

## **Challenges faced by smallholder dairy farmers in Kirinyaga County, Kenya**

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**Abstract:** *In Kirinyaga County, dairy cattle production is one of the most important agricultural activities practiced by the smallholder farmers, who own between one and three acres of land. The aim of this study was to document challenges faced by farmers in the County. Epidemiological data was collected using a questionnaire survey administered to 244 respondents. The study revealed that 60% of the cows produced between 1- 4 litres of milk and those who produced over 8 litres per day were 25 %. The farmers who sold their milk to the neighbors could only sell about 4 litres per day and they were the majority (87%). Those who sold over 8 litres to the neighbors accounted for 5 % only. For deworming, the farmers gave first priority to milking cows 51 %, calves 35 % and pregnant cows 10 %. The common species of helminthes identified as affecting their cattle were Roundworms (Njoka) which accounted for 42%, tapeworms (Ndanguru) 15.2% while 37.1% were Flukes (Ndambara). Over 70% of farmers noted that availability of feeds was a major challenge in cattle rearing. In conclusion, the farmers were well aware about the types of challenges, they encounter in cattle rearing.*

**Keywords:** *Worm awareness, Production practices, cattle husbandry and management*

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Date of Submission: 26-07-2017

Date of acceptance: 14-08-2017

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### **I. Introduction**

Agriculture is the single most important sector in the Kenyan economy and it contributes approximately 25% of the Gross Domestic Product [1]. Over 80% of the Kenyan population lives in the rural areas and they derive their livelihood directly or indirectly from agriculture [2]. In Africa, Kenya is ranked as one of the largest dairy producer [1]. The smallholder dairy farmers in Kenya dominates the industry at the production level and they account for 75-80% of the milk produced [3]. In general, farmers owns two to five herds of dairy cattle which are reared on 3 to 5 acres (1.2 to 2.0 ha) of land [4,5]. Of the national cattle herd, dairy breeds constitute about 3.3 Million of the total 12 M cattle, 40% of which are pure-bred while 60% are cross-bred [6, 7]. Milk production is in excess of 3.1 billion litres per year and the country is self-reliant in milk and milk products except in years of drought [6]. In Kirinyaga County, livestock production has been shown to be one of the most important agricultural activities [8]. Despite the central role of the smallholder farms in the dairy industry in Kenya, 'production levels are lower than their potential [9]. A number of constraints hamper increased production in these systems, which include diseases, poor management, inadequate nutrition and lack of farm inputs among others [9]. Therefore, the overall aim of this study was to document challenges faced by smallholder dairy farmers in the County.

### **II. Material And Methods**

#### **1.1 Description of study area**

The study was conducted in Kirinyaga County, Central Kenya that covers approximately 1,478 Km<sup>2</sup>, which is 11.2 percent of old Central Province. It has an estimated population of 455,000 people and a population density of 309 persons per square kilometer. The County is located between latitude 0° and 0°40' south and longitude 37° and 38 ° east. The county consists of 21 locations and 80 sub locations. The sub locations comprises of a number of smallholder farms totaling to 114,439 households. The county lies between 1,480 m above sea level in the south to over 6,800m above sea level at the mountain peak. Mt. Kenya, which is volcanic mountain, lies to the northern side of the county.

#### **1.2 Sampling procedure**

A questionnaire was developed and survey conducted on the social economic and farming characteristics of smallholder farmers in Kirinyaga County and was administered to randomly selected farmers.

The data was collected using stratified random sampling with three strata as the uplands, midlands and the lowlands zones and the samples from each stratum were selected using simple random sampling technique.

### 1.3 Data collection

Questionnaires that had been pretested were used to collect detailed information on farm characteristics, socio-economic factors and management practices of smallholder farmers in the County. The questionnaires were closed ended to ease precision of responses and it was administered to respondents at the farm level through face to face interviews.

### 1.4 Data entry, handling and analysis

Data were first entered into Ms Excel program (Microsoft Corporation, USA) and screened for errors that might have occurred during the entry. Any error detected was corrected by rechecking against the original data forms, and later analysed using SPSS Statistics version 19 (SPSS, Inc. Chicago).

## Results

### 1.5 Milk production, sales and value of animals

Results on milk produced and milk sold in Kirinyaga County are presented in table 1.

