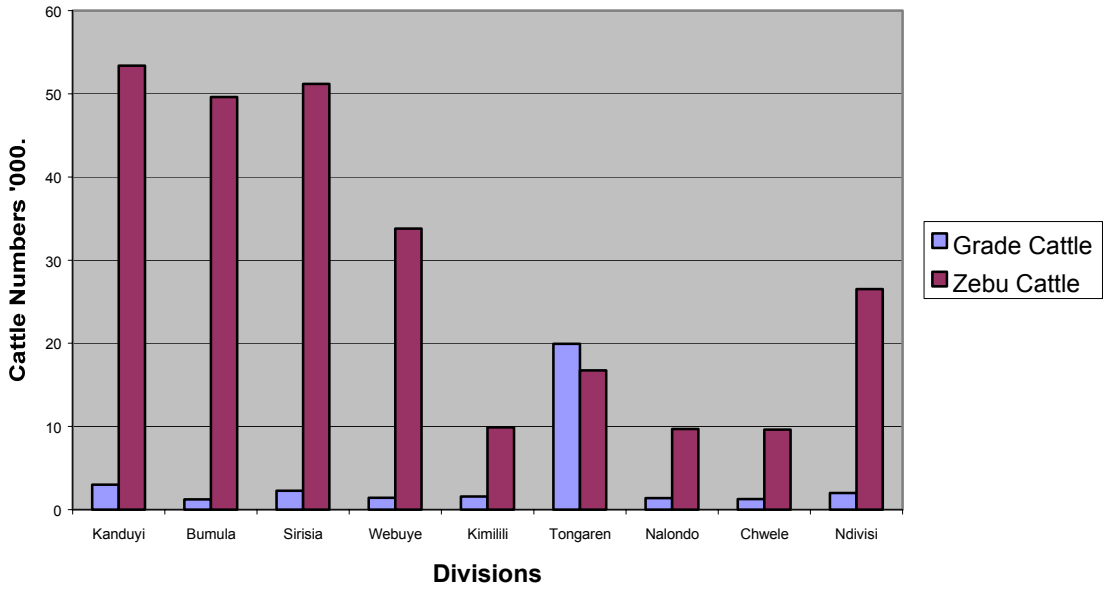
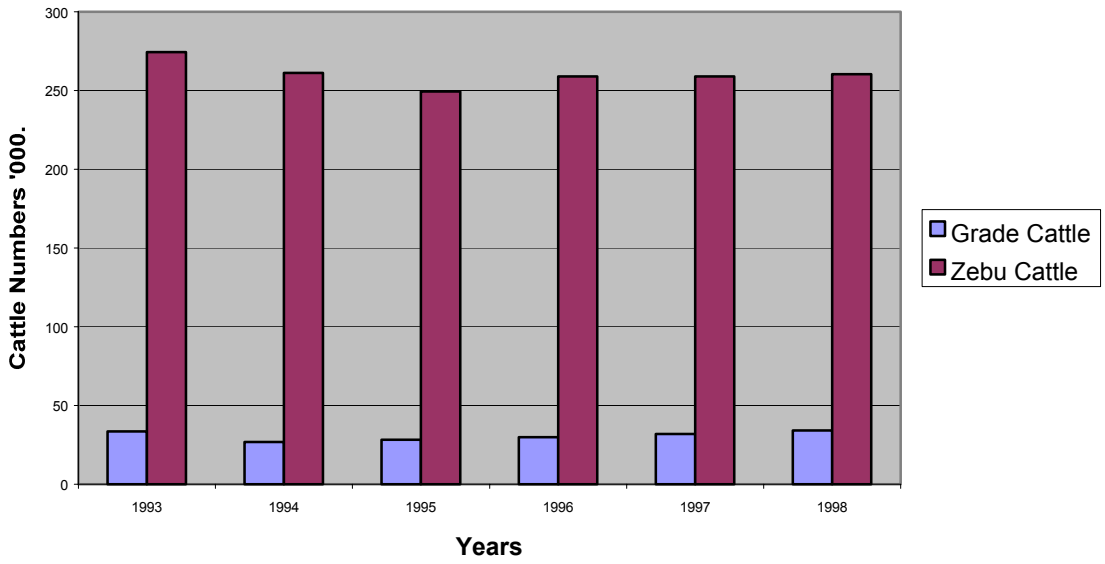
Nalondo, Kimilili and Chwele and this is mainly attributed to sugarcane and tobacco, major cash crops and farm income earners in those Divisions

