

# Characterization of the livestock production systems and potential for enhancing dairy productivity through improved feeding in Matayos sub-County of Busia County, Kenya

F.N. Muyekho<sup>2</sup>, B.A. Lukuyu<sup>1</sup>, A.J. Duncan<sup>1</sup>, D. Siamba<sup>2</sup>, H. Agevi<sup>2</sup> and S. Okotsi<sup>3</sup>

<sup>1</sup>International Livestock Research Institute

<sup>2</sup>Masinde Muliro University of Science and Technology

<sup>3</sup>International Centre of Insect Physiology and Ecology

<sup>4</sup>Matayos 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](mailto:ILRI-Kenya@cgiar.org)

Box 5689, Addis Ababa, Ethiopia  
Phone: +251 11 617 2000  
Fax: +251 11 617 2001  
Email: [ILRI-Ethiopia@cgiar.org](mailto: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 Matayos, sub-County, Busia County of Kenya. The assessment was carried out through focused group discussions (FGD) and completion of short questionnaires at three sites, representing peri-urban and near tarmac road and typical rural setup. At each site, nine key farmers (consisting of three each) representatives owning small, medium and large-scale farms. The study was carried out on the 22nd of November and 3rd December 2013. The farming system is a mixed crop-livestock production system. Cattle (predominantly local) are the most important livestock species in Matayos Sub-county. Improved dairy production is constrained by inadequate feeds and high cost of disease control in all the wards. Lack of improved breeds in Nasewa and Lwanya and milk marketing are also constraints that require attention to activate commercial dairy productivity. To mitigate these constraints farmers suggested an integrated approach to improve livestock production through (i) expanding the area for fodder crops, using crops that are more tolerant to Napier grass stunt disease and those tolerant to drought, (ii) improving access to animal health and AI facilities to ensure farmers can rapidly upgrade the genetic merit of their cattle holdings (especially in Nasewa and Lwanya), (iii) access to credit facilities to enable farmers invest in livestock production enterprises and also improve the 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 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* Schumach), 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% (Lusweti et al., 2004; Mulaa et al., 2004). 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 Busia County**

Matayos is one of the seven sub-Counties in Busia County lying between latitude 0 ° N and 0<sup>010'</sup> N longitude 34 ° E and 34 <sup>60</sup>E. It borders the Republic of Uganda in the West, Teso sub-County in the North, Nambale sub County in the North East, Butula sub County in the South East and Samia sub County in the South West. Matayos sub-County is covering a total area of 196.1 km<sup>2</sup>.

Matayos sub-County has a population of 111,345 (53,577 males and 57,768 females). There are 23,826 households and a population density of 567.8 people per km<sup>2</sup> according to the 2009 National Population and Household Census. The community is cosmopolitan with a cross-section of ethnic groups. The residents include members of the Luhya (mainly Khayo subtribe), Luo, Teso, Kikuyus and Somali ethnic groups. Average family size is 6 members and average farm holdings are 1 (one) hectare of land. The major economic activities of the residents include; retail and wholesale businesses, small scale farming, transport business, real estate, hotel industry and buying and selling of cereals. Despite the economic activities, the sub-County is faced with high poverty levels of 60%.

The sub county receives a bimodal rainfall pattern which ranges from 1200 to 1500 mm per year with an average annual rainfall of 1350 mm. 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. The maximum temperatures range is 26°C while the annual mean temperature is 20°C. The sub-County is dominated by the Low Midland 1 (LM1) and lies at an altitude of 1000 to 1231 m.a.s.l. The soils are well-drained and consist of dark reddish-brown clay (orthic acrisols). The sub county is traversed by River Sio.

General methodology

### **Study sites**

The study was carried out in three sites in Matayos (Busia County) which are within the sub-humid zone of Western Kenya. The sites included were Lwanya and Nasewa (Matayos ward representing typical rural and transition setup between rural and peri-urban respectively and Busia township location (Burumba administrative ward) representing peri-urban set 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.

## Data Analysis

The quantitative data collected during individual interviews were analyzed using the FEAST excel template ([www.ilri.org/feast](http://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.

## Material and methods

In order to characterize the livestock production system, and its potential for enhancing productivity through improved feed and feeding interventions, a three-step approach was performed. Firstly, a synthesis of available secondary data to establish the status of the general farming system in the sub county was carried out, before carrying out the Participative Rural Appraisal (PRA) exercise. The second and third stages were focus group discussions and individual farmer interviews, respectively, using the Feed Assessment Tool (FEAST), version, Duncan et al., 2012) to characterize the livestock production system and feed-related aspects. The FEAST tool is a rapid and systematic method that combines a PRA (Participative Rural Appraisal) with individual farmer interviews. The PRA provides an overview of the farming system and the livestock production system. It also helps identify major challenges, issues and opportunities within the livestock production system. The individual farmer interview gathers both quantitative and qualitative information, based on the land size owned.

The assessment was carried out through two structured group discussions and completion of short questionnaires by key farmer representatives in Nasewa and Lwanya locations/wards on 22<sup>nd</sup> November 2013; and Burumba administrative Locations on 3<sup>rd</sup> December. Nasewa is a typical rural setting accessed only by an earth road from Matayos town, Lwanya borders the Busia – Kisumu tarmac road and represents a transition zone between the more rural Lwanya to more urbanised Burumba ward in the Busia Township. The PRA at Lwanya and Nasewa wards was preceded by a PRA training on 21<sup>st</sup> November 2013. The composition of the groups is shown in Table 1.2. Participating farmers were chosen by the sub-County Livestock Production Officers, Busia County Ministry of Agriculture and Livestock. Overall, 25 persons participated in the group discussion in Lwanya and Nasewa wards and 18 in the Busia Township ward (Table 1.1). From each PRA group, 3 representatives of different wealth classes were chosen for the individual interviews. The following are findings of the assessment and conclusions for further action.

Table 1. 1. Group composition of farmer representatives for feed assessment applying FEAST in Matayos sub-County, Busia County Kenya

Site	Men	Women	Total
Busia township location	9 (5)	9 (4)	18 (9)
Lwanya location (Blanda) <sup>1</sup>	10 (5)	15 (4)	25 (9)
Nasewa location (Agori) <sup>1</sup>	16 (6)	9 (3)	25 (9)

<sup>1</sup>Sub-County administrative locations (what in brackets is the venue of PRA)

Number of individual farmer interviews in parentheses

## Results and discussion

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

### Crop and livestock production

The average landholdings in the study sites are presented in Figure 1.1. Although Nasewa is typically a rural farming area, the majority of the farming households are categorised as smallholders with land sizes < 1hectare. In Busia township, majority of the farmers fall under small farmer category while in Lwanya, the landholdings amongst the farmer categories are normally distributed.

### Food crop production

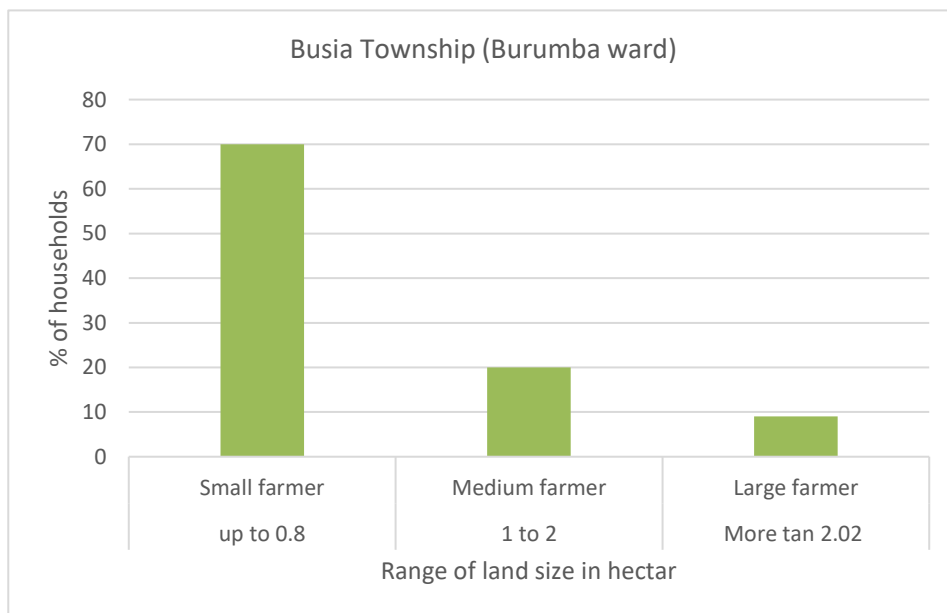
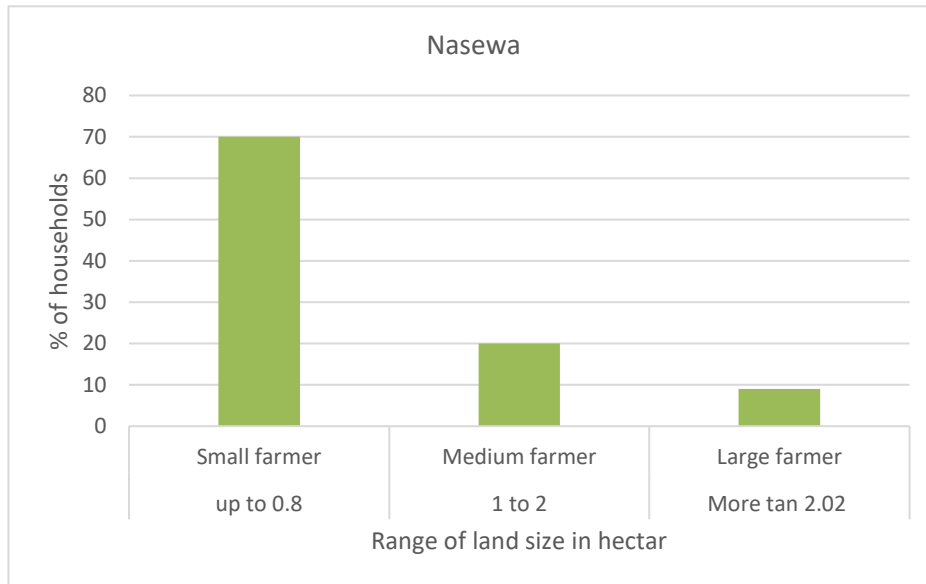
The high and reliable rainfall coupled with moderate temperatures and good soils is suitable for growing crops. About 80% of the county is arable. Therefore, agriculture is an important part of the livelihoods of the people of Matayos sub County.

