

Gender in Dairy Production and Marketing in the Central Highlands and Eastern Midlands of Kenya

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ABSTRACT

Women play an important role in agriculture, but they have less access to and control of resources, such as land and livestock, as well as decision-making powers. This inequality hinders dairy cattle technology to have a positive impact on women farmers. The objective of this study was to examine gender inequality in dairy cattle production and marketing in Kenya's central highlands and eastern midlands. Data were collected using multiple methods. These included a formal survey that covered 629 households, focus group discussions, key informant interviews, and a literature review. Household data were analyzed through descriptive statistics using the Statistical Package for Social Science Version 20 software. The Harvard theoretical framework was used to conduct this analysis. The main findings indicated that men performed most dairy cattle activities. Men also controlled most of the dairy cattle equipment and dominated the decisions in the enterprise. The study recommends that, since dairy appears to be a men's enterprise, research scientists need to design gender-responsive technologies that are tailored to men's needs for increased productivity.

Keywords: Gender, dairy, resources, decision-making.

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1. INTRODUCTION

Women farmers play a very important role in the agricultural sector in Kenya as they contribute about 43% of all the labor requirements [1], [2]. However, women have less access to and control of resources, such as land, livestock, and credit, as well as unequal power relations in the household [3]–[8]. This inequality is attributed to the patrilineal norms that give men de jure rights to control assets such as land and livestock, as well as power in decision making [7]–[9]. If women had equal access to resources as men, agricultural yields would increase by 20%–30%. This would subsequently increase agricultural output by 2.5%–4% and reduce hunger by 2.5%–4% [1], [5], [10]. It is against this background that this study was conducted with the objective of assessing gender inequality in dairy cattle production and marketing activities in the

central highlands and eastern midlands of Kenya. Based on this objective, four research questions were asked:

1. Which gender category performed what activities in dairy production?
2. Which gender category owned and controlled what dairy production equipment?
3. Which gender category accessed and controlled what dairy production equipment?
4. Which gender category made decisions regarding dairy cattle production and marketing activities?

The Harvard theoretical framework contested by Adrienne [11] was used to structure this analysis.

This paper contributes knowledge to literature on gender inequality in dairy production and marketing.

2. LITERATURE REVIEW

2.1. Division of Labour

Dairy production and marketing are gender activities, as both men and women are involved in the success of an enterprise [3], [4], [7]. Traditionally, women performed tasks that were performed on a daily basis, such as feeding, watering, milking, cleaning the shed, and taking care of calves, while men implemented activities that were executed weekly or seasonally, such as deworming, spraying, and planting fodder/forages [7], [12]. Furthermore, women perform activities near homesteads, such as milking, owing to their reproductive roles that involve cooking and child-care [13], [14], [7]. This meant that feeding or milking cattle would be performed simultaneously with domestic chores. This labor allocation pattern depends on several factors, including ethnicity, division of labor, production system, and household socioeconomic characteristics [12], [14], [15]. However, with the advent of milk commercialization, men are gradually appropriating the dairy enterprise and are increasingly involved in the performance of various dairy activities [3], [6], [16]–[18]. This implies that the gender division of labor in the dairy sector varies depending on the prevailing milk production and marketing systems, as argued by [14], [17], [18].

2.2. Ownership and Control of Livestock Resources

Productive resources such as land, credit, and equipment are essential for increasing dairy productivity and enabling farmers to escape poverty [6], [19], [18]. However, women have less access to and control of these resources than men [4], [7], [17]. Men and women control different types of resources [18], [20]. Generally, men control resources such

as land, cattle, and bulls, whereas women control small livestock such as chickens and household goods such as utensils and furniture [4], [7], [13], [18]. This phenomenon is influenced by patrilineal norms [7], [20], [21].

