Dairy Cattle Productivity after the Post Election Crisis in Uasin Gishu District of Kenya

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ABSTRACT

The dairy sub sector is one of the most important of the agricultural sub sectors in Kenya, contributing to 5% of Kenya's GDP. The estimated annual consumption of milk stands at 3.1 billion litres. Although there was a steady agricultural growth to about 6% between 2003 and 2007, other emerging challenges as high production costs have emerged. These were compounded by the post election crisis (PEC) after the disputed Presidential elections which saw the looting of property including livestock, leading to a decline in the sector. The objective of the study was to determine the dairy productivity after the PEC. The survey was done in four designated project areas namely, Turbo, Kapseret, Kessess and Ainabkoi. Primary data was collected by use of structured questionnaires from 194 systematically selected farmers. The data was then analyzed by use of the SPSS. The results show that 67.53% of the farmers had lactating cows; the average number being 1.2 cows. The numbers of all the livestock categories (lactating, dry, bulls and steers, and calves) reduced after the PEC. Despite a higher mean production of 10.67 lts/day for pure breeds, this was not significantly different from the average production of 7.38 lts/day among the crosses. This implied that the milk production potential of pure bred dairy cattle was yet to be exploited. It is recommended that development agencies focus on all production and management initiatives to enable farmers exploit existing potential.

Key Words: Dairy productivity, Uasin Gishu, Kenya

INTRODUCTION

Background to the Study

Although food production outpaces population growth in most regions, the demand for food is mounting and many of the world's people are going hungry (World Bank, 2004). In the first two decades after independence, Kenya's agricultural sector grew at an average of 6% per annum. This growth recorded an annual average of 3.5% between 1980 and 1990; 1.3% between 1990 and 2000, and 0.7% in 2002. The declining agricultural productivity was identified as a major cause of food shortages, unemployment, low incomes and poor nutritional status (RoK, 2001). Although a steady growth to about 6% was observed between 2003 and 2007, other emerging challenges as high costs of production due to fertilizer, fuel and machinery costs have emerged. These were compounded by the post election crisis (PEC) after the disputed Presidential elections. The PEC saw destruction and looting of property including livestock, leading to a decline in milk production.

Following the crisis, development agencies including the Anglican Church of Kenya saw the need to revitalize the sub sector. The ACK was therefore supported by the Food and Agriculture Organization to implement the Dairy Sector Support Programme after the PEC in Uasin Gishu district. The project aimed at restoring livelihoods for farmers and building peace through heifer restocking and subsequent inter-community heifer exchange. There was therefore the need for a study to profile the dairy sub sector situation in the PEC areas to inform how the project should be implemented.

The Dairy Sub sector

The dairy sub sector is one of the most important of the agricultural sub sectors in Kenya contributing to 5% of Kenya's GDP. The estimated annual milk production stands at 3.1 billion litres. More than 600,000 smallholders, with between one and three cows, currently produce 80 per cent of Kenya's milk. Most dairy consumption is as liquid milk, and the preference for raw milk is high even in urban areas; the exception is Nairobi, where consumers drink more pasteurized milk.

In 2007, dairy farming remained the leading enterprise among all other livestock in Uasin Gishu from which farmers earned KShs. 1.93 b from the sale of 107 million kgs of milk. This was a 20% increase from the 2006 production. The main market outlets are New Kenya Cooperative Creameries (KCC) ltd., private processors, mini dairies, milk bars and small scale mobile traders. It is estimated that there are about 359,644 cattle in the larger Uasin Gishu District of which 76,556 are pure bred, 251,480 are crosses, and 31,608 are indigenous. Of this population, the number of lactating cows was estimated at 134,868 (GoK, 2007).

At the targeted project divisions (Turbo in Eldoret West district, Kapseret and Kessess in Wareng district and Ainabkoi in Eldoret East district), the livestock population is as shown in table 1.

Table 1: Cattle Population by Breed in the Study Area

New District	Project Division	Number of Cattle by Breed			Total
		Pure Breed	Crosses	Indigenous	
Eldoret West	Turbo	8,274	27,176	3,414	38,864
Eldoret East	Ainabkoi	26,471	87,132	10,929	124,532
Wareng	Kapseret	6,412	20,600	2,648	29,660
	Kessess	9,474	31,187	3,912	44,573
Total	4 Divisions	50,631	166,095	20,903	237,629

Source: Compiled from GoK, 2007

From the above data, it is evident that Ainabkoi division in Eldoret East district is the leading division in the number of all cattle breed categories, followed by Kessess and Turbo in that order.