Lwanya has the greatest variety of crops grown (14 crops) while Nasewa and Burumba had 10 crops, despite the small landholdings (Figure 1.2). Maize is the dominant crop in all the locations and is usually intercropped with beans (Figure 1.3). In Nasewa, maize is closely followed by sugarcane and cassava. The next important crops for farmers in Busia township (Burumba ward) was bananas and beans, while in Lwanya it was cassava and beans. Maize is the main staple food crop and supplemented by cassava and beans. Sugarcane is the chief cash crop in the rural Nasewa ward and mostly grown on a few medium and large farms (Figure 1.1). Households in the surveyed areas consisted of approximately 6-8 people.

Farmers described two distinct cropping seasons based on the rainfall patterns and the time of crop harvest. The long rainfall season '**Irotso**' extends from March to June, while the short rainfall season '**Sirumbi**' is from September to November. During the main dry season '**Simiyu**' from January to February, no precipitation takes place. Finally, '**Likesa**' refers to the harvesting season from July to August and December, and these months are characterized by very low rainfall (Table 1.2). The reduced rains during this period facilitate harvesting of the crops and provide opportunities for utilization of the crop residues as animal feed. Due to well distributed and adequate amount of rains, agricultural activities are mainly rain-fed, except for the 20% of the farmers who live along the course of the rivers and practice vegetable gardening using bucket irrigation during the dry season. Labour is generally available and is mostly required in the rainy season for land preparation, planting and harvesting. In Nasewa and Lwanya, the cost for labour is KES 100 – 150 (\$ 1.25 to 1.88), plus tea and lunch. In Burumba, labour comes to KES 300- 500 per day (\$ 3.75 – 6.25) without meals. Many of the youth (70-80%) move to the bigger towns in search of alternative livelihoods.

Crop production is almost entirely rainfed. Although there is potential for irrigation, adoption of the technology is still low. Bucket irrigation is commonly practised along river valley bottoms. There is an upcoming lower Sio Basin Irrigation Project by the National Irrigation Board. There would be a compensation to farmers, for those farms that would be used for setting up the canals and other structures (unpublished Matayos ministry of agriculture sub-County annual report 2013. The project is expected to cost KES 3 billion/\$37,500).

From the results presented above, the land is a limiting factor and the present conditions favour maize production during two seasons/year. This provides opportunities for use of crop residues as livestock feed. Intercropping with leguminous crops such as beans and growing of sugarcane further enhances the quantity of the residues available, and the potential for specific interventions to improve the nutritional value of livestock feed





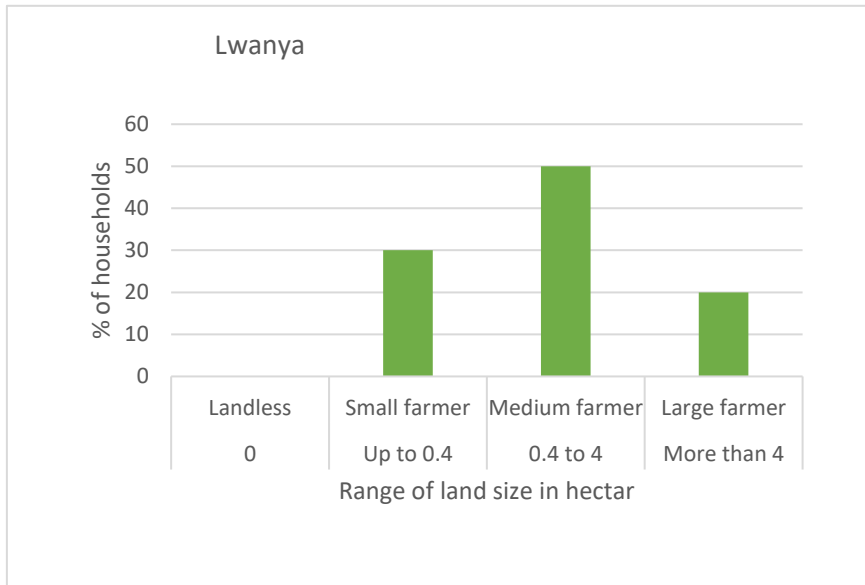


Figure 1. 1: Average landholdings in Nasewa ward (above), Burumba Township (middle) and Lwanya ward (below), Matayos sub-County

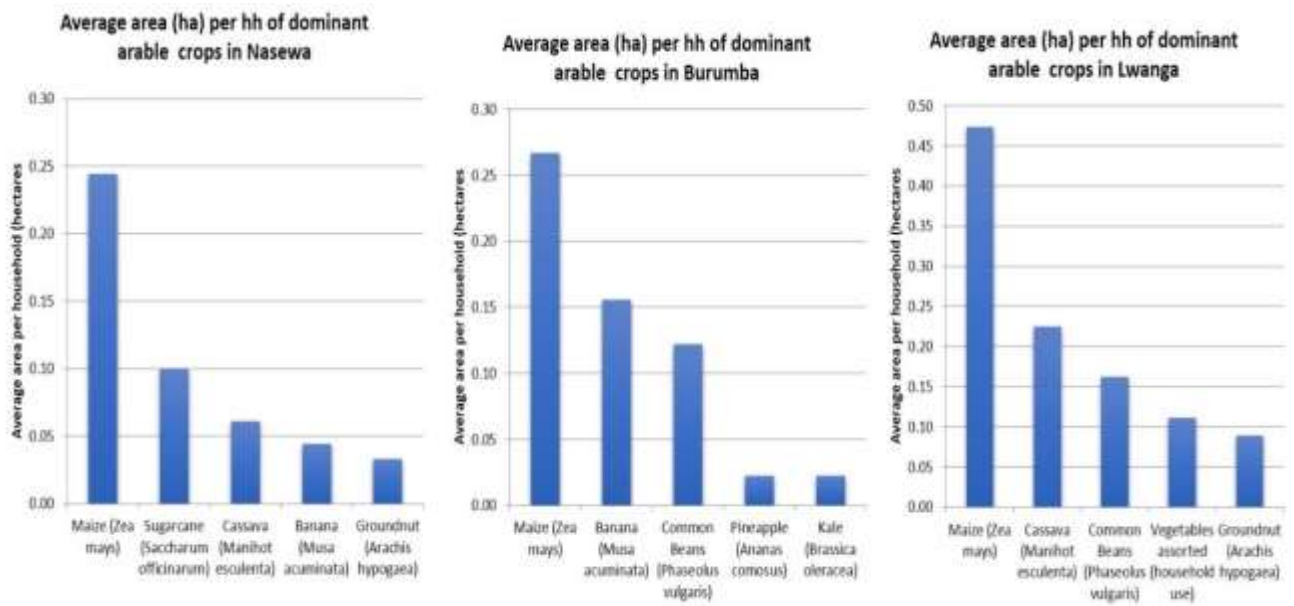


Figure 1. 2: Average area (ha) per household of dominant arable crops Nasewa ward (left), Burumba Township (Middle) and Lwanya ward (right), Mayos sub-County

Table 1. 2. Cropping seasons occurring in Matayos

Name of season	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Long Rain (Irotso)												
Short Rains (Sirumbi)												
Dry (Simiyu)												
Likesa												

## Livestock production

Livestock production is an integral part of agriculture and almost every household keeps ruminants and indigenous chicken (Matayos sub-County Annual Report 2012). Improved dairy cattle form only 15% of the cattle population in the sub County and there are less than 200 (Table 1.3). Common dairy cows' breeds are Zebu crosses with Friesian, Jersey and Aryshire, and also random crosses between the exotic breeds. Since 2010, the sub-county has recorded a steady increase in milk production with 5.5 million litres produced in 2013, representing a 15% increase compared to 4.7 million litres in 2010 (Figure 1.3). The improvement is could be attributed to improvement in production per animal of the dairy stock since there is very little increase in the stock numbers. The sub-County, however, is still a net deficit in milk production and relies on milk imports from the North Rift counties in Kenya and Uganda.