Figure1. Cattle population ('000) and distribution by Division in Bungoma District (1998).



Source: MoARD Bungoma District Annual report (1998).

Figure 2. Cattle population ('000) trends in Bungoma district (1993 - 1998).



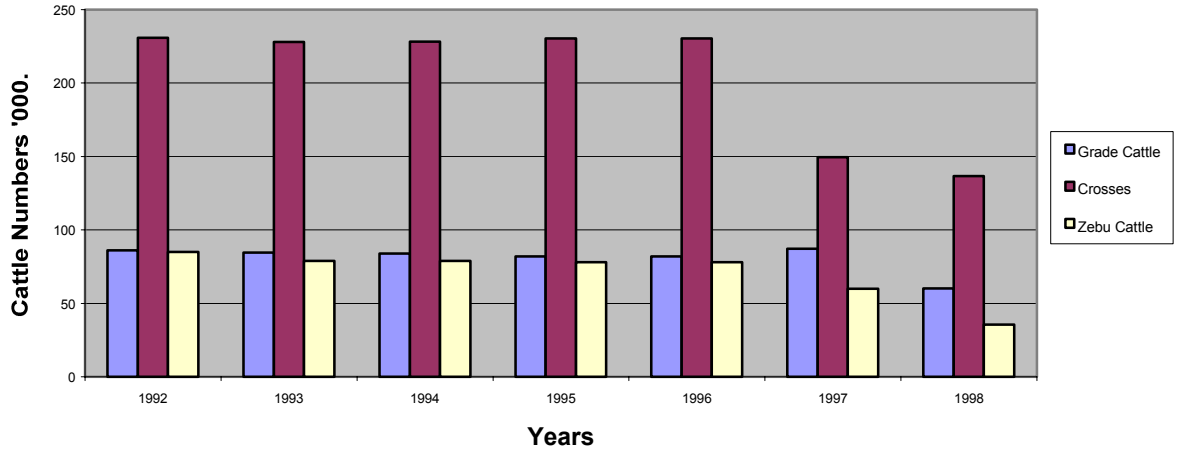
Source: MoARD Bungoma District Annual reports (1993-1998)

Nandi District

Nandi district is one of the districts in the Rift valley province and falls within RRC-Kakamega regional mandate. Uasin gishu District to the North and East, Vihiga, Kakamega and Lugari Districts to the West and Kericho and Kisumu Districts to the South border the district. It falls in the high potential region with a surface area of 1926 square kilometres of which 1401 sq. Km. is arable land. Forests, rocks, water and swamps cover the rest of the land. It has an average land size of about 7 acres per household (District Development Plan, 1997-2001). Administratively the District is divided into nine divisions (Kapsabet, Kilibwoni, Nandi hiils, Aldai, Kaptumo, Kosirai, Kabiyet, Kipkarren and Tindiret), 91 Locations and 283 Sub Locations.

The District is predominantly dairying with farmers keeping pure breed dairy cattle and high grade crosses with tea as the main cash crop. Zebu cattle are, however, still kept in the lower parts of the District neighboring Kisumu District, where sugar cane as a cash crop is grown. Cattle management in the District is mostly by grazing and semi-zero grazing with zero grazing on few farms. Development in the dairy industry in Nandi District unlike in the other Districts within the region could be attributed to the presence of Kenya co-operative creameries and other well organized milk processing and marketing societies. The proportion of high milk producing grade cattle is also high with the numbers of zebu cattle steadily reducing over the years (fig.3). There was, however, a drop in the grade cattle population in 1998 and in the exotic crosses between 1997 and 1998 and this was as a result of the prolonged dry season experienced between those years. Kilibwoni and Kabiyet Divisions of the District have the highest numbers of grade cattle and crosses with a few zebu cattle.

