances (18%). The results indicate the general importance of agriculture and livestock husbandry for the livelihoods of Sabatia sub-County.

Contribution of livelihood activities to household income (as a percentage) in Chavakali



Contribution of livelihood activities to household income (as a percentage) in Wodanga

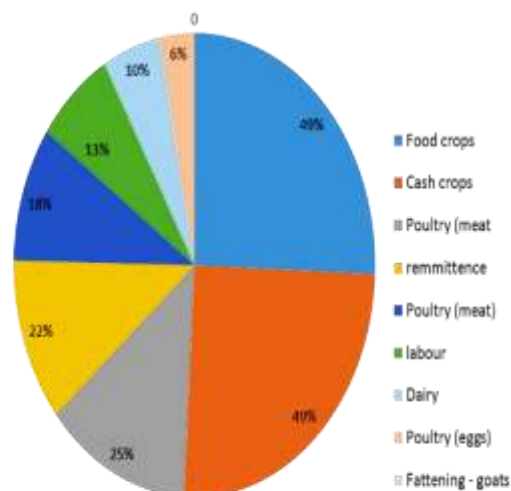


Figure 2. 10: Contribution of livelihood activities to household income (as a percentage) in Chavakali Ward (left) and Wodanga Ward (right), Sabatia sub-County

Challenges and opportunities

The main challenges that farmers face are listed in Table 2.8. Feed issues and costly animal health services were considered the biggest constraints in Chavakali and Wodanga. Inadequate feed was majorly caused by small farm sizes, Napier stunt disease, lack of credit to hire land and invest in feed production, lack of knowledge on ration formulation (to improve the nutritional quality of crop residues) and the high cost of commercial feeds. Control of tick-borne diseases was a major concern to farmers in Sabatia sub-County. Chemical pesticides (acaricides) for individual spraying are expensive since the collapse of communal dips. Furthermore, the inefficient individual spraying has contributed to the prevalence of tick-borne diseases and tick resistance of acaricides. Inadequate improved breeds were considered a key problem in Chavakali more than in Wodanga. The reason could be that farmers in Chavakali are affiliated with dairy enterprises which have more improved dairy cattle. Artificial Insemination (AI) services that could help disseminate improved genetics are costly and unreliable. Farmers depend on private AI providers mainly from Chavakali and Mbale, and due to distance, cost of transport increases causing delayed services. This might lead to repeats costing 50 to 100% of the first insemination.

A lack of credit facilities is also a clear constraint to the further development of crop and dairy production in Sabatia sub-County. Whereas credit facilities exist from commercial banks and microfinance institutions, lack of collateral unfavourable repayment schedules, coupled with unstable prices of agricultural products, discourage farmers from going in for these loans. Internally generated credit from the merry-go-round and Table Banking does not provide enough capital to invest in agricultural activities. Milk marketing was also highlighted as a problem in both wards because farmers mainly depend on sale at farm gate prices to neighbours, but because of the high poverty levels (64%) (Vihiga County District Development Office Reports), this marketing channel is not reliable. There are organized transport to reach urban markets. There are no cooling plants in the sub-County.

The list of potential solutions in Table 2.8 suggests that farmers require initial assistance from outside, in order for dairy production to be improved.

Table 2. 8. Ranking of main problems in livestock production and proposing possible solutions by farmers from Sabatia, and Wodanga Wards Sabatia sub-County after pairwise ranking in each PRA