Table 1. 3. Livestock population trends

Species/crops		2013	2012	2011
Cattle	Grade/Crosses	3,590	3,570	3,515
	zebu	20,900	20,704	20,499
Goats	Local (meat)	7,665	6,660	6,500
	Dairy (Grade)	180	122	108
Sheep	Hair	-	6,150	5,890
Poultry	Indigenous	131,500	128,689	125,689
	Layers	1,000	600	2,000
	Broiler	1,200	1150	800
	Ducks	3,500	4,290	1,276
	Turkey	1,800	1,575	587
	Geese	375	252	143
	Cockerels			900
Pigs	-	-	10,368	10,432
Bee Hives	KTBH	300	349	346
	Langstroth	450	450	355
	Long hives	110	110	89
Donkey		21	0	0

Emerging livestock	Guinea fowl	600	692	765
	Quails	1,000	400	200
	Pigeons	1,600	1,590	1,650

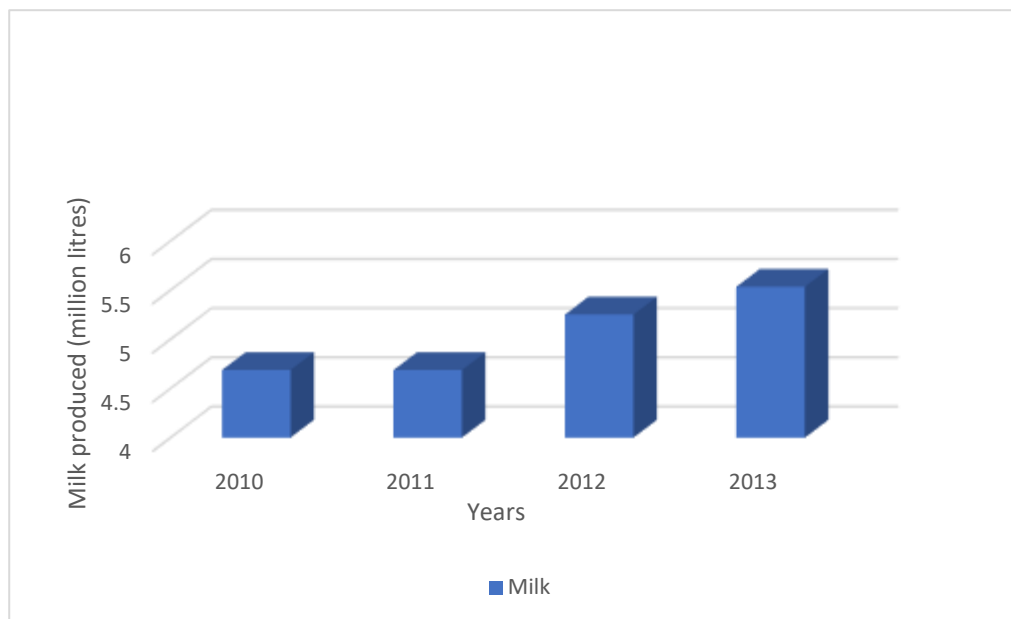


Figure 1. 3: Annual Milk production in Matayos sub-County (Ministry of livestock Matayos sub county reports 2010, 2011, 2012, 2013)

In terms of livestock improvement, most of the farmers use locally available bulls with low genetic potential for dairy as sires for breeding purposes. Only a few farmers use artificial insemination (AI) due to the high cost which ranges from US\$ 12.5 to 18.75 (KES 1200 to 1500). A.I. service providers are mainly located in Busia township. Indigenous poultry is also a flourishing enterprise in the three sites (Table 1.4).

## Livestock production systems

The most common livestock production systems in Matayos were:

- The **zero-grazing system** with well-designed units, practised by farmers with improved livestock and most common in Busia township (Burumba ward). Farmers in this category practice cut and carry feeding systems. Fodder is often chopped before feeding and supplemented with concentrate feeds.
- The **semi zero-grazing** mainly used for keeping crossbreed cattle. Cattle are kept in a fabricated zero-grazing unit (not build to standard) or tethered in the homestead during the day and provided with feed from the farm or collected from outside. This system is more common in Nasewa and Lwanya.
- Tethering and free grazing – mainly practised for local cattle and most common in Lwanya and Nasewa, where there are higher numbers of local cattle compared to Burumba.

In Busia Township, the majority of the farmers (70%) keep on average two improved TLU dairy cattle per household (Table 1.5), while in Nasewa and Lwanya they keep on average 1.4 to 1.6 improved TLU per household (Figure 1.4). Majority of the farmers selected for individual interviews had received support from Heifer International (international NGO) which buys starting dairy cows to

groups (the pioneer members allocated) and the heifers, from the cows, are passed on to other members as a gift. Both improved and local dairy cattle provide milk, manure and are sold as meat to supply substantial income when the need arises, and to meet other social obligations such as dowries. The improved dairy cattle are also sold as breeding stock. Dairy goat production is still at an early stage with only 10% of households in Busia township, having an average of one goat (Table 1.6). Majority of the farmers (90-100%) keep poultry for eggs, meat, manure and sale for income; and local goats (60%) for sale for income, meat and manure.

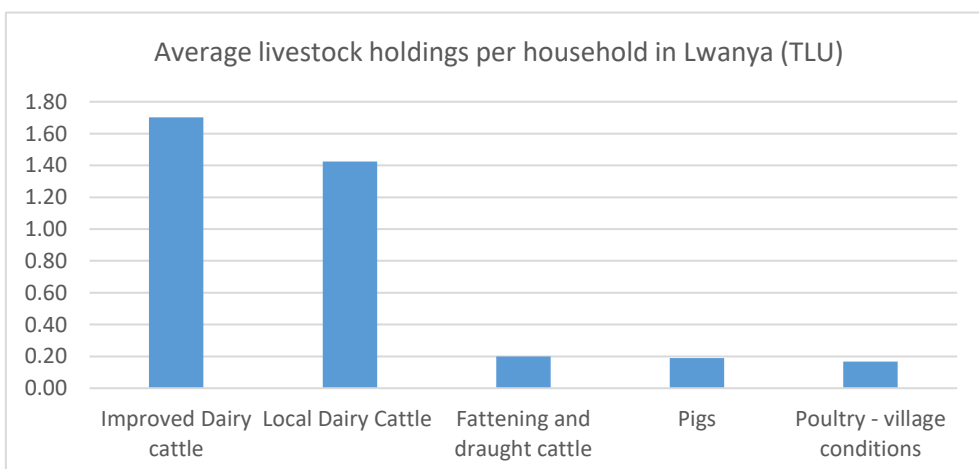
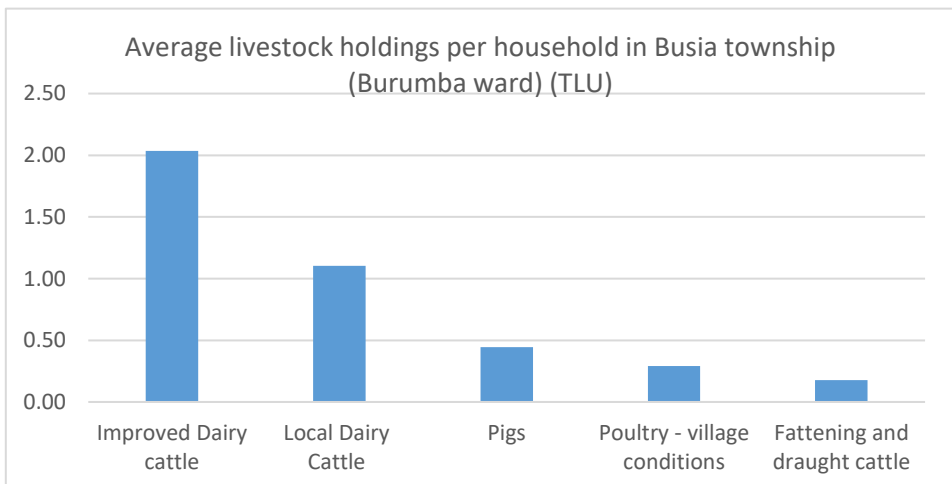
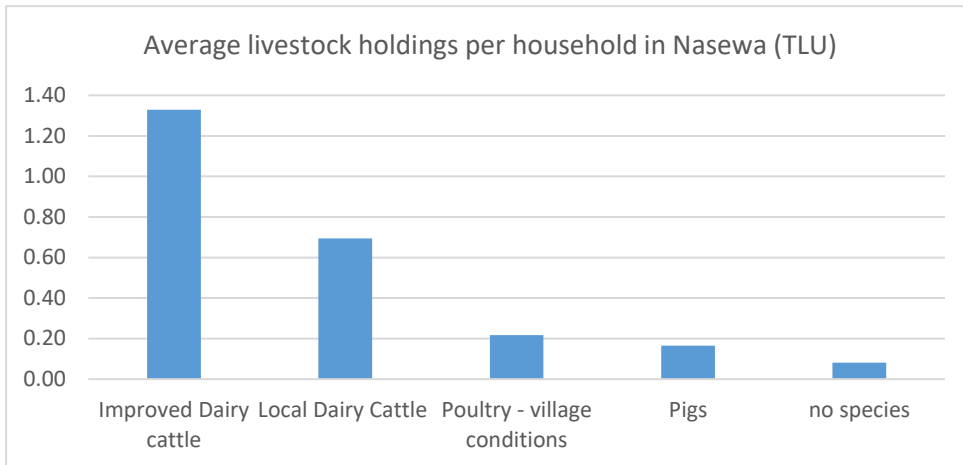