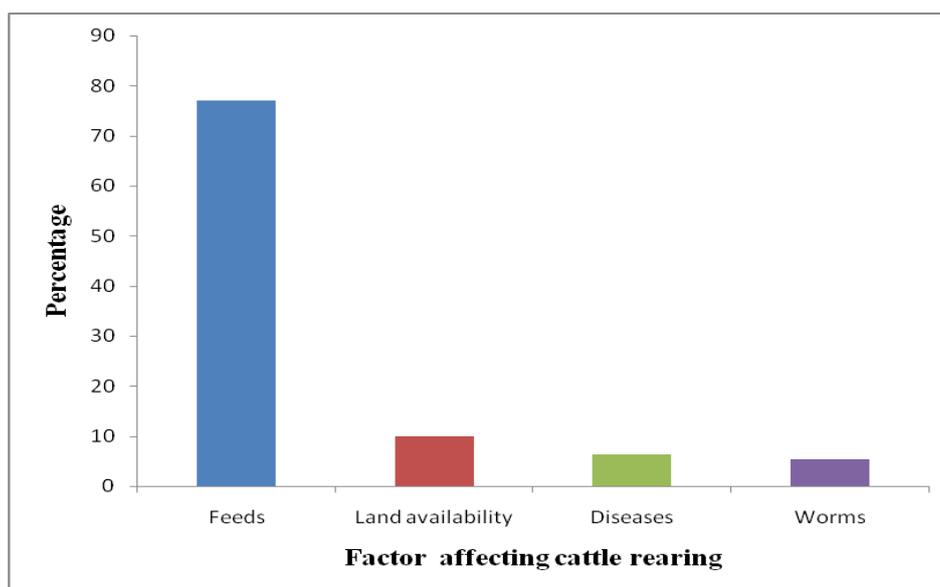
**Table 1:** Milk produced and sold in litres by farmers in Kirinyaga County, Kenya

Milk produced (L)	% of farmers	Milk sold (L)	% of farmers
1 to 4	60%	1 to 4	87%
4.1 to 8	22%	4 to 8	9%
> 8	25%	> 8	5%

The results demonstrated that, farmers whose cows produced over 8 litres per day accounted for 25 %, while those producing 4 to 8 litres of milk were 22%. Eighty seven percent of the farmers sold 1 to 4 litres, followed by 9 % who sold 4 to 8 litres of their milk to the neighbors per day. Those who sold over 8 litres to the neighbors accounted for 5 % only.

### 1.6 Factors affecting cattle rearing

The factors affecting cattle rearing in Kirinyaga County are presented in figure 1. Farmers in all Agro Ecological Zones agreed that the main problems they encountered in rearing cattle, were feeds (77 %), land availability(10 %), diseases (6.3%), and worms (5.4%) in that order.



**Figure 1:** Problems associated with cattle rearing in Kirinyaga County

### 1.7 Farmers worm awareness

Results on farmer's awareness on worms affecting their cattle are presented in table 2.

**Table 2:** Awareness of the worms in Kirinyaga county

Agroecological zone	The most common worms perceived to be affecting their animals most (local name)				
	<i>Njoka</i>	<i>Ndanguru</i>	<i>Ndambara</i>	<i>Thundo</i>	<i>Mahuri</i>
Uplands	11.6%	6.3%	3.1%	0.4%	0%
Midlands	17.0%	7.6%	11.6%	0%	0%
Lowlands	12.9%	1.3%	22.3%	0.4%	2.2%
Total	41.5%	15.2%	37.1%	0.9%	2.2%

Key: *Njoka* = Roundworms, *Ndambara* = Flukes, *Ndanguru* = Tapeworms, *Thundo*=Oesophagostomum, *Mahuri*=lungworms

Forty two percent of the farmers knew about roundworms (*Njoka*), 15.2% tapeworms (*Ndanguru*) and 37.1% flukes (*Ndambara*). Other helminths, like *Oesophagostomum*, and lungworms were least identified. Furthermore, farmers were conversant with the helminths which affect their animals from their respective agro-ecological zones as indicated by their response to a question seeking to identify them. Round worms were the most commonly identified in all agro-ecological zones while lungworms were not reported in the uplands and midlands. Furthermore, Oesophagostomum was not reported in the midlands. In the lowlands however, all the four helminths were reported with flukes being the most common.

### 1.8 Challenges in cattle husbandry and management

i) Perceived source of helminthosis in cattle in Kirinyaga County	Factors	% response
	Grass	17
	Dirty feeds	12
	From other cattle	1
ii) Sources of water for livestock in Kirinyaga County		
	Piped water	31
	In Pastures	6
	Streams and Rivers	51
	Others	10
iii) Sources of pasture for livestock in Kirinyaga County		
	Grown in their farms	58
	from neighbourhood	5
	Bought	27
	Others	8
iii) Distance travelled by cattle for pastures in Kirinyaga County		
	0 to 1km	84
	1 to 2km	7
	2 to 3km	9
	> 3km	9
iv) farmers reasons for dipping their cattle		
	Control ticks	85
	control diseases	10
	prevent diseases	4
v) The distribution of the cost of deworming a cow per year		
	0 to 400 Kshs	29
	401 to 800 Kshs	55
	801 to 1200 Kshs	9
	> 1200 Kshs	8

Seventy one percent of farmers attributed water as the main source of helminthosis and 17 % felt that their cattle were infected by worms through grass. Those who felt that their cattle were infected by worms due to dirty feeds were 12 % while only 1 % thought that their cattle got infected due to worms from other animals. The source of water for livestock in Kirinyaga County during dry and rainy season was mainly from streams and rivers (51%) with about 6% of farmers having water available in pastures or grazing areas. About 58% of farmers got animal feed grown within their farms, and 27 %, were buying forage for their animals. Buying of forage was the second largest source of feed with other sources of fodder being rice straws acquired from the rice growing areas. Cattle moved some distance to acquire pastures with 84 % of the animals travelling for about one kilometer, 7 % (1-2) kilometers, while 9% travelled between 2 and over 3.0 kilometers. The majority of farmers (85%) dipped their animals on the reason of controlling ticks while less than 10% to control and prevent diseases. On the distribution of the cost incurred on deworming a cow per year, 55 % of the farmers spent between Ksh 400-800, while those who spent over Ksh 1,200 were the lowest with (8 %). Those who used up to Ksh 400 per cow per year were 29% and those spending from Ksh 800 to 1200 per cow per year were 9 %.