Challenges	Ranking in Sabatia Ward	Ranking in Wodanga Ward	Possible solutions
Lack of/difficulty to reach milk markets	4	4	<ul style="list-style-type: none"> • Set up a milk cooling plant • Organize milk transport together
Lack of improved breeds	2	4	<ul style="list-style-type: none"> • Train and provide initial capital for local A.I. services providers • Initial capital to acquire improved breeds • Address issues of dairy cattle fertility
Inadequate technical knowledge on fodder, feeding management	2	4	<ul style="list-style-type: none"> • More technical knowledge in feeds production, processing and feeding through training and tours • Reduce costs of feeds by procuring them together (cooperative)
Costly animal health services	1	2	<ul style="list-style-type: none"> • Preventive strategies through effective tick control • Vaccination campaigns • More technical knowledge in animal health services including hygiene
Lack of credit facilities to invest in feed and commercial concentrates	3	3	<ul style="list-style-type: none"> • Merry-go-round • Provide affordable credit facilities • Institute farmer-friendly collateral for loans • Form input access groups
Inadequate feed especially due limited land, Napier stunt disease and prolonged dry periods	2	1	<ul style="list-style-type: none"> • Promote fodders tolerant to stunt disease • Adopt 'Tumbukiza' method • Credit facilities to hire land and invest in feed production • Technologies on improving quality of crop residues

Ranking: 1= Most important problem in terms of farmers priority and 4= Least important problem

Conclusions

Sabatia sub-County is characterized by smallholder mixed crop-livestock production systems on approximately less than one hectare (2.5 acres) of land. Dairy and food crops are the primary sources for household income. Farmers in Chavakali Ward have improved dairy cattle while in Wodanga local cattle is used. Improved dairy production is constrained by inadequate feeds, high cost of disease control and poor breeds. Unorganized milk marketing is also a constraint. To mitigate these constraints farmers (and other stakeholders) will be required to (i) lease land and expand area under forage crop cultivation with forage crops that tolerant to Napier grass stunt disease, (ii) improve access to animal health and AI facilities to ensure farmers can rapidly upgrade the genetic merit of their cattle holdings, (iii) improve access to credit facilities to enable farmers invest in livestock production enterprises and also milk marketing strategies.

Acknowledgements

We acknowledge the unreserved collaboration by all survey respondents. Mr. MacDonal Wesonga of ARDAP for initial guidance on the target sub-Counties and the Sabatia sub-county livestock productions team is thanked for excellent logistic support. We also sincerely thank the Sabatia County livestock production officer for allowing us to work with his officers and Dr. Ben Lukuyu of ILRI for continuous guidance during the excise, and ILRI for funding through the sub humid programme.

References

- Duncan, A., York, L., Lukuyu, B., Samaddar, A. and Stür, W. 2012. Feed Assessment Tool (FEAST). www.ilri.org/feas
- Jaetzold, R., Schmidt, H., Hornetz, B. & Shisanya, C. (2005). Farm Management Handbook of Kenya—Natural Conditions and Farm Management Information –West Kenya-Subpart A1. Western Province. Vol. VOL. II, pp 1-319 Nairobi, Kenya: Government printers.
- KARI Kakamega annual report 2006. Kenya Agricultural Research Institute, KARI Kakamega Annual report 2006.
- MoALF. (2010). Kenya National Dairy Master Plan. A situational analysis of the dairy sub-sector. Volume I. Nairobi: Ministry of Agriculture, Livestock and Fisheries (MoALF), Republic of Kenya.
- Mulaa M., B Awalla, J Hanson, J Proud, A Cherunya, J, Wanyama, C Lusweti and F Muyekho (2010) Stunting disease incidence and impact on napier grass (*Pennisetum purpureum schumacher*) in Western Kenya. 12th KARI Biennial conference proceedings pg 937-943. <http://www.kari.org/biennial-conference/conference12/docs>.
- Nicholson, C. F., L. Mwangi, S. J. Staal, and P. K. Thornton. 2003. Cow ownership and child nutritional status in Kenya. Research Bulletin 11-2003. Department of Applied Economics and Management, Cornell University, Ithaca, NY.
- Republic of Kenya. (2009). Kenya 2009 Population and housing census highlights. Nairobi, Kenya.: Government ministries.
- Waithaka MM, Nyangaga JN, Staal SJ, Wokabi AW, Njubi D, Muriuki HG, Njoroge LN, Wanjohi PN (2002). Characterisation of Dairy Systems in the Western Kenya Region; Report of Dairy and Crop Characterisation Activities in Western Kenya. The Smallholder Dairy Research and Development Project. <http://www.smallholderdairy.org/publications>, accessed on 2nd November 2011.