Figure 3. Cattle population ('000) trends by type in Nandi district (1992 - 1998).



Source: MoARD Nandi District Annual reports (1992-1998).

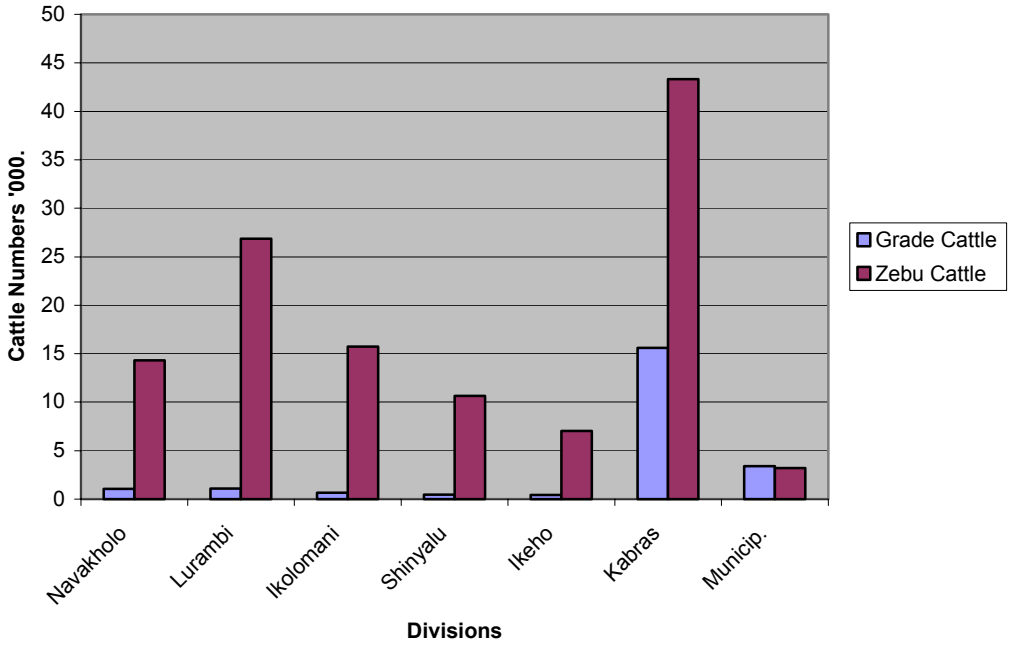
Kakamega District

Kakamega District borders Vihiga District to the South, Nandi and Uasin gishu Districts to the East, Trans nzoia and Lugari Districts to the North and Bungoma, Busia, Butere/Mumias and Siaya Districts to the West. The District lies between longitudes 340 20' and 350Eand latitudes 00 15' and 10N of the equator. Administratively, it is divided into seven (7) Divisions, namely; Municipality, Ikolomani, Lurambi, Navakholo, Ileho, Shinyalu and Kabras; 23 Locations and 82 Sub-locations.

The District covers a total land area of 916 square kilometres of which 879 sq. Km. is arable land and 37 sq. Km. is covered by Kakamega Forest. The District has about 100,760 farm families with an average family size of 8 persons per household and a mean farm size of 0.8 hectares (1.5 acres).