METHODOLOGY

The Survey Area

The baseline survey was conducted in the months of January-February 2010 in four designated project areas in the larger Uasin Gishu district, which comprises the three new districts of Eldoret East, Wareng and Eldoret West. One project site was identified in both Eldoret East and Eldoret West, but two sites were identified in Wareng, owing to a greater impact of the PEC (in Wareng). In each of the districts, the divisions that suffered greatest impact of the crisis were selected. These included Ainabkoi division in Eldoret East, Turbo division in Eldoret West and Kapseret and Kesses divisions of Wareng.

Objectives of the Study

The overall objective was to perform an in-depth analysis of local needs of dairy households in four (4) selected areas of the larger Uasin-Gishu district. Specifically, the study sought to profile the situation before and after the PEC on the dairy sector and recommend on how the dairy sector support programme could be implemented.

The Sample Frame

The study's sample frame was the small scale dairy farmer affected by the impacts of the Post Election Crisis (PEC). In this frame, two clusters were identified depending on the perceived impact of the PEC on the respondents. These were those who were "***most affected"*** and the "***least affected***" by the PEC. In the PEC terminology, the most affected generally constituted those communities who were displaced from their farms during the crisis while the least affected generally constituted those who remained at their farms but may have been affected in one way or another. In the course of data analysis, a group which was termed as that with "***intermediate effects***" emerged. This group mainly belonged to neither of the most affected, nor the least affected categories, but were more vulnerable to the crisis than the least affected group. The least affected respondents were sampled from locations adjacent to the locations of the most affected respondents. A sample size of 194 respondents was achieved.

Data Collection and Analysis

The study used literature review to understand the dairy sub sector, its supportive infrastructure and various economic activities in the project area. Following this, interview schedules were used to gather data and information from key informants who included the District Veterinary and the District Livestock Production Officers. Observation and photography was used to capture relevant information in the survey area, particularly on dairy cattle condition, farmer coping strategies and dairy farms' outlook which reflected the farmers' management capacity. Further, questionnaires were used to collect a wide range of data on dairy farming from farmers.

The data and information were then collated and analyzed to enable the drawing of inferences regarding the dairy sub-sector in the study area. This included data coding, entry and statistical analyses in the Statistical Package for Social Scientists (SPSS) and MS Excel programs. Hypothesis testing for significant difference in dairy breed productivity was done by t-tests. The results were then presented in appropriate cross tabulations,, pie charts and graphs.

RESULTS AND DISCUSSIONS

The Number of Respondents Interviewed by Gender

Generally, more male respondents across categories were interviewed. However, there was adequate representation of both genders in the survey. The number of respondents consisted 118 male and 76 female representing 60.8% and 39.2% respectively (Table 2).

Table 2: Cross Tabulation of Respondent Category by Gender

Respondent Category	Number and Frequency of Respondents by Gender				Total	
	Male		Female			
	No	%	No	%	No	%
Most Affected	59	30.4	38	19.6	97	50.0
Least Affected	51	26.3	22	11.3	73	37.6
Intermediate	8	4.1	16	8.2	24	12.4
TOTAL	118	60.8	76	39.2	194	100.0

The family size of respondents ranged between 1 and 11 with an average of 7 household members. The age ranged from 21 to 87 years with an average of 50.65. On the other hand, farm size ranged between 0.1 and 70 with a mean of 4.95 acres.

Dairy Sector Analysis of the before and after PEC

Current Livestock Statistics

The livestock category owned by the largest number of respondents was poultry with 142 farmers having between 1 and 150 birds and a mean of 9.6 birds. Only 52 respondents out of the total 194 -26.8%- had no poultry. This was closely followed by the lactating cows with 67.53% of the farmers having at least one (range 1 to 10) with a mean of 1.2 cows. Table 3 shows these statistics.

Table 3: Livestock Statistics by Category

Livestock Category	Respondents with Category		Livestock Statistic	
	No.	Frequency (%)	Maximum	Mean
Lactating cows	131	67.53	10.00	1.2268
Dry	54	27.84	10.00	.4588
Heifers	43	22.16	8.00	.3608
Bulls & Steers	35	18.04	4.00	.2784
Calves	104	53.61	7.00	.8660
Poultry	142	73.20	150.00	9.6289
Sheep	83	42.78	16.00	1.7629
Goats	19	9.79	12.00	.3866
Pigs	4	2.06	4.00	.0361
Beehives	23	11.86	10.00	.4021
Donkeys	10	5.15	3.00	.0722

Given that the minimum number for each of the livestock categories was zero, this statistic is not reflected in the table. It is conspicuous that pigs are a very rare livestock category among the farming community with only 4 farmers (2.06%) having between 1 to 4 pigs.