Figure 1. 4: Average livestock holdings per household - dominant species (TLU) in Nasewa ward (above), Burumba Township (middle) and Lwanya ward (below), Matayos sub-County

Table 1. 4. The proportion of farmers owning different species of livestock, average herds per household (HH) and use in Matayos sub-County

Livestock species	Use	Nasewa		Busia township		Lwanya	
		HHs owning the species (%)	Animals per HH (average no.)	HHs owning the species (%)	Animals per HH (average no.)	HHs owning the species (%)	Animals per HH (average no.)
<b>Improved dairy cows</b>	Milk, manure and breeding stock sale (income)	5	2	70	3	10	1
<b>Local dairy cows</b>	Milk, manure, meat and breeding stock sale (income), dowry	40	3	50	5	80	8
<b>Draught cattle</b>	Ploughing, crashing machine, transport and hiring/sale for income	5	2-4	-	-	10	1
<b>Sheep</b>	Meat, cultural activities and sale for income	10	2	-	-	40	4
<b>Local Goats</b>	Meat and sale for income	20	4	20	1	40	3
<b>Dairy goats</b>	Sale for income, milk, meat, manure	<1	1	10	1	-	-
<b>Pigs</b>	Pork, manure and sale for income	20	2	10	3	50	2
<b>Indigenous poultry</b>	Eggs, meat, manure and sale for income	90	30	100	25	100	> 10

<b>Commercial poultry</b>	Eggs, meat, manure and sale for income	30	<50	5	100	-	-
Quails	Meat, cultural and sale for income	<0.5	25	-	-	-	-
Guinea fowls	Meat, pet and sale for income	-	-	20	3	-	-
<b>Donkey</b>	Sale for income, draught power	-	-			2	2
<b>Rabbits</b>	meat, manure	-	-	<b>20</b>	<b>3</b>	-	-

Generally, livestock input services such as animal feed and veterinary drugs are available but were reported to be costly. Government veterinarians are mainly involved in vaccinations but are unavailable for routine animal health services. Private veterinary services are generally costly for most farmers. For example, treating East Coast Fever (ECF) will cost farmers KES 4,000 (\$50) per treatment and between KES 2500 to 3000 (\$24-29) for other tick-borne diseases. The farmers also reported that some of the private service providers are quacks and the farmers incur a loss of animals due to treatment failures. The most common diseases are East Coast Fever (ECF), mastitis and internal parasites (worms).

Artificial Insemination (AI) services are available in Burumba from private service providers. In Nasewa and Lwanya, the services can also be accessed from Busia Township, but the long-distance makes the service expensive. The cost for single insemination is KES 1,000-3,000 (\$12.5-37.5) depending on the breed and is inclusive of semen and transport. Majority of the service providers will charge for a repeating procedure, as the insemination often fail, and can cost the farmers from 50% to 100% of the insemination costs (depending on the distance). Improved bulls are mostly used for breeding at Nasewa and Lwanya at a cost of KES 500 (\$6.25) per service, while local bulls are offered at KES 100 (\$1.25). Because of diseases, some farmers with high yielders fear using local bulls. Therefore, the high rates of repeats coupled with the high cost of AI in Nasewa and Lwanya contribute to the low numbers of improved cattle.

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 in Busia town. The majority of farmers lack collateral due to lack of title deeds and/or fear of losing land in the event of default. Farmers also complained of high-interest rates and the short grace period for bank loans. Merry-go-round and Table banking are available within the communities but the capital available is low and cannot support most of the farming activities. The income generated, within the sub-County, is mainly from food crops, livestock and small businesses within and across the Uganda border. There are no major cash crops in the County since the collapse of the cotton industry. From the above information, the farming system can be classified as an integrated mixed crop-livestock production system.

## Feed types and feeding systems

About 80% of the farmers in Burumba Township and 10% in Nasewa keep improved cattle. The animals are usually stall-feed using cut and carry forages that are manually chopped with a 'panga' (local machete) or by a motorized chopper. Improved animals are often supplemented with commercial concentrates, such as dairy meal, maize bran and minerals, but not in adequate amounts due to the high costs. Local cattle are open grazed except in Burumba Township where some are tethered (limited grazing area). For the improved dairy cattle, men participate mostly in the forage collection while women participate in the feeding.

Napier grass is the main forage crop grown in Nasewa, Burumba (Township) and Lwanya. The hectare planted ranges from 0.2 in Nasewa and Burumba to 0.25 in Lwanya which is inadequate to feed a dairy cow throughout the year (Figure 1.5). Farmers in Nasewa and Lwanya also grow calliandra (*Calliandra calothyrsus*), leuceana (*Leucaena leucocephala*), desmodium (*Desmodium intortum* and *D uncinatum*) and sweet potato on very small acreages ranging from 0.01 to 0.05 again, and this does not meet the dietary needs of one dairy cow. A range of commercial and roughage feeds are purchased to supplement those animals grown on the farm. The purchased feeds (at all the locations) were mainly commercial mixed rations (dairy meal), cracked maize and fresh Napier grass (Figure 1.6). In Burumba, farmers interviewed did not mention Napier grass as a purchased feed. However, at the follow-up telephone call, all the farmers confirmed that 25 to 50% of the roughage consist of purchased Napier grass. Crop residues, mainly maize stovers and sweet potato vines, form the bulk feed during the dry season.

## Dietary composition

Naturally occurring and collected roughage feeds accounts for 64% and 54% of DM in the diet in Nasewa and Lwanya locations respectively, while in Busia township (Burumba ward) this accounts for only 13% (Figure 1.7). A significant contribution (49%) of total DM in Busia township comes from cultivated forage especially Napier grass. Similarly naturally occurring and collected feeds contribute highest ME (Fig 1.8). In Busia township (Burumba ward) cultivated fodder contributed the highest (46%) followed by purchased feeds (24%) while grazing is contributed the least due to the more urban settlement. This pattern could be attributed to the diminishing land sizes and the need for improved nutrition to sustain the improved dairy breeds. Driven by better access to the urban market for the sale of milk, there is a tendency to plant more fodder in order to meet the higher demands. Contribution to CP was highest (73%) from cultivated fodder in Nasewa, while in Lwanya the highest contribution was from grazing (41%) followed by cultivated fodder (37%). In Busia township, the highest contribution was from cultivated fodder followed by purchased feeds (Figure 1.9). The results presented above indicate that dairy production improvements in Matayos sub-County, regarding the nutrient intake, should be targeted to grazing and planted fodder. Supplementation of concentrates, especially in stall-fed animals in Busia township, should also be considered. Crop residues generally contributed the least DM, ME and CP intake in all the sites.

## Available feed resources

The available feed resources are shown in Figure 1.10. Natural pasture contributed the highest to the diet of animals, but the availability is lower in December, January, February and March. During these drier months, crop residues and green forage (probably from road reserves and along the rivers) were the most important roughage feed in terms of availability. Residues of maize, sugarcane tops, bean haulms and banana pseudostems are also important feed sources during the dry season. The harvesting index (the ratio of tonnes of utilizable crop by-product to tonnes of primary crop harvested) data demonstrated that

6.7, 4.2 and 7.1.6 tons of crop residues/household can be produced in Nasewa, Busia township and Lwanya, respectively. Weeds from cropping areas, along the riverbanks and roadsides, are mainly provided during the dry season. It was reported that some farmers offer crop residues (during the rainy season), before being let out to graze, in order to avoid the risk of bloating. According to respondents, no incidence of bloating happens if animals are offered some dry feeds like maize straws.