2.3. Decision Making

In many cultures, women's lower status coupled with cultural norms restricts them from being involved in decisions pertaining to large livestock, such as dairy cattle, bulls, and camels, at the household and community levels [7], [15], [17], [18]. The main reason for this phenomenon is that men have de jure ownership rights over animals, which are justified by cultural norms [7], [18], [20], [21]. These norms were dynamic. Among the Kalenjin, for instance, men dominated decisions on the sale of morning milk offered in formal markets, yet in Meru, women had the liberty to use income accruing from goat milk [6], [21]. Generally, women make decisions related to the consumption of livestock products, such as chickens, eggs, and milk, which is good for household food and nutritional security [4], [7], [13]. However, once these products become commercialized, men will appropriate them [16], [17]. For instance, women generally own and care for chicken, but they rarely make sole decisions regarding the use of income accrued from the sale of birds or eggs [13], [21].

3. MATERIALS AND METHODS

3.1. Description of the Study Sites

The study was conducted in Machakos County, located in the eastern mid-lands, and Kirinyaga County, situated in the central highlands of Kenya, as shown in Fig. 1.

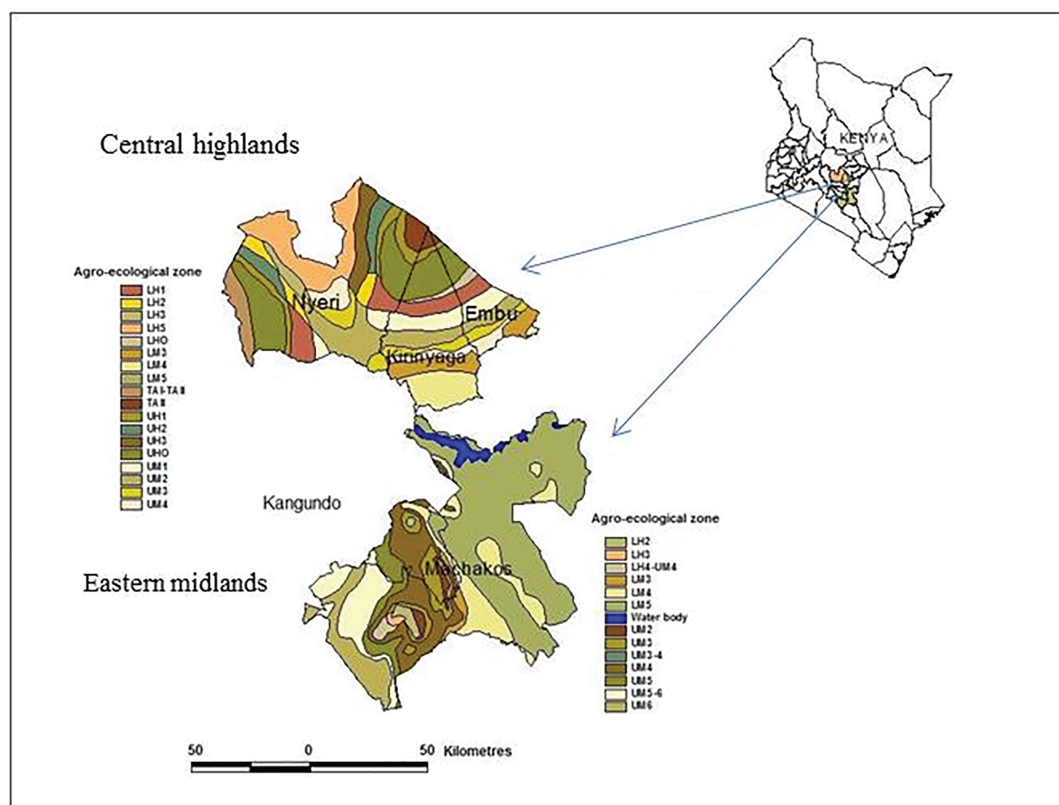


Fig. 1. Study site. Source: Dairy household survey, 2020.