Current Cattle Herd Composition

The analysis of the herd composition shows that the majority of the herd comprises the lactating cows at 39% followed by calves at 27%. The least in proportion is the bulls and steers category at 9%, which is good indication in a dairy herd (figure 1).

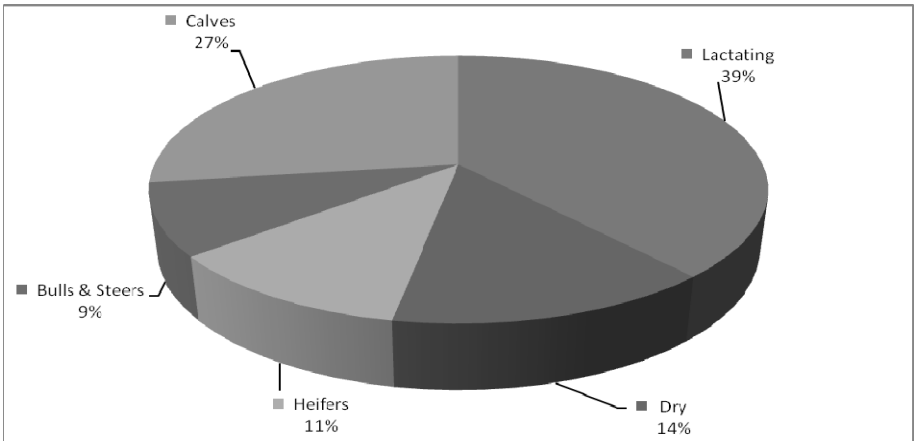

Figure 1: The Cattle Herd Composition after the PEC

Just as with the farm sizes the total number of cattle (TNCattle) owned by the farmers was skewed towards 3 (figure 2).

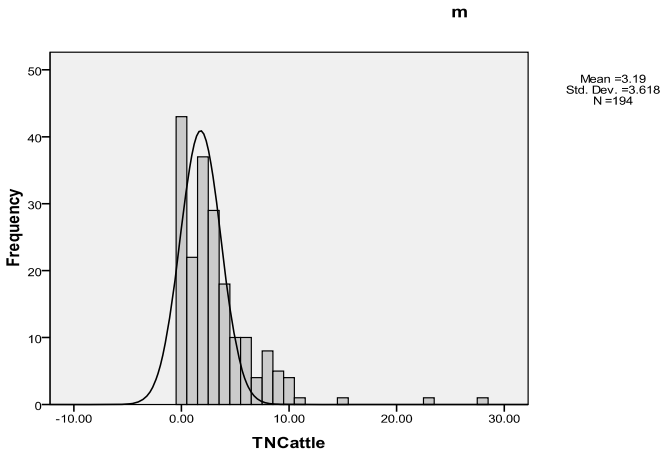

Figure 2: Histogram of the Number of Cattle

Current Types of Breeds

The farmers in the project area keep crosses, pure breeds and indigenous cattle. The most popular breed is the cross breed with 61.3% of the farmers keeping them., However, the pure breeds are less common with only 2% of the farmers keeping them (table 4).

Table 4: The Number and Frequency of Cattle Breeds by Respondent Category

Respondent Category	Number and Frequency Cattle Breed						Total	
	Crosses		Pure		Indigenous			
	No	%	No	%	No	%	No	%
Most Affected	50	25.8	3	1.5	7	3.6	60	61
Least Affected	56	28.9	1	0.5	8	4.1	65	89
Intermediate	13	6.7	0	0.0	5	2.6	18	75
TOTAL	119	61.3	4	2.0	20	10.3	143	74

The Livestock Categories before and after the PEV

This indicates that all the livestock categories have reduced in number among the respondents. For example the numbers of lactating cows have reduced from an average of 2.6 to 1.2 per respondent. The same trend exists for the dry cattle, bulls and steers, and the calves. Figure 3 illustrates this.