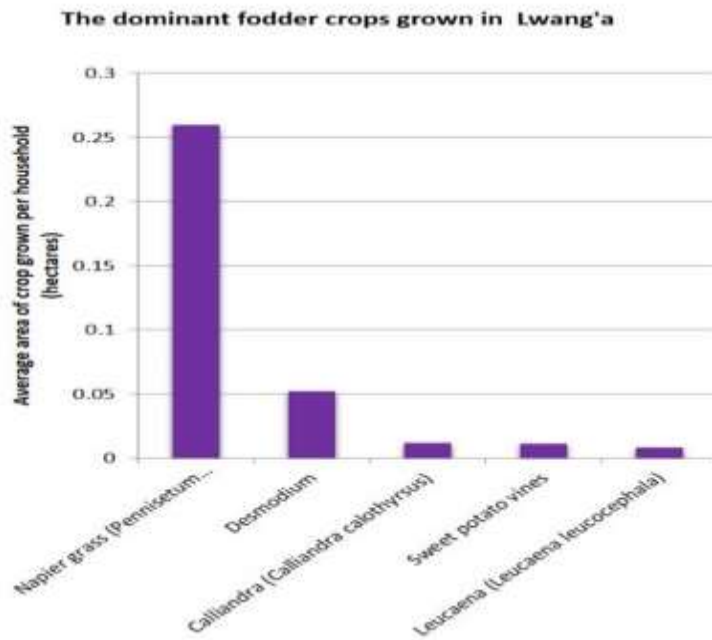
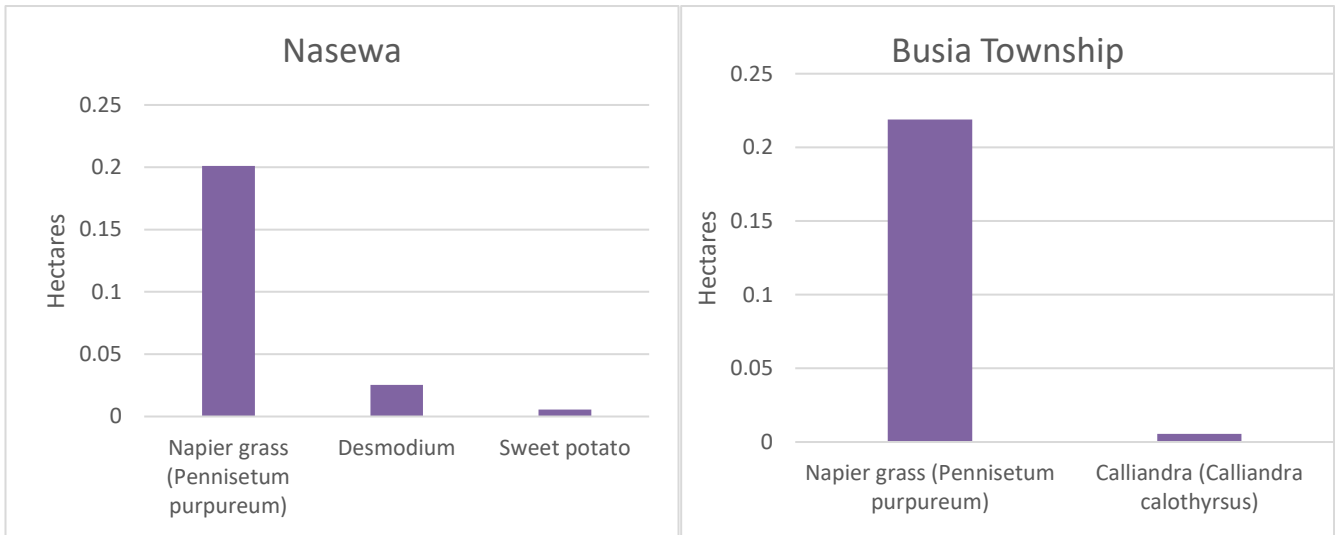


Figure 1. 5: The dominant fodder crops are grown in Nasewa ward (left), Busia Township (right) and Lwanya ward (below), Matayos sub-County

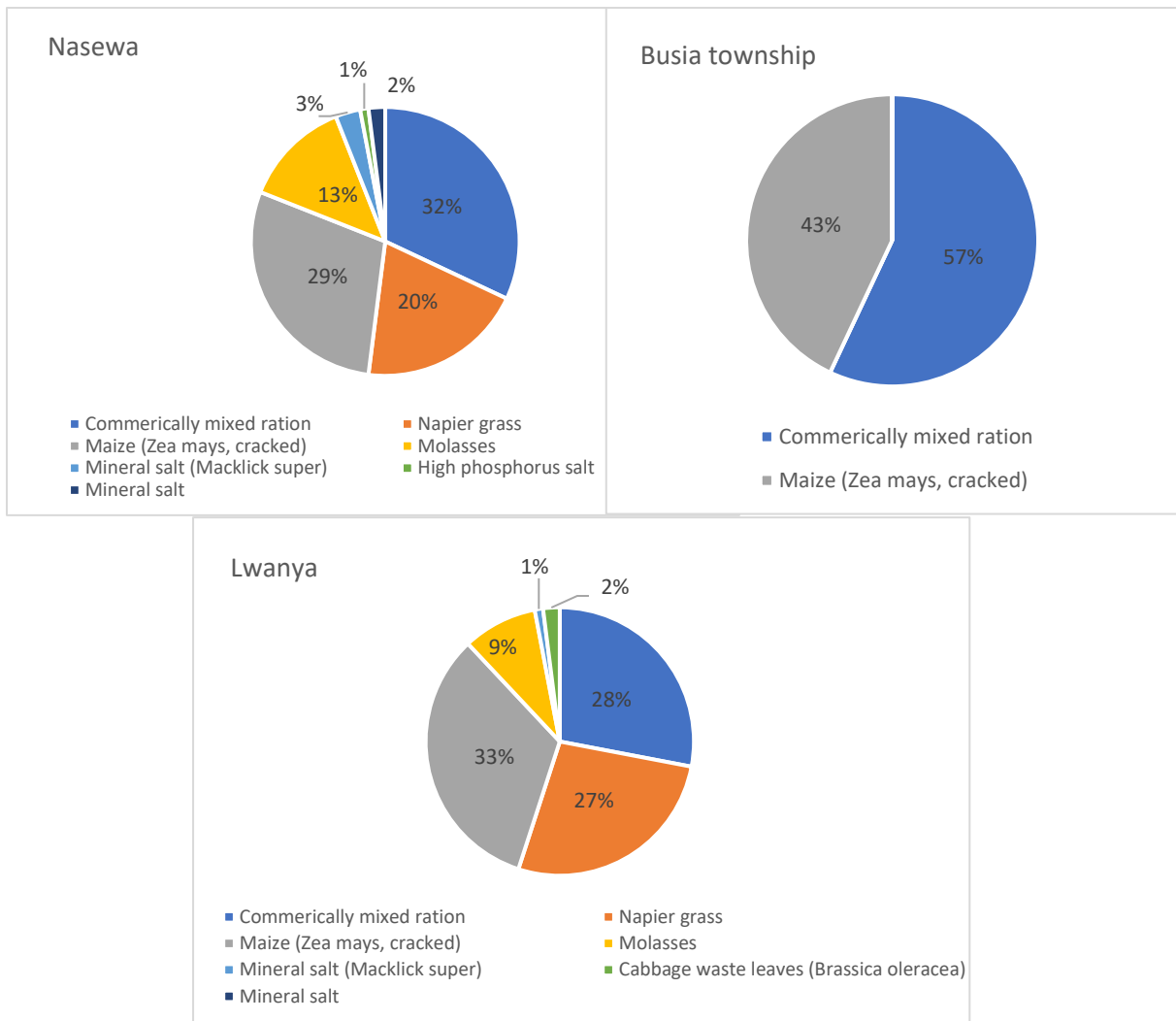


Figure 1. 5: Quantity of feed purchased over a 12mth period grown in Nasewa ward (left), Busia Township (right) and Lwanya ward (below), Matayos sub-County