The total cattle population in the District is estimated at 144,275 (District Annual report, 1998). Out of this, less than 20% are dairy cattle. The population of dairy cattle has however been on the increase in all the Divisions within the District since 1996 except in Shinyalu division, where the population dropped from 1,010 in 1996 to 452 in 1998, because of an outbreak of Foot and Mouth disease. The population of zebu cattle during the same period has also been on the increase, with considerable increases in Ikolomani and Lurambi Divisions. It is only in the Municipality Division where there has been a big drop in the zebu cattle population from 5,766 in 1996 to 3,201 in 1998. This is primarily because of the pressure on land for urban settlement as a result of human population increase, hence cattle especially high value (grade) are reared under intensive cattle production systems; zero grazing and semi-zero grazing in few isolated cases. Kabras Division leads in the number of cattle, both graded and zebu and is followed by Lurambi, Ikolomani and Navakholo Divisions respectively.

Figure 4. Cattle Population ('000) in the Divisions of Kakamega District (1998).



Source: MoARD Kakamega District Annual report (1998).

Vihiga District

Vihiga District was curved out of Kakamega District in 1991 and now forms one of the eight Districts in Western Province. It borders Kakamega District to the North, Nandi District to the East, Kisumu District to the South and Siaya District to the South West. The District lies between longitude 34^0 30' East and 35^0 0' East and between longitude 0^0 and 0^0 15' North. The Equator cuts across the southern tip of the District. The District is 33 km wide from East to West and 19 km from North to South and occupies a total land area of 408 sq. km (District Development Plan, 1997-2001).

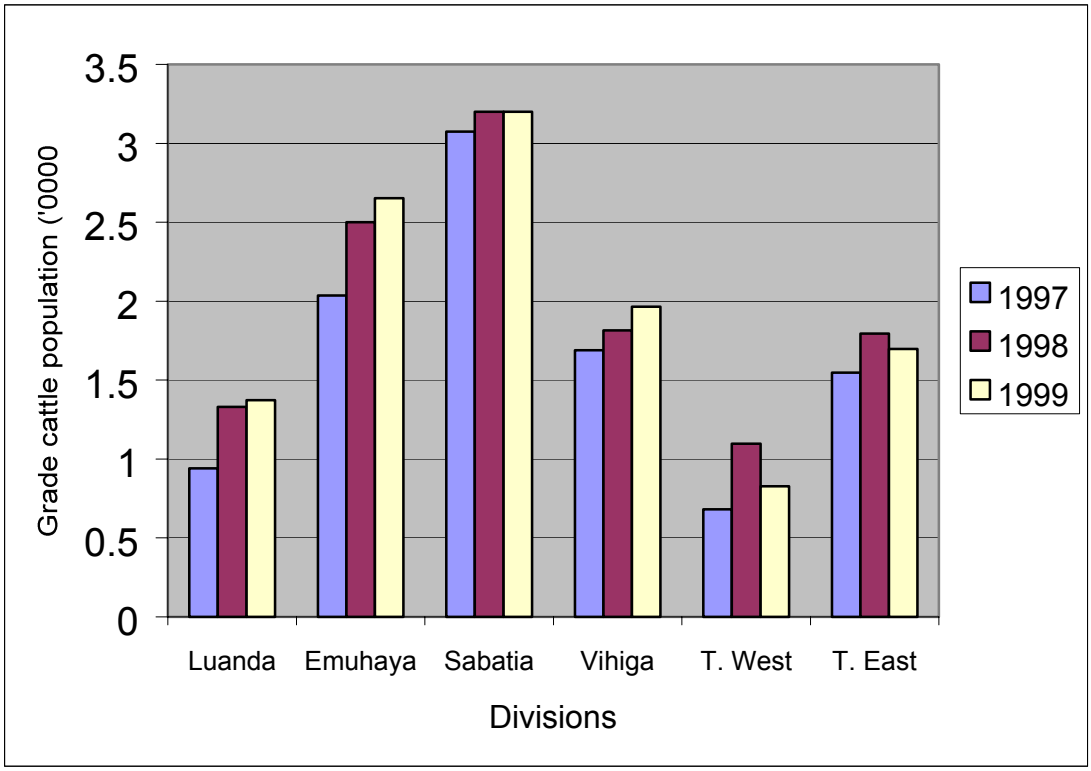
The District has about 75,000 farm families, with an average population density of 1050 persons per sq. km. The average family size is 8 persons per household with a mean farm size of 0.6ha (1.2 acres) (1989 Population Census Report). Administratively, the District is divided into six Divisions namely; Emuhaya, Luanda, Sabatia, Tiriki East, Tiriki West and Vihiga, that are further sub-divided into 27 Locations and 115 sub locations.