3.2. Sample Size

This study employed a descriptive research design using quantitative and qualitative methods. Using the quantitative method, a survey of 629 households was conducted. The sample size was determined using the Yamane [22] formula as follows:

$$n = \frac{N}{1 + N(e)^2}$$

where n is the sample size, N is the population size, and e is the precision level. Using this formula, the sample size of 629 dairy cattle farmers was obtained.

$$n = \frac{2412}{1 + 2421(0.05)^2}$$

$$n = 629 \text{ farmers}$$

3.3. Sampling Procedure

A combination of purposive and systematic sampling techniques was used. Thus, we purposively selected Machakos and Kirinyaga counties that have adopted Brachiaria and dairy cattle technologies. Then, in every county, we purposively selected a sub-county and sub-location where data were collected through systematic sampling of farmers.

3.4. Data Collection

Data were collected by a team of well-trained enumerators using a questionnaire that had been pre-tested using open-kit data (ODK). The questionnaires covered the following: (a) demographic and socioeconomic information, (b) gender activity profile, (c) gender access to and control of resources, and (d) gender and decision-making profile. More data were collected through ten Key Informant Interviews (KIIs) and eight Focus Group Discussions (FGDs). The KIIs were a purposively selected (non-random) group of experts who were knowledgeable about the issues under investigation. These include extension officers, lead farmers, and administrators. The focus group discussions comprised six to eight participants (men, women, and youths separately).

3.5. Data Analysis

Household survey data were entered into the Statistical Package for Social Sciences (SPSS) version 20 computer software. Descriptive statistics (frequency, percentages, chi-squared, and means) were calculated using the Harvard Analytical Framework, as argued by Adrienne [11], which organizes data into which gender category has access to and control of what resources, which gender category does what activity, and which gender category makes what decisions. Focus group discussions and KIIs were analyzed using content analysis.

4. RESULTS AND DISCUSSION

4.1. Demographic and Socio-Economic Characterization of Farmers

4.1.1. Education Levels

Results revealed that majority of the farmers had attained secondary education at 45% with men at 48.3% and women at 32.6%. This was followed by primary at 31%, with women at 44.7% and men at 27.4%. Then there was tertiary with men at 22.5% and women at only 12.1%. In general, more women had no formal education as shown in Table I. These results imply that men had more access to education than women. This illiteracy of women had an indirect impact on dairy productivity, as new technological advancements required a certain level of formal education. Therefore, men with higher levels of formal education were more likely to adopt emerging dairy technologies as they had the ability to read, as argued by researchers [8], [23], [24].

4.1.2. Age

Majority 36% of dairy farmers were above 52 years while only 8% of the youths below 35 were engaged in the dairy subsector, as shown in Table I. Previous studies have indicated that older farmers are less likely to adopt new technologies, as they are typically more conservative [8], [24]–[26]. Contrary to this argument, age may show a positive relationship, as older farmers have more experience and wealth, which can facilitate the adoption of dairy

TABLE I: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERIZATION OF FARMERS

Variables	Description	Women n = 132 (%)	Men n = 497 (%)	Total n = 629 (%)
Farmers characteristics education level of household head	Adult education	0.8	0.0	0.2
	No formal education	8.3	1.4	2.9
	Primary	44.7	27.4	31.0
	Secondary	32.6	48.3	45.0
	Tertiary	12.1	22.5	20.3
	Vocational Training	1.5	0.4	0.6
Age	<35 years	0.8	10.3	8.3
	36–51 years	19.7	33.6	30.7
	52–66 years	37.9	36.0	36.4
	>66years	41.7	20.1	24.6
Major occupation of household head	Farming	90.9	70.8	75.0
	Self-employed (business)	5.3	15.3	13.5
	Employed in formal sector	3.8	13.6	11.5
	(public/private /NGO)			

Source: Dairy household survey, 2020.

TABLE II: GENDER AND DIVISION OF LABOR IN DAIRY PRODUCTION ACTIVITIES

Activity	Men		Women		Youths		chi-square	P-value
	n	%	n	%	n	%		
Land preparation	207	48.8	140	33.0	77	18.2	59.8	<0.001***
Purchase of inputs	266	63.8	127	30.5	24	5.8	212.2	<0.001***
Planting fodders	221	47.2	172	36.8	75	16.0	70.8	<0.001***
Weeding fodders	208	41.8	204	41.0	86	17.3	57.9	<0.001***
Cutting fodders	254	40.7	253	40.5	117	18.8	59.7	<0.001***
Transporting fodders	180	40.8	174	39.5	87	19.7	36.9	<0.001***
Feed conservation	51	41.1	43	34.7	30	24.2	5.4	0.066ns

Note: NB/ *** significant at 0.1%, **, at 1%, * at 5%, and ns not significant. Source: Dairy Household Survey 2020.