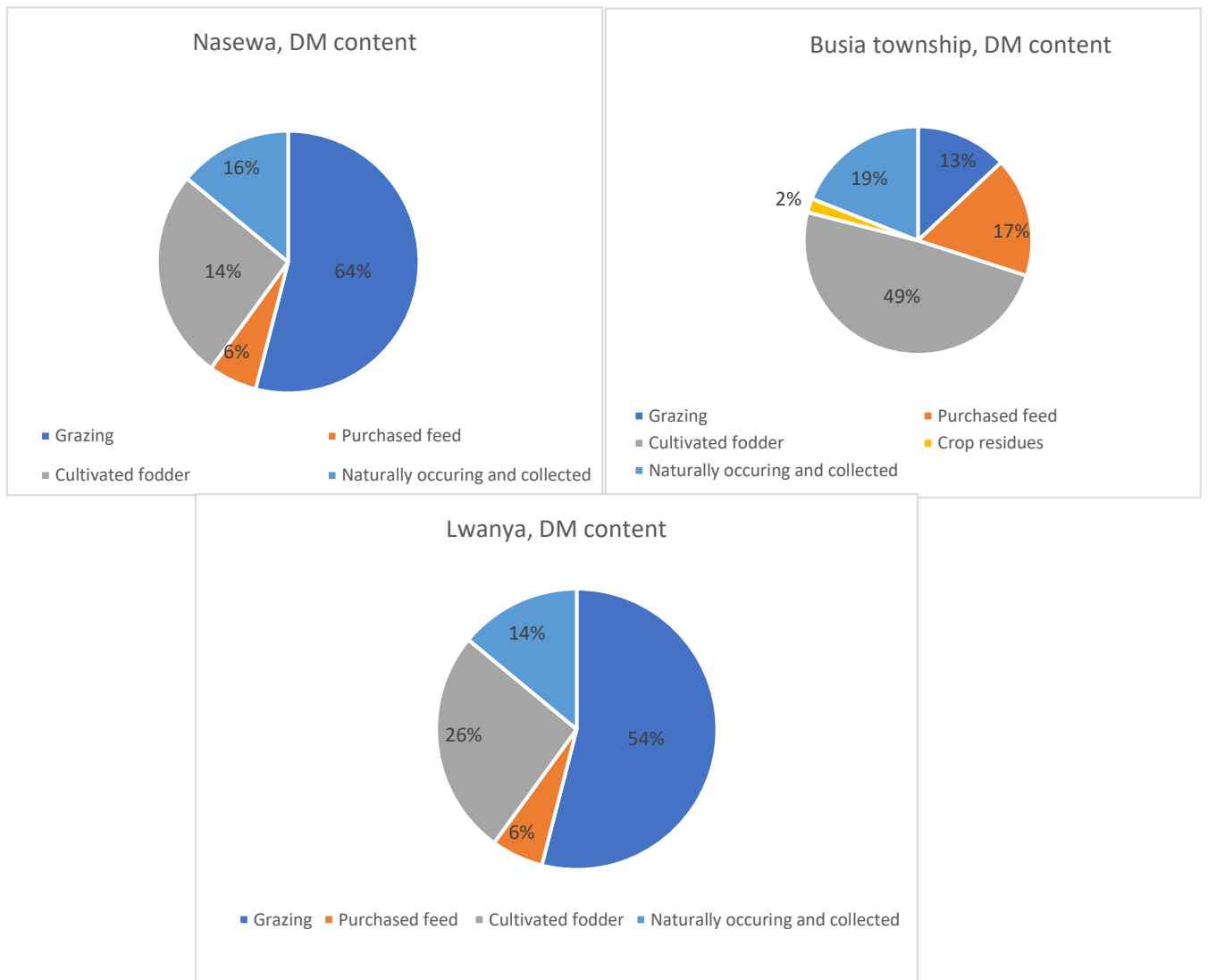


Figure 1. 6: The contribution of various feedstuffs to DM to livestock diets in Matayos sub county

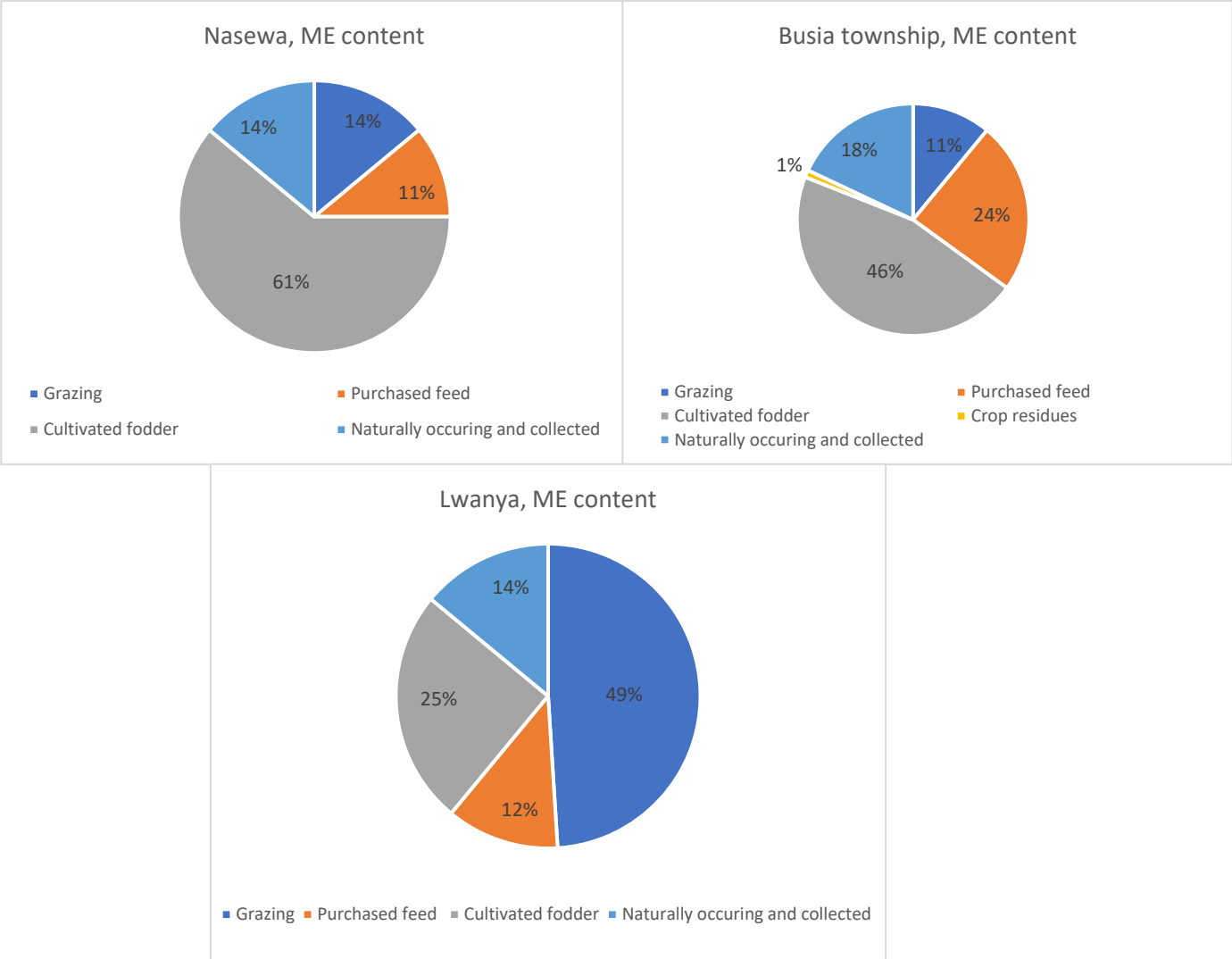


Figure 1. 7: The contribution of various feedstuffs to ME to livestock diets in Matayos sub county