Due to lack of good quality feeds for exotic dairy cattle and their crosses and small size of land holdings, most farmers in the District still prefer to keep the local stock. There is however a shift towards intensive cattle production systems.

Ministry of Agriculture Rural Development reports from Vihiga District MoARD Annual Reports 1997-1999) shows that the cattle population in the district rose from a total of 135,350 in 1997 to 146,492 in 1998, representing an increase of about 8% (Appendix 1). By 1999, there was however a drop of 9% in the cattle population to a total of 133,109, the drop being mainly in the total population of Zebu cattle compared to the Grade cattle (Appendix 1). The major drop occurred in Sabatia division. Implying that there has been a departure from keeping indigenous breeds of cattle by some farmers in the District mainly due to the limited land space and the realization of benefits of keeping high value stock. There is no land in the District for communal grazing and the zebu cattle kept are restricted to owner's plots.

Figure 5 shows a steady increase in the population of grade cattle in Emuhaya and Vihiga Divisions between 1997 and mid 1999. The population of grade cattle as a proportion of the total cattle numbers has however fluctuated during the same period in the other Divisions of the District. The numbers of grade cattle in Sabatia Division increased more by 1999 compared to the other Divisions, probably due to the increase in dairy development projects

Figure 5: Grade cattle population ('000) trends per Division in Vihiga District (1997-1999)



Source: MoARD Vihiga District Annual Reports (1997-1999).

2.2 Cattle breeding programmes within the region

The main breeding systems are by natural service either using improved bulls introduced by various cattle development projects or the bulls and Artificial Insemination.

2.2.1 Artificial Insemination

This is very popular with farmers in the region and the service is being rendered by both the government and private groups. Artificial insemination services in the region have, however, not fared well because farmers opt to use natural service due to costs involved. The farmers find AI services expensive at the range of KSH 300 to 2000 depending on the quality and source of the semen and transport charges. Natural service dominates using locally owned bulls and bull schemes set up by the Livestock development project (LDP), Heifer Project International (HPI) and a few other Non governmental organizations (NGO) projects. Their impact for improving the dairy genotype is, however, so far low. The tables 5 and 6 below show the recorded inseminations for each scheme as offered by both the government and private groups in Vihiga, Bungoma, Nandi and Kakamega Districts, while table 7 shows semen distribution by cattle breeds in the same Districts.

Table 5. Government recorded inseminations per scheme (1998).

Station	Grade Cattle		Zebu Cattle		Total		Grand Total
	First service	Repeat	First Service	Repeat	First Service	Repeat	
Kakamega	556	280	44	08	600	288	888
Bungoma	583	260	103	13	686	273	959
Vihiga	682	138	116	34	788	174	963
Nandi	498	144	-	-	498	144	642
Total	**2319**	**822**	**263**	**55**	**2572**	**879**	**3451**

Source: Western Province. AI report, 1998.

Table 6. Private schemes recorded inseminations (1998).

Scheme (District)	Grade Cattle		Zebu Cattle		Total
	1st Service	Repeat	1st Service	Repeat	
MOCO (Kakamega)	938	258	136	48	1380
KARI (Kakamega)	18	8	nil	nil	26
Esabalu (Vihiga)	179	20	14	-	213
Lessos FCS (Nandi)	529	103	-	-	632
Kamno FCS (Nandi)	347	101	-	-	448
Tambache Malugei (Nandi)	69	1	-	-	70
Kopoch Farm	27	1	-	-	28
Total	**2107**	**498**	**150**	**48**	**2849**

Source: Western Province. AI report, 1998.