TABLE III: GENDER ACCESS AND CONTROL OF DAIRY PRODUCTION EQUIPMENT

Equipment	Men		Women		Joint		Chi-square	P-value
	n	%	n	%	n	%		
Hoes	112	29.24	33	8.62	238	62.14	167.473	<0.001**
Spades	170	44.74	18	4.74	192	50.53	141.747	<0.001**
Zero-grazing units	206	54.21	20	5.26	154	40.53	145.411	<0.001**
Chicken houses	83	22.62	194	52.86	90	24.52	63.177	<0.001**
Spray pumps	189	58.15	4	1.23	132	40.62	165.717	<0.001**
Stores	81	29.03	88	31.54	110	39.43	4.925	0.085ns
Sickles	43	16.48	68	26.05	150	57.47	72.023	<0.001**
Stoves	16	5.76	240	86.33	22	7.91	351.568	<0.001**
Chaff cutters	85	61.59	1	0.72	52	37.68	77.87	<0.001**
Water troughs	80	51.0	10	6.4	67	42.7	53	<0.001***
Water pumps	67	60.36	0	0.00	44	39.64	4.766	0.029ns
Weighing scales	48	49.48	21	21.65	28	28.87	12.144	0.002**
Sprinklers	50	50.5	5	5.05	50	50.51	36.182	<0.001**
Animal ploughs	45	65.00	0	0.00	10	35.00	2.01	<0.001**
Biogas	3	15.79	6	31.58	10	52.63	3.895	0.143ns
Greenhouses	3	42.86	0	0.00	4	57.14	0.143	0.705ns
Water pans	4	44.44	2	22.22	3	33.33	0.667	0.717ns

Note: NB/ *** significant at 0.1%, ** at 1%, * at 5%, and ns means not significant. Source: Dairy household survey, 2020.

technologies, as contested by Ha and Park [27] and Chuang et al. [28].

4.1.3. Occupation of Household Head

Farming was the main occupation for the majority of the agriculturalists at 75% with women at 90.9% and men at 70.8%. This was followed by self-employed at 13.1% with men at 14.9% and women at 5.3%. Only 11% were employed in the formal sector (public/private/NGOs), with women at only 3.8% and men at 13.2% as shown in Table I. These findings agree with other studies that have shown that agriculture is the mainstay of the Kenyan economy [29], [30].

4.2. Gender and Division of Labour in Dairy Production Activities

Men, women, and youth perform diverse dairy cattle production activities. However, men performed all the dairy cattle production activities more than women and youth, with significant differences ($P < 0.05$), as shown in Table II. These activities included land preparation, purchasing inputs, planting fodder, weeding fodder, cutting and transporting fodder, and feed conservation. These findings are in agreement with similar studies that found

that men are more involved in dairy cattle activities [7], [12], [31], [32]. Furthermore, according to KIIs and FGDs, men were mostly involved in the purchase of inputs because, unlike women who had drudgery of work, males had more free time to go out in the market. Men were also more involved in land preparation because traditionally, this was their responsibility. In addition, men owned land and had the authority to decide which part of it, and how much of it should be put under fodder cultivation, as argued by KIIs and FGDs. Youths performed very few dairy activities because they were either in school or engaged in off-farm activities.

