

BREED AND SOCIAL ECONOMIC FACTORS INFLUENCING SMALLHOLDER DAIRY CATTLE PRODUCTIVITY IN TIGANIA EAST SUB-COUNTY, KENYA

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Abstract

A survey in Tigania East Sub County, Kenya was carried where structured questionnaires were administered to 156 respondents, spread out in 3 agro-ecological zones. The study objectives were to establish social-economic and breeding factors influencing milk productivity. There were 87.2% male respondents. About 89% were married and 93% had post primary education. About 40% had monthly incomes between 100-200 US dollars. Only 27% of respondents mentioned dairy farming as their major source of income. About 78.4% owned 1-2 dairy cows. Farmers' experience in dairy farming averaged 11.8 years. Regression analysis showed that education levels, family income, decision maker on dairy farming, major farming activity involved and experience in dairy farming were the significant ($p < 0.05$) social economic factors influencing milk productivity. While usage of artificial insemination, type of semen breed, breeding service, and quality of breeding bull used were the breeding factors that significantly ($p < 0.05$) affected milk productivity. Improving on these significant factors would help improve dairy industry in the study area.

Key words: dairy, breed, social economic

1.0 Introduction

About 150 million households in the world rely on dairy sector for their livelihoods (FAO, 2010). However global milk production experienced a declining growth rate of 0.5% in 2018, lower than the average growth rate of 2.1%.per annum. The production decline in the major world exporters was partly due to adverse weather conditions, low milk prices, herd size decline and individual yields per cow (FAO, 2018). Though there has been an increase in milk production in the developing countries, it has been as a result of increased herd size rather an increase in individual dairy cow productivity (FAO, 2018).

Dairy sector in East Africa contributes to poverty reduction and food security, its potential is unexploited resulting to low milk productivity. There are a number of challenges facing the sector such as lack of modern farming technologies, use of poor dairy breeds leading to low milk production compared to other parts of the world (Bingi *et al.*, 2015). This is despite an increase number of farmers and the size of the improved dairy herd in East Africa especially in Kenya (Kurwijila *et al.*, 2011).

The aim of this study was to establish challenges facing the farmers in Tigania East Sub-County, Kenya that could be addressed in order to improve milk productivity in the area.

2.0 Statement of the Problem

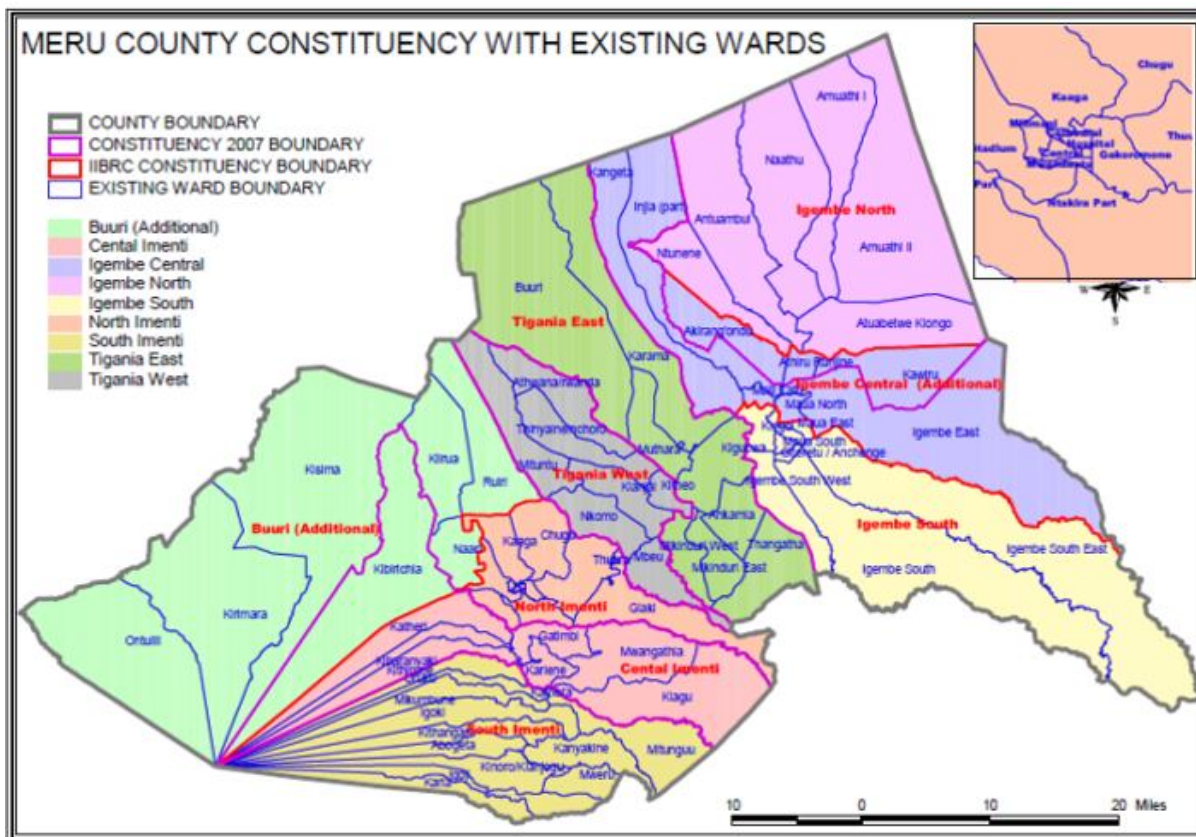
Smallholder dairy cattle milk production in Tigania East Sub-County has been lagging behind other Sub-Counties in Meru County. The Sub-County has the lowest number of dairy cattle population and the lowest milk production (MoLD, 2013). The average milk production is less than five litres per cow per day (DLPO, 2010), which is below the national average level of ten litres per cow per