Note: Private artificial insemination services recorded for Nandi District excludes those offered by the University of Eastern Africa (Baraton), Kibabet Tea Estate and the American Breeding Services (ABS) based in Sabatia Division of Vihiga District.

Table 7. Semen distribution by cattle breed in Bungoma, Vihiga and Kakamega Districts (1998).

Station	Ayrshire	Friesian	Guernsey	Jersey	Boran	Sahiwal	Brown Swiss	Total
Vihiga	641	493	635	507	nil	nil	nil	2270
Bungoma	409	399	283	175	nil	7	nil	1339
Kakamega	357	206	269	56	nil	nil	nil	888
Nandi	275	250	76	41	nil	nil	nil	642
Total	**1682**	**1348**	**989**	**779**	**nil**	**7**	**nil**	**5239**

Source: Western Province. AI report, 1998.

However, a number of problems hinder proper delivery and expansion of artificial insemination services in the region and these include;

a) Lack of proper transport modes and poor road networks limiting accessibility to farmers on time after heat detection.
b) Lack of A.I containers i.e. they are not readily available in the market and the ones which are there are expensive hence not easily affordable.
c) Acquisition of A.I resources (semen) from C.A.I.S in Nairobi i.e. it is difficult to get these resources from there due to the distance and this increases the insemination costs rendering it unaffordable to most farmers.
d) Insufficient knowledge on management of fertility of dairy cows by the farmers.
e) Few technically competent inseminators employed by the groups.

2.2.2 Bull Schemes

There are quite a number of bull schemes established by the government through Livestock Development Project in Bungoma, Vihiga and Kakamega Districts to help improve the genetic potential of animals for increased milk production. In addition there are also privately owned bulls for the same.

2.2.3 Contract Mating

Mukumu farm in Kakamega District has Guernsey animals and operates a contract-mating scheme with semen imported from the United States of America (U.S.A) through the Central Artificial Insemination Station (C.A.I.S) in Nairobi. The imported semen is used for contract mating dams selected by the bull purchasing committee on the farm. The farm was established in 1927 by the Catholic Church and sells Guernsey animals to farmers in the region.

2.2.4 Progeny Testing

Bukura Farmers Training Centre and Bukura Agricultural College in Kakamega District and Mabanga Farmers Training Centre in Bungoma District carry this out on Aryshire breed of cattle, though on small scale.

2.3 Cattle Diseases

Cattle Diseases and pests have been identified as a major constraint to increased cattle productivity in the region (NARPII inception report, 1995). To realize optimum productive and reproductive performance from these cattle, it is vital to enhance efforts on disease control and pest management. Currently, the region is characterized by poor disease control strategies resulting into high morbidity and mortality of both the young and adult stock (District Annual reports, 1998). This is largely due to the high cost of veterinary drugs and deterioration in the quality of animal health care delivery systems in the region over the years.

The most prevalent cattle diseases in Bungoma, Kakamega, Nandi and Vihiga Districts include:

a) Tick Borne Diseases - East Coast Fever (ECF), Anaplasmosis, Babesiosis, Heart water and Black Quarter.
b) Worm infestations.
c) Nutritional and Metabolic disorders - Milk fever, Bloat and Avitaminoses.
d) Lumpy Skin Disease (LSD).
e) Mastitis.
f) Respiratory Disease ie Pneumonia, especially in young stock.
g) Helminthiasis - both worm and liver fluke infestation.
h) Foot and Mouth Disease (FMD).

Most communal cattle dips are non operational after the government withdrew their funding and left them to community initiative and management. Also high costs of accaricides has rendered them unaffordable by most small scale rural farmers in these areas. There are also no strategic and pre-determined vaccination campaigns against the various notifiable cattle diseases. It is therefore necessary to adopt an integrated approach (making optimal use of all the available control methods in a flexible way adopted to the local circumstances and to economic reality) in the management of these cattle diseases and pests. Also integration of locally available materials and technology (Indigenous Technical Knowledge) in control and treatment of these diseases is bound to reduce the costs and enhance sustainability.