### III. Discussion

Although the farmers reported that dairy farming and milk production was their main economic activity, this was not reflected by data because there was generally low milk productivity per cow with 87% of farmers only producing about 4 litres of milk per day. The observation made in Kirinyaga County concurs with information that “despite the central role of the smallholder farms in the dairy industry in Kenya, production

levels are lower than their potential and continue to decline”[10, 11]. The low milk productivity in the county is attributed to unavailability of feeds, lack of land for provision of fodder and prevalence of diseases. These are among the major problems farmers encounter in the study area. The study demonstrated that majority of farmers (77%) indicated that unavailability of feeds was their biggest challenge to their cattle rearing in addition to scarcity of land. These findings were consistent with other previous studies. For instance, [12] reported that farmers in Nyandarua considered diseases (75%), high cost of supplementary feeds (70%) and inadequate pastures (60%) as the main production constraints. [13] Reported a scenario in Kiambu district where lack of intervention strategies led to low milk productivity and poor sales, a situation which was encountered in this study.

On the level of worm awareness in Kirinyaga County, 42% of the farmers knew about roundworms (*Njoka*), 15.2% tapeworms (*Ndanguru*) and 37.1% flukes (*Ndambara*). Other helminths, like *Oesophagostomum*, and lungworms were least identified. In Nyandarua County, Kenya it is reported that 75% of farmers deworm their cattle indicated a high level of awareness of the helminths and their effects to cattle [12]. On the perceived sources of helminths, it was apparent that farmers were associating water as the main source of helminth infection. Water availability was mainly from the rivers and streams both in dry and wet seasons. Communal watering spots, the irrigation canals and the rice paddies were common sources of water in the lowland areas of Kirinyaga County. Marshy, areas are well known to harbor the intermediate vectors for a number of disease causing organisms [14]. Another source of helminths could be pastures. These were available in the farmers’ land, while others were buying fodder for their cattle. Roadside grazing was also a common practice by some farmers in the upland and midland areas. It was apparent that majority of cattle were grazed within the farms and travelled about one kilometer for search of fodder, implying that cattle had access to feeds fairly easily. In the lowlands farmers graze their cattle in paddies after rice is harvested and along the canals where grass is available [14]. The lowland farmers indicated that they recognize flukes to be the most dominant as compared to other helminths. The marshy and the irrigated paddies are a good habitat for flukes where snails which are the intermediate host of Flukes can thrive. This concurs with the farmers’ perception that flukes were their main recognized helminth. This report is in agreement with studies done in Nepal and Peru, where Fascioliasis was reported to be prevalent in the rice growing areas [14].

Farmers were also very clear that they were dipping their cattle for the purpose of tick control which was a good indication that tick control programs were in place. This possibly contributes to the reduction of the tick borne diseases in the study area as was similarly reported [12, 13] for Murang’a and Kiambu Counties. Other than tick-borne diseases, helminth infection, especially subclinical gastrointestinal nematode infections, are among the major health problems limiting the productivity of dairy animals [15, 16]. Economic losses are caused by gastrointestinal parasites in a variety of ways. The losses can be through lowered fertility, reduced work capacity, involuntary culling, a reduced feed intake, lower milk production, treatment costs and mortality in heavily parasitized animals [17]. The effects of these infections, even when the worm load is low can be aggravated by other factors which causes stress, such as frequent drought or concurrent infections which may be present in such areas. Such low levels of infection have been described as the most economically important form of infection that may lead to unthrifty animals which become more susceptible to other infections [18].

#### **IV. Conclusion**

From this study it is concluded that low productivity of milk per cow was due to unavailability of feeds and lack of land for provision of fodder. The farmers valued the milking cows because of the milk production aspect and calves as replacement stock. Farmers were highly aware of helminthes as a major constraint to the dairy cattle rearing in Kirinyaga County. It is recommended that farmers need to be assisted through extension services to overcome the challenges identified.

#### **Acknowledgements**

The author thank the Jomo Kenyatta University of Agriculture and Technology for partially funding this study and the Director of veterinary services for allowing this research to be conducted within his jurisdiction.

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F K Njonge. “Challenges faced by smallholder dairy farmers in Kirinyaga County, Kenya .” *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, vol. 10, no. 8, 2017, pp. 71–75.