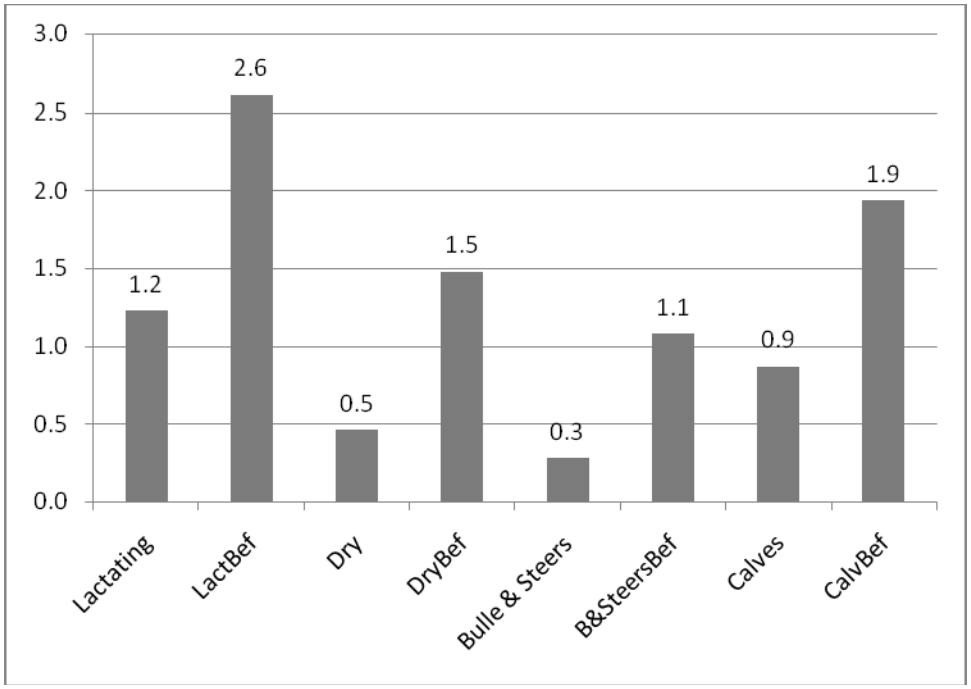

Figure 3: The Livestock Categories Before and After the PEC

Livestock Productivity by Breed before and after PEC

The livestock categories were investigated on productivity before and after the PEC. The results show that the majority of respondents kept and still keep cross bred cattle. The number of respondents who kept indigenous cattle increased from 14 to 20, a 42.85% increase, while those who kept pure breeds decreased by 81.82% after the PEC. This shows that the type of breeds that have higher productivity (pure breds and crosses) reduced. The results also show that there was a general reduction in the number of lactating cows across all the breeds. These have negative implications on milk productivity. Tables 5 and 6 show these statistics.

Table 5: The Breeds and Number of Lactating Cows before and After the PEC

Breed	No. Respondents			No. Lactating Cows		
	Before	After	% Change	Before	After	% Change
Indigenous	14	20	42.85	2.53	1.20	(52.57)
Crosses	126	118	(6.35)	3.15	1.62	(48.57)
Pure Breed	22	4	(81.82)	3.27	1.25	(61.77)

These statistics indicate that there was an increase in the number of farmers who owned indigenous cattle (by 42.85%), but a decline in both the number of the dairy farmers who had crosses and pure breds by 6.35% and 81.82%, respectively. It is worth noting that the percentage decline of farmers with purebreds is much higher. The implication here is that the quality of the herd, and therefore the production potential decreased after the PEC. The project therefore should endeavor to inject a high quality stock into the dairy production system in the project area.

Table 6: Cattle Breed Productivity Before and After the PEC

Breed	Production (lts/day)		Sales (KShs./day)		Productivity (lts/cow/day)		Sales (KShs./Cow/day)	
	Before	After	Before	After	Before	After	Before	After
Indigenous	15.86	4.1	285.35	68.72	6.25	3.42	112.40	57.27
Crosses	17.84	7.38	396.18	171.66	5.6	4.55	125.69	105.84
Pure Breed	19.61	10.67	320.05	254.67	5.99	8.53	97.79	203.73

A more in-depth analysis of breed productivity was done, with the objective of determining whether there was significant difference in productivity between breeds. It was hypothesized that there was no significant difference in mean milk production between indigenous, crosses and

pure breeds of cattle ($\mu_{cross}=\mu_{indig}$; $\mu_{pure}=\mu_{indig}$ *and* $\mu_{pure}=\mu_{cross}$); alternate: $\mu_{cross}>\mu_{indig}$; $\mu_{pure}>\mu_{indig}$; *and* $\mu_{pure}>\mu_{cross}$.