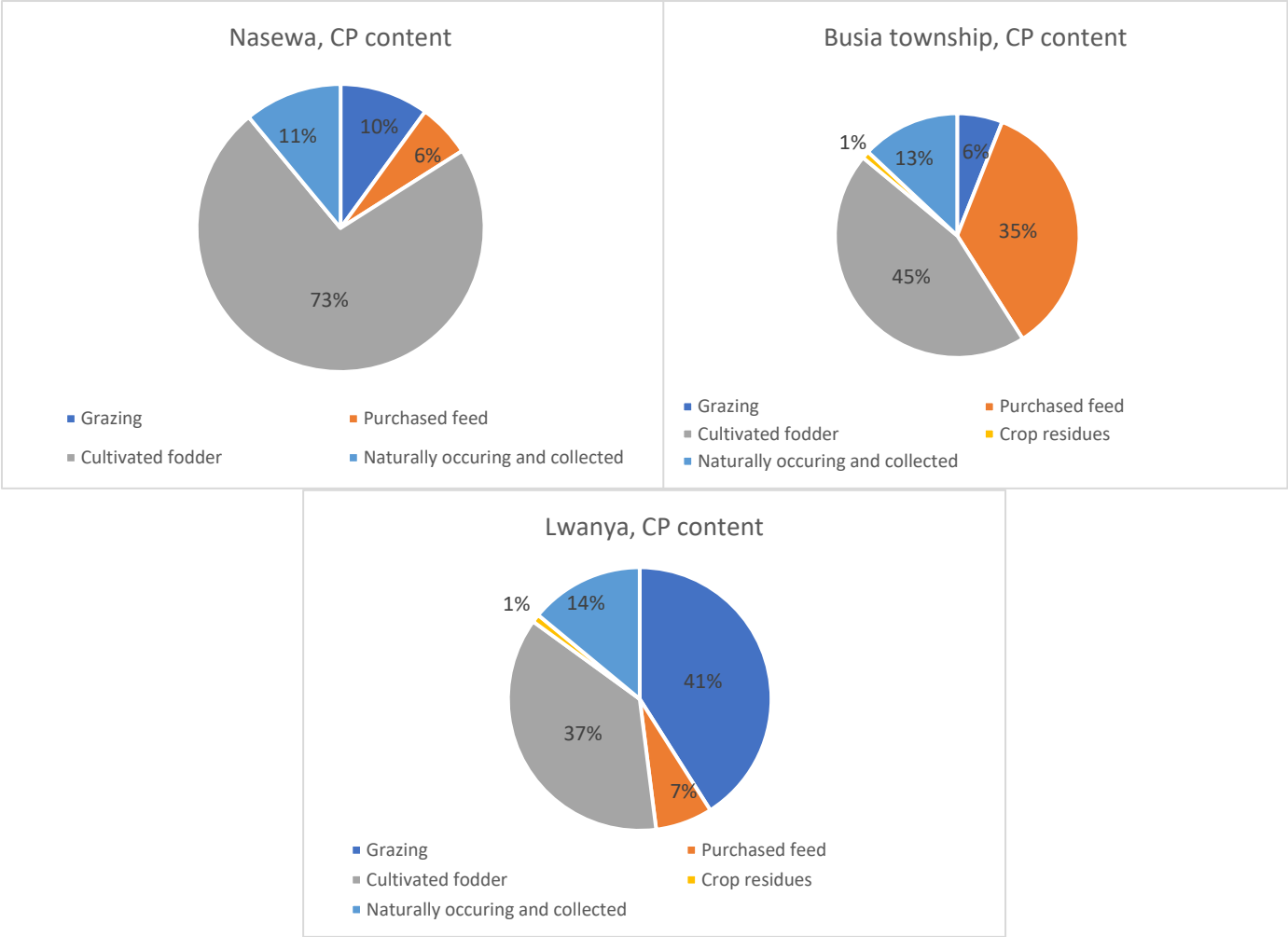
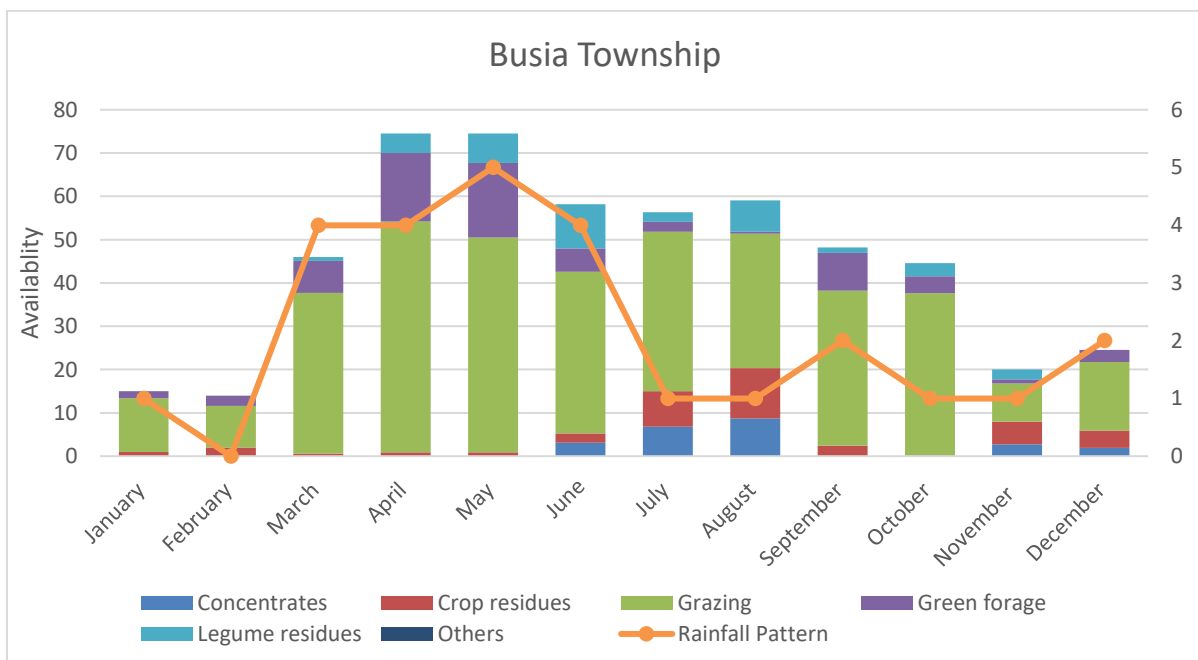
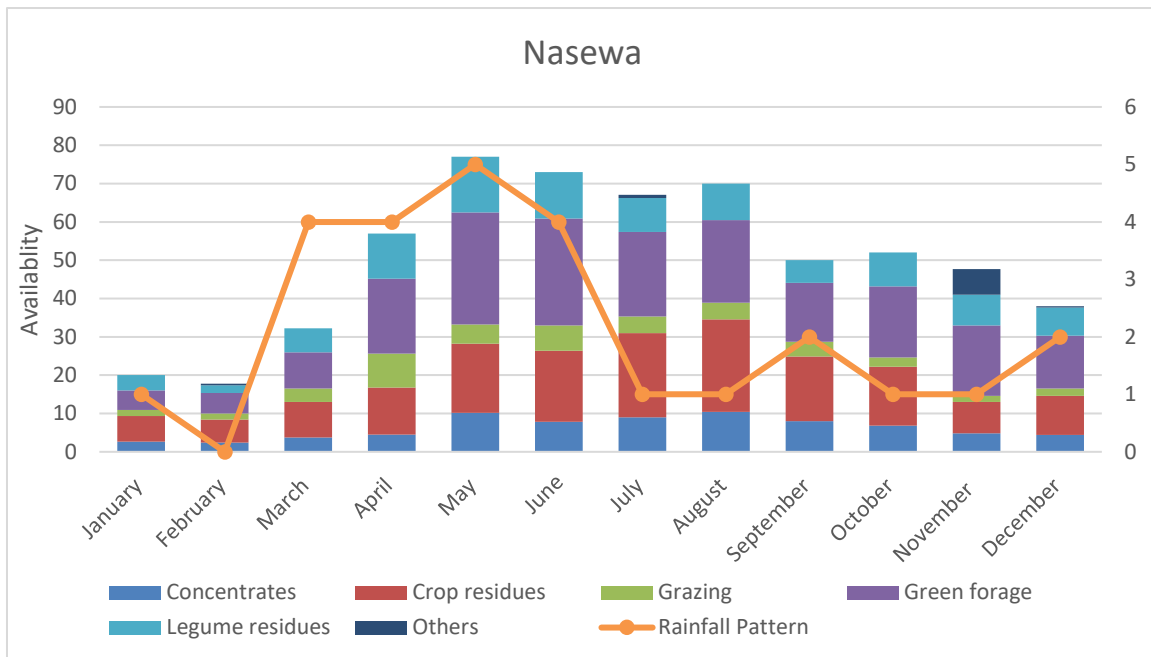


Figure 1. 8: The contribution of various feedstuffs to CP to livestock diets in Matayos sub county



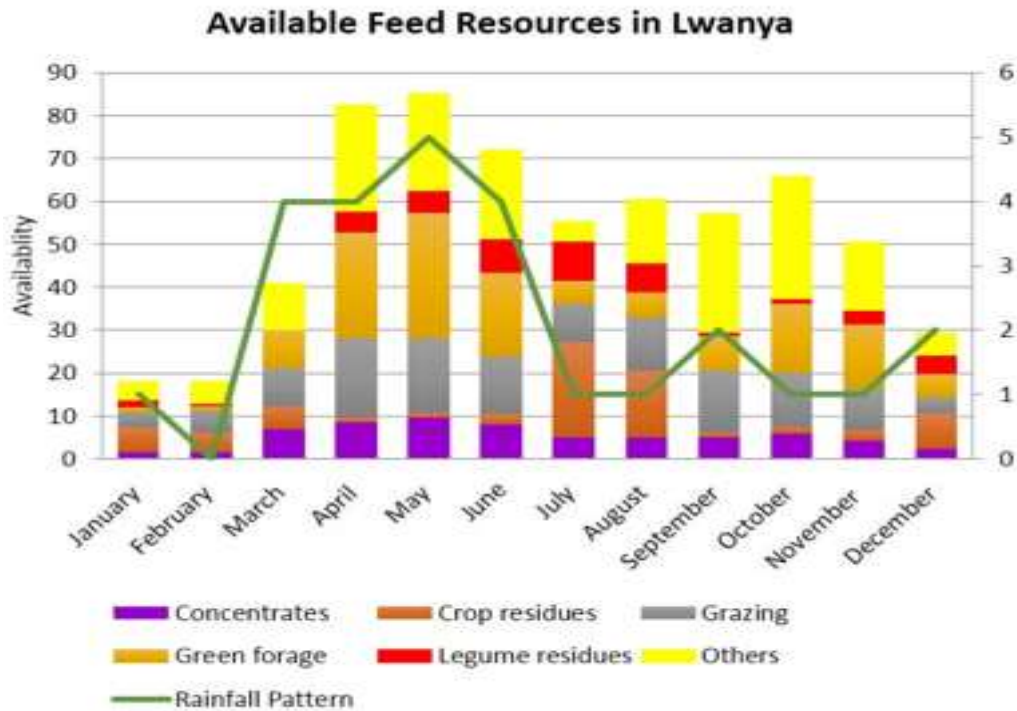


Figure 1. 9: Availability of feed resources in Naswea, Busia Township and Lwanya, Matayos sub-county, Busia County

### Major income sources

As presented in Figure 1.11, the main contributors to household income vary at specific sites. Cash crops (25%) is the biggest contributor in Nasewa and Busia township, and the cultivated crops are mainly from groundnuts. Dairy production (36%) is the biggest contributor in Lwanya, while food crops (23%) is the second major contributor. Off-farm business contributes significantly to household income (24% at each site) in Nasewa and Burumba but does not contribute to income in Lwanya. The results indicate the general importance of agriculture and livestock husbandry for the livelihoods in Matayos sub-County, with dairy and cash crops predominating especially in more accessible wards of Busia township and Nasewa.