2.4 Cattle feed resources and utilization

Dairy farming in RRC-Kakamega mandate region is mostly practiced under rain-fed conditions. The uneven rainfall distribution pattern across the agro-ecological zones influences the availability and quality of forages. Severe feed shortage in the region is experienced during the dry seasons between the months of December and February and during this time there is increased concentrates (bran, dairy meal, local brewers waste, molasses and spoilt maize) and crop by products (Stover, banana pseudo stems, sugar cane tops, sweet potato vines, bean hauls etc) usage. However during the wet seasons dairy cows are constrained by low intake owing to the high moisture content of grass based diets even though total available dry matter may be adequate in nutritional value. Smallholder dairy farmers in the region rarely practice any form of feed (pasture and fodder) conservation during this time when there are plenty of forages.

Dairy producers in high rainfall areas of the region depend almost entirely on Napier grass as the feed resource during the wet season and on crop residues during the dry season. Little commercial concentrates are used due to the high cost and in, some areas their unavailability. Technology to introduce forage legumes to improve quality and utilization of these grasses has not been adequately disseminated in most areas.

Currently, the pressure on land is increasing due to sub divisions and hence the feed resource production will need to be intensified to sustain dairying. Certain areas are characterized by frequent night frosts, especially during the cold months, others are water logged in rainy seasons, whilst other areas have low and erratic rainfall with frequent droughts. Adopted forages of high productivity need to be developed for these specific ecological niches. Systems of utilization to maximize nutrient intake by dairy cows from these feed resources are equally lacking.

It is therefore necessary to adopt technologies that could be used to improve on the feed quality and increase herbage production per unit land for the dairy enterprise. Ideally, the concept should be to provide adequate nutrition to the dairy cow, without a net reduction in food and/or cash crop production.

2.4.1 Vihiga District

The District is characterized by ever diminishing land sizes per household as a result of rapid human population increase and this remains a major constraint to cattle production. The forage resource base of the District continues to decline as the available land is put under crop production, both cash (i.e. tea, coffee) and food crops (i.e. maize, beans) and this limits the expansion of the dairy herd. There is minimal acreage of land under natural pastures (improved and unimproved) and in most cases animals will be found tethered or grazing along road reserves.

There have been fluctuations in the acreage of land under Napier grass over the years since 1992 (table 8). There is also quite a sizeable proportion of land under sweet potatoes, and this form a supplementary feed resource for the animals especially during the dry season between the months of December and February. There is thus a need to emphasize to farmers on the need for forage conservation to be fed to the animals during the dry season, and also on appropriate techniques of increasing herbage production per unit area of land without a net reduction in food and/or cash crop production.

Table 8. Fodder production trends in Vihiga District (1992- 1999)

Year	Napier (Acres)	Fodder trees (No. of stems)	Desmodium (Acres)	Sweet potatoes (Acres)
1992	2,431.4	17,726	5.5	
1993	2,561	26,725	17.3	
1994	2,897	46,996	20.5	
1995	3,031	77,850	23.7	
1996	3,159.8	64,030	23.0	
1997	3,938	89,554	22.9	
1998	2,630	107,900	11.5	
Mid 1999	2,920.5	150,600	19.5	187

Source: MoARD. Vihiga District Annual Reports, 1992 - 1999.

2.4.2 Kakamega District.

The District like Vihiga District is also characterized by diminishing land sizes over the years due to increasing human population hence putting pressure on the available land. There is very little land under pastures and fodder production in Kakamega District as much of it has been placed under cash and food crop production. However, Kabras Division of the District has a large proportion of land under natural pastures and fodder (table 9), and this explains why there is a high cattle population in the Division as compared to the other Divisions of the District. Forage conservation has also not been reported in the District and the need for this also has to be emphasized to the farmers.