It was also hypothesized that there was no significant difference in productivity before and after the PEC ($\mu_{pure\ before}=\mu_{pure\ after}$; $\mu_{cross\ before}=\mu_{cross\ after}$ *and* $\mu_{indig\ before}=\mu_{indig\ after}$); alternate: $\mu_{pure\ before}>\mu_{pure\ after}$; $\mu_{cross\ before}>\mu_{cross\ after}$ *and* $\mu_{indig\ before}>\mu_{indig\ after}$).

To enable the calculation of the statistics required to test significant difference in productivity, the variace (δ^2) in production were required. The variances in milk production among the cross breeds, indigenous and pure breeds were 75.02, 13.67 and 101.33 respectively. The t-statistics of the test of hypotheses are shown in table 7.

Table 7: T-test for Significant Difference between Cattle Breed Production

Hypothesis (Ho)	Alternate (H_1)	$T_{\alpha(0.05)}$ calculated	$T_{\alpha(0.05)}$ tabulated	Decision
$\mu_{cross}=\mu_{indig}$	$\mu_{cross}>\mu_{indig}$	1.664	1.645	There is a significant diference in production between farmers with crosses and indigenous breeds; Reject Ho_1 since $\mu_{cross}>\mu_{indig}$
$\mu_{pure}=\mu_{indig}$	$\mu_{pure}>\mu_{indig}$	2.369	1.717	There is a significant diference in production between farmers with pure and indigenous breeds; Reject Ho_2 since $\mu_{pure}>\mu_{indig}$
$\mu_{pure}=\mu_{cross}$	$\mu_{pure}>\mu_{cross}$	0.7408	1.645	There is no significant diference in production between pure and crossbreeds; Accept Ho_3: $\mu_{pure}=\mu_{cross}$

Despite a higher mean production of 10.67lts/day for pure breeds, this was not significantly different from the average production of 7.38lts/day among the crosses. This implies that the potential of pure bred dairy cattle is yet to be exploited. Efforts on management of the dairy herd, particularly of the improved breeds should be considered.

An analysis of the significant difference between ***cattle productivity*** (litres/cow/day) showed that 193 crosses had a mean productivity of 4.55 litres/cow/day and a variance of 8.82; that 24 indigenous cows had a mean of 3.42 and a variance of 12.61; and that 5 purebred cows had a mean of 8.53 and a variance of 0.22. These statistics were subjected to t-tests for significant difference in the productivity of the various breeds (table 8).

Table 8: T-test for Significant Difference between Cattle Breed Productivity

Hypothesis (Ho)	Alternate (H_1)	$T_{\alpha(0.05)}$ calculated	$T_{\alpha(0.05)}$ tabulated	Decision
$\mu_{cross}=\mu_{indig}$	$\mu_{cross}>\mu_{indig}$	1.7188	1.645	There is a significant diference in productivity between crosses and indigenous breeds; Reject Ho_1 since $\mu_{cross}>\mu_{indig}$
$\mu_{pure}=\mu_{indig}$	$\mu_{pure}>\mu_{indig}$	3.1667	1.703	There is a significant diference in productivity between pure and indigenous breeds; Reject Ho_2 since $\mu_{pure}>\mu_{indig}$
$\mu_{pure}=\mu_{cross}$	$\mu_{pure}>\mu_{cross}$	3.0037	1.645	There is a significant diference in productivity between pure and crossbreeds; Reject Ho_3 since $\mu_{pure}>\mu_{cross}$

Despite the significant difference in milk productivity between indigenous, cross and pure breeds of cattle, the general productivity is very low (at 3.42, 4.55 and 8.53 litres per cow per day) respectively.

Other Variables Before and After PEC

All the variables considered in the before and after situation declined, except pasture area which increased from an average of 1.3 acres to 1.5 acres per respondent; and price of milk per litre which increased from an average of 16.8 to 21.9. The increase in pasture acreage was occassioned by high fertilizer costs which hindered planting of a variety of crops leading to development of fallows. This was also compounded by inaccessibility of some internally displaced persons (IDPs) to their land parcels, hence reduced cultivation. Milk sales in KShs. before the PEC stood at an average of KShs. 359.40 while the after situation currently stands at KShs. 139.80. This represents a drop of 61% in sales (figure 4).