day (Wambugu *et al.*, 2011). The Sub-County has potential for dairy farming but farmers are faced with constraints leading to low productivity. This study therefore documents these challenges.

3.0 Methodology

The study was carried out in Tigania East sub-county in Meru County, Kenya. It covers an area of 723.4 km² and has a population of 157,746 persons. It lies between Agro-ecological zone I-IV; rainfall is bimodal and ranges from 380mm-2514mm representing both low arid and highlands. The physical features and the cool climatic conditions around the hills offer ideal conditions for dairy cattle

SITE MAP OF TIGANIA EAST SUB COUNTY



The sample size was 156 smallholder dairy farmers which were spread across three agro-ecological zones, with each zone having 52 respondents. Purposive, stratified random sampling was used to select respondents. Only farmers in agro-Ecological-Zones I-III were included in the study because of the high concentration of dairy cattle in the zones. Data was collected using structured questionnaires by interviewing household heads. Secondary information was obtained from livestock extension workers, prominent dairy farmers, leaders of dairy self-help groups, co-operatives and owners of milk selling outlets.

Data was analysed using SPSS version 21 and presented as percentages, means and standard deviation

4.0 Results and discussion

4.1 Demographic data for the respondents

Majority (87.2%) of the respondents were males. About 89% were married and over 93% had post primary education. Majority (40%) were had monthly incomes of 100-200 US dollars. Household income is important since high income households can afford more improved dairy cattle breeds for more milk production (Wambugu *et al.*, 2011). Only 27% of respondents mentioned dairy farming as their major source of income. Kamau, (2013) indicates that higher milk yields are likely to be experienced by the farmers who view dairy farming as a main economic activity.

About 86.5% of respondents practiced subsistence farming. Regarding crop farming, 52.7% grew *miraa* (Khat) while 31.8% grew other cash crops like tea and coffee. Dairy cattle ownership was as follows; 78.4% owned 1-2 dairy cows; 16.9 % owned 3-5 cows; while 4.7% owned above 5 cows. Farmers' experience in dairy farming averaged 11.8 years. Experience has been found to assist

farmers in dealing with risks and uncertainties (Njarui *et al.*, 2009). Mean household size was 5 persons with average age of household head at 46 years.

Table 1: Demographic characteristics

		<u>AEZ1</u>	<u>AEZ2</u>	<u>AEZ3</u>	<u>Mean</u>
Gender	Female	4.00%	14.30%	20.40%	12.80%
	Male	96.00%	85.70%	79.60%	87.20%
Marital status	Married	98.00%	85.70%	81.60%	88.50%
	Single	0.00%	2.00%	6.10%	2.70%
	Divorced	0.00%	0.00%	2.00%	0.70%
	Widowed	2.00%	12.20%	6.10%	6.80%
Highest education level	Below primary	8.00%	6.10%	4.10%	6.10%
	Primary level	52.00%	28.60%	28.60%	36.50%
	Secondary	28.00%	28.60%	34.70%	30.40%
	Tertiary	12.00%	36.70%	32.70%	27.00%
Family's income levels	0-10000	16.00%	14.30%	24.50%	18.20%
	10001-20000	42.00%	38.80%	38.80%	39.90%
	20001-30000	26.00%	12.20%	16.30%	18.20%
	30001-40000	8.00%	32.70%	6.10%	15.50%
	Above 40000	8.00%	2.00%	14.30%	8.10%
Key decision maker in the household	Female	2.00%	20.40%	16.30%	12.80%
	Male	98.00%	79.60%	83.70%	87.20%
Decision maker on dairy farming matters	Man	94.00%	63.30%	55.10%	70.90%
	Woman	6.00%	36.70%	44.90%	29.10%
Decision maker in cattle management	Woman	6.00%	24.50%	42.90%	24.30%
	Man	80.00%	63.30%	44.90%	62.80%
	Both	14.00%	12.20%	12.20%	12.80%