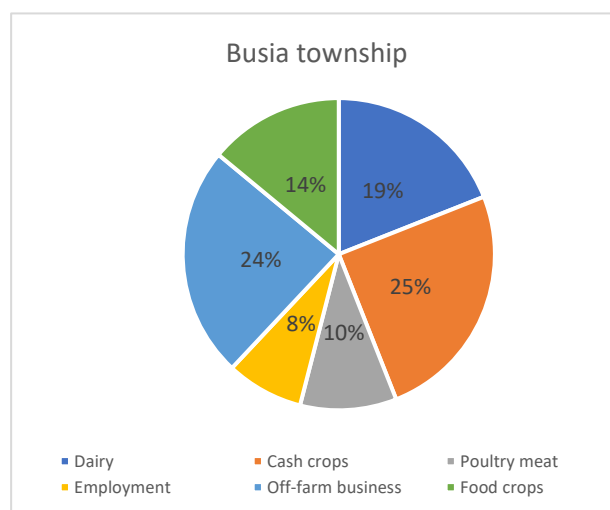
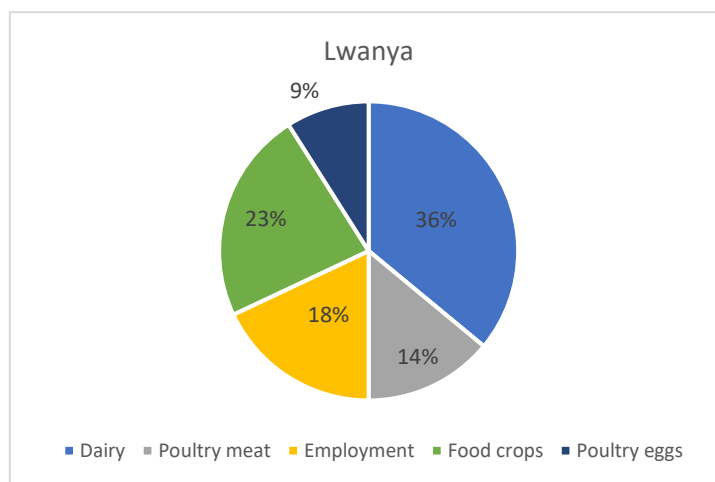
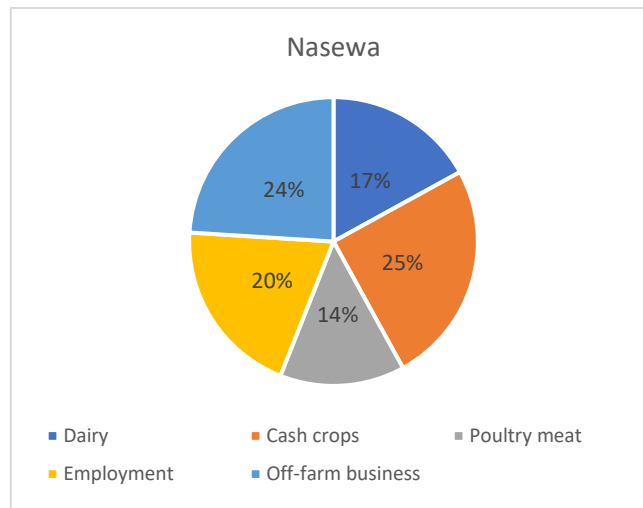


Figure 1. 10: Contribution of livelihood activities to household income (as a percentage) in Nasewa ward (left), BuSIA Township (right) and Lwanya ward (below), Matayos sub-County



## Challenges and opportunities

Overall, the main issues that farmers face in the farming systems are listed in Table 1.5. Inadequate animal feeds and costly animal health services were challenges in all the locations. Inadequate animal feeds, especially roughage, was attributed to Napier stunt disease and prolonged drought in all the sites, while limited land was a major constraint to feed production in Nasewa and Burumba (Township). The major disease problems were tick-borne infections, especially East Cost Fever and trypanosomiasis, as this is a tsetse flies infested zone. Cost of treating these diseases is KES 4000 (\$50) and KES 500 (\$62.5) for ECF and trypanosomiasis, respectively. Improved breeds were a priority in Nasewa and Lwanya. Both diseases treatment was considered to be costly in Nasewa and Lwanya as service providers are all located in Busia town. The cost of AI services ranges from KES 1500 (\$18.75) for local semen, to KES 8000 (\$100) for sexed semen (inclusive of transport). Farmers in Nasewa and Lwanya experienced high costs related to delayed services, which leads to 1-3 repeats. Bulls are available at a cost of KES 500 (\$6.25) but quality and diseases are a major concern to farmers. In Burumba, farmers considered milk marketing to be their third challenge due to lack of organized marketing, coolers/processing plants and competition with milk coming from eastern Uganda and from the North and South Rift Valley Counties of Kenya. Majority of the female farmers in Burumba cited labour and under zero-grazing to be of concern. Lack of credit is a problem for rural farmers but was ranked low by farmers in Burumba (Township). The list of potential solutions in Table 1.5 suggests that farmers require initial assistance from outside to help improve dairy productivity.

Table 1. 5. Ranking of main problems in livestock production and proposed possible solutions  
Matayos sub-County

Challenges	Ranking in Nasewa	Ranking in Burumba	Ranking in Lwanya	Possible solutions
Lack of/difficulty to reach milk markets	4	3	-	<ul style="list-style-type: none"> <li>• Ensure milk quality</li> <li>• Set up a milk cooling plant</li> <li>• Organize milk transport together</li> </ul>
Lack of improved breeds	4	-	3	<ul style="list-style-type: none"> <li>• Train and provide initial capital for local A.I. services providers</li> <li>• Acquire improved breeds</li> <li>• Address issues of dairy cattle fertility</li> </ul>
Inadequate technical knowledge on fodder, feeding management	-	-	4	<ul style="list-style-type: none"> <li>• More technical knowledge in feeds production, processing and feeding through training and tours</li> <li>• Reduce costs of feeds by procuring them together (cooperative) <ul style="list-style-type: none"> <li>• Training in record keeping</li> </ul> </li> </ul>
High costs of animal health services	2	1	1	<ul style="list-style-type: none"> <li>• Preventive strategies through effective tick control by the revival of communal dips and routine hand spraying</li> <li>• Vaccination campaigns</li> <li>• More technical knowledge in animal health services including hygiene</li> </ul>
Lack of credit facilities to invest in feed and commercial concentrates	3	-	3	<ul style="list-style-type: none"> <li>• Merry-go-round</li> <li>• Provide affordable credit facilities</li> <li>• Institute farmer-friendly collateral for loans</li> <li>• Form input access groups</li> </ul>
Inadequate feed (due limited land), Napier stunt disease and prolonged dry periods	1	2	1	<ul style="list-style-type: none"> <li>• Promoted Napier stunt disease tolerant fodders</li> <li>• Practice zero grazing</li> <li>• Credit facilities to hire land and invest in feed production</li> <li>• Conserve when it is in plenty</li> <li>• Plant variety of crops and conserve</li> <li>• Plant drought-resistant fodder and pastures</li> </ul>
High labour costs for Zero grazing dairy system	-	3	-	<ul style="list-style-type: none"> <li>• Provision of motorized Napier grass choppers</li> <li>• Access to credit</li> </ul>

s 1= most important problem according to the ranking matrix, 2= second most important, 3= third most important and 4=fourth most important

## **Conclusions**

Matayos sub-County is characterized predominantly by mixed crop-livestock production systems. Dairy and food crops are the primary sources of household income. Cattle are the most important livestock species. Farmers in Nasewa and Lwanya (Matayos ward) have predominantly local cattle while the majority of the households in Busia township (Burumba ward) keep improved dairy cattle. Improved dairy production is constrained by inadequate feeds and high cost of disease control in all the three sites. Lack of improved breeds in Nasewa and Lwanya and milk marketing are also constraints that require attention to improve or stimulate commercial dairy productivity in the sub-County. To mitigate these constraints, farmers (and other stakeholders) will be required to take an integrated approach to improve livestock production through (i) expanding the area under forage crops with crops more tolerant to Napier grass stunt disease and those more tolerant to drought, (ii) improving access to animal health and AI facilities to ensure farmers can rapidly upgrade the genetic merit of their cattle holdings (especially in Nasewa and Lwanya), (iii) access to credit facilities to enable farmers to invest in livestock production enterprises and milk marketing equipment and strategies.

## **Acknowledgements**

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