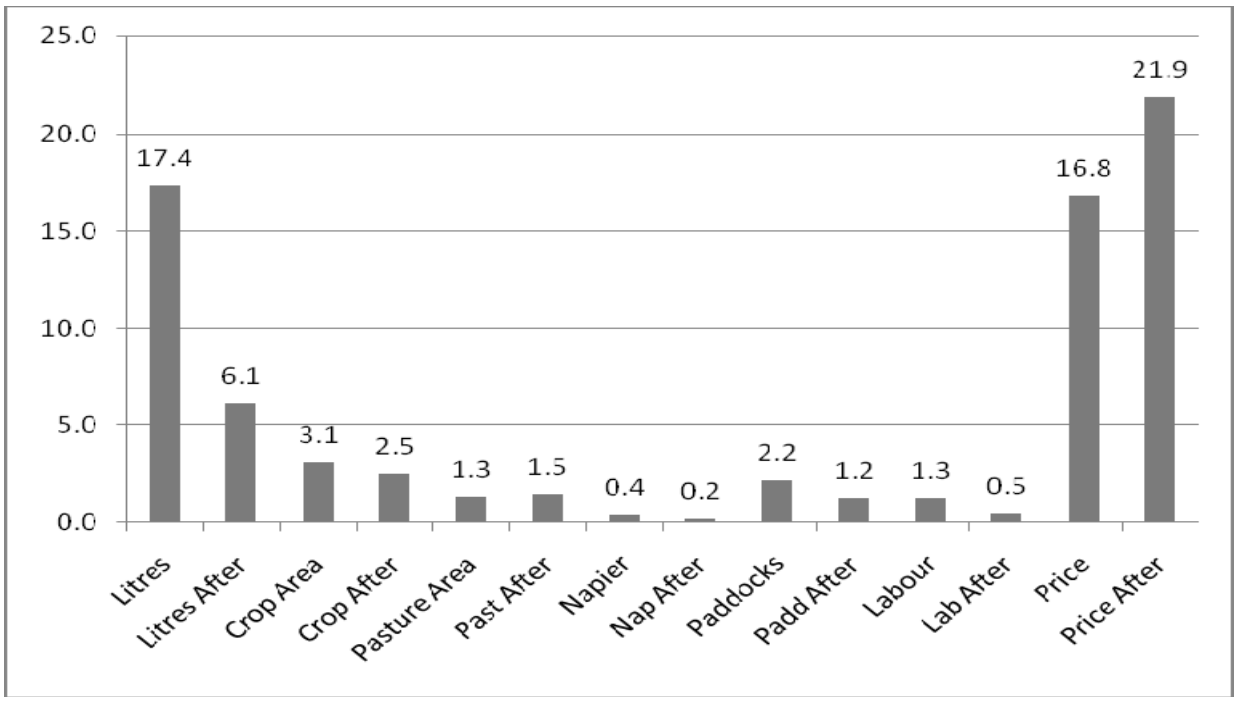

Figure 4: Other Variables before and after the PEC

Conclusions

The study revealed that the average age of the dairy farmers ranged between 21 and 87 years, with an average of 50.6 years. This casts some doubt on the ability of the older members of this community to manage the dairy herd. A means of empowering the youth to participate in the dairy value chain is needed. This may require the education of the older members to involve the youth in dairy farming.

The analysis of the dairy sector shows that all the livestock categories (lactating, dry, bulls and calves) decreased after the crisis. Although the number of crosses and pure breeds owned decreased, the number of indigenous cattle increased. This implies that the quality of the herd, and therefore the production potential decreased after the PEC. All the variables considered in the before and after situation declined, except pasture area which increased from an average of 1.3 acres to 1.5 acres per respondent; and price of milk which increased from an average of KShs. 16.8 to 21.9 per litre.

Recommendations

The targeted project areas are high potential for dairy production. However, there is low milk productivity among the dairy herd (average of 4.55 and 8.53 kg/cow/day for crosses and pure breeds respectively). This implies that the existing milk productivity potential has not been exploited. Further, the number of indigenous cattle owned increased after the PEC. This should

be coupled with the need to involve the youthful generation in dairy production and milk marketing. Given that some youth are engaged in dairy farming (as young as 21 years of age), the project should deliberately target the youth as part of the beneficiaries of the heifer exchange programme in the affected areas. Further, the project can explore opportunities of involving youth in AI, operation of milk bars and related engagements along the value chain.

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