Decision maker on income from dairy farming	Woman	12.00%	22.40%	36.70%	23.60%
	Man	36.00%	49.00%	12.20%	32.40%
	Both	52.00%	28.60%	51.00%	43.90%
Major source of income	Dairy farming	36.70	27.00	20.40	27.00
	Other	63.30%	79.60%	76.00%	73.00%
Number of dairy cattle in the farm	1 – 2	87.80%	84.00%	63.30%	78.40%
	3 – 5	6.10%	16.00%	28.60%	16.90%
	Above 5	0.00%	6.10%	8.20%	4.70%
Experience in dairy farming (Mean)		13.45	12.39	9.68	11.84
Size of house hold(Mean)		5	4.63	4.44	4.69
Age of household head (mean)		45.46	45.2	47.1	45.92
Other farming activities	Subsistence	82.00%	87.80%	89.80%	86.50%
	Cash crop	42.00%	34.70%	18.40%	31.80%
	Miraa farming	54.00%	65.30%	38.80%	52.70%

4.2 Socio-economic factors affecting the levels of production

Using a logistic multi-linear regression model, five variables were found to be statistically significant ($p < 0.05$) and therefore influence the level of milk production in the study area. They include; education levels, family income, decision maker on dairy farming, major farming activity involved and experience in dairy farming (Table 2).

Using “B” factor reporting, it was found that an increase in age, levels of education, income and experience in dairy farming would lead to an increase of the levels of milk production by 0.04, 0.59, 0.449 and 0.46 log odds respectively. The chi-square test also showed that education level, family income, decision maker on dairy farming activities, subsistence farming activities practiced and

experience gained in dairy farming had an association with the levels of milk production by a factor of 1.2, 0.589, 0.958, 1.75 and 0.88 respectively.

Educated farmers are more learned, exposed, innovative, adopters of improved technologies, better managers and therefore produce higher levels of milk than the less educated farmers (Kamau, 2013; Njarui *et al.*, 2009; and Wambugu *et al.*, 2011).

Table 2: Socio-economic factors contributing to milk production in the 3 AEZ's

Variable	B	S.E.	Wald Chi-square	Sig.(p-value)	Exp(B)
House hold size	.065	.163	5.63	.688	1.067
Gender	.007	1.560	2.87	.920	.170
Age	-.040	.028	8.47	.151	.961
Marital	.008	.362	3.87	.473	.297
Education level	.590	.348	1.2	.002*	1.347
Income level	.449	.245	0.589	.046*	1.567
Decision on dairy	.247	.824	0.958	.030*	3.480
Subsistence activities	.142	1.067	1.75	.045*	8.512
Experience in dairy	.460	.034	0.88	.003*	1.039
Number cattle	.091	.433	11.2	.833	1.095
Management decision	.076	.334	2.89	.154	1.610
Decision on income	.069	.241	8.42	.125	1.447

***=significant values, p<0.05**

4.3 Effect of breeds and breeding factors on milk production

Usage of artificial insemination, type of semen breed, breeding service, and quality of breeding bull used were the factors that significantly ($p<0.05$) affected milk production in the study area using logistic multi-linear regression analysis (Table 3). Use of unproven (unknown genetic value) bulls

and limited use of A.I. services has unfavorable long-term effects on productivity due to degradation of the herd genotype and subsequently milk productivity (Bebe *et al.*, 2003; Amunda, 2012).

Table 3: breeds and breeding factors contributing to milk production in 3 AEZ's

	B	S.E.	Chi-square	p-value	Exp(B)
Usage of AI	0.812	0.523	1.22	0.02*	0.745
Breed quality	0.212	0.118	0.222	0.043*	0.809
Breeding service	0.716	0.504	1.608	0.001*	0.180
Quality of bull	0.391	0.467	0.003	0.042*	1.479
Inbreeding	-0.106	0.437	5.292	0.510	2.734
Prolonged length of calving	-0.201	0.101	2.90	0.885	1.597
Constant	0.267	1.457	0.034	0.854	1.307

*=significant values, $p < 0.05$

5.0 Conclusions & recommendations

There were few farmers in Tigania east who practiced dairy farming as a major source of income with subsistence farming being common. Men were mostly the final decision makers on dairy farming activities although incomes from dairy were jointly managed. Dairy farming was given low attention compared to cash crops (like Khat) and food crops leading to a negative impact on overall milk production. Social economic factors that influenced dairy farming were; education levels, family income, decision maker on dairy farming, major farming activity involved and the experience in dairy farming. Usage of artificial insemination, type of semen breed, breeding service, and quality of breeding bull used were the breeding factors that significantly affected milk production.

Therefore, allowing women to make decisions regarding dairy farming, use of artificial insemination with superior bull semen, and improving levels of education would positively influence milk productivity in the study area.

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