4.3. Gender and Access to and Control of Dairy Production Equipment

Men accessed and controlled most of the dairy production tools with a significance difference of $P < 0.05$, as shown in Table III. This equipment included zero-grazing units, spray pumps, chaff cutters, water troughs, weighing scales, sprinklers, and animal plows. Women only accessed and controlled stoves and chicken houses, with significant differences ($P < 0.05$). Men accessed and controlled most of the equipment because livestock assets are highly gendered with large stocks, such as cattle, bulls, and their

assorted equipment belonging to them. In contrast, women only owned and controlled small livestock, such as chickens, and household goods, such as stoves, a finding that resonates with similar studies [4], [7], [13], [18], [21]. These findings were further corroborated by FGDs and KIIs, who contended that women only controlled household goods such as stoves because they were in charge of cooking. Men also accessed and controlled their sprinklers. This means that women were constrained from adopting irrigation technologies that could increase fodder for increased dairy production and marketing. This is because irrigation technologies are regarded as Climate-Smart Agricultural (CSA) practices that can make farmers resilient to the vagaries of climate change [10], [32]. Animal plows are also owned and controlled by men, perhaps because plowing with draught beasts in many cultures is considered a task for men [19]. Consequently, with minimal access to alternative energy sources, women remain largely dependent on human labor for cultivation.

The only tools that were owned and controlled jointly were basic labor-intensive agricultural hand equipment such as hoes, spades, and sickles that were used for burdensome activities such as weeding, planting, and harvesting. According to KIIs and FGDs, these tools are laborious, ineffective, and time consuming.

4.4. Gender and Decision Making on Dairy Production and Marketing Activities

Men dominated many decisions regarding dairy production and marketing activities, with significant differences ($P < 0.05$), as shown in Table IV. These decisions included what fodder to grow, livestock breed to raise, adoption

of fodder production technologies, adoption of crop production technologies, commitment and engagement in farmers' organizations, participation in extension services, and choice of transport means to purchase. This implies that dairy cattle in the region are mainly owned by men. These findings are echoed by Haug *et al.* [5], who found that, in the same study region, men dominated decisions on fodder and dairy cattle husbandry. The findings are also consistent with similar studies that have shown that men owned and dominated decisions on large livestock, such as cattle and sheep [7], [12], [18], [21].

Joint decisions with significant differences ($P < 0.05$) were mostly related to finance. These included: (a) use of cash from milk and milk products; (b) borrowing money and use of credit; (c) allocation of farm and non-farm income; (d) whether to buy, sell, and consume livestock; (e) choice of financial planning for households; and (f) what agricultural farm inputs to purchase. These findings demonstrate that women play a significant role in decision-making regarding cash, which is an indicator of their empowerment, as asserted by Haug *et al.* [5]. Similar results were obtained by Bain *et al.* [4], who argued that women contributed significantly to decisions pertaining to the use of proceeds from dairy cattle in Uganda. The results also imply that ownership of an asset, such as dairy cattle, does not mean that the owner has the sole decision-making power over the income it produces [33].

Women dominated decisions only on where to sell milk and milk products, and on household equipment to purchase, with significant differences ($P < 0.05$). This is because milk is usually sold at farm gates to neighbors and traders, a finding that is consistent with other studies [14],

TABLE IV: GENDER AND DECISION MAKING ON DAIRY PRODUCTION AND MARKETING ACTIVITIES

Activities	Joint		Men		Women		Chi-Square	P-value
	n	%	n	%	n	%		
What fodder to grow	122	27.3	242	54.1	83	18.6	92.2	<0.001***
Livestock breed to raise	178	37.1	262	54.6	40	8.3	157.1	<0.001***
Adoption of fodder production technologies	122	28.2	238	55.1	72	16.7	100.7	<0.001***
Adoption of crop production technologies	157	34.1	198	43.0	105	22.8	28.3	<0.001***
Adoption of technologies in livestock raising	150	32.5	248	53.8	63	13.7	111.5	<0.001***
Commitment and engagement in farmers' organizations	99	35.4	160	57.1	21	7.5	104.0	<0.001***
Participation in extension services	75	33.0	99	43.6	53	23.3	14.0	0.001***
Choice of transport to purchase	71	27.2	186	71.3	4	1.5	194.8	<0.001***
Use of cash from milk and milk products	172	49.0	43	12.3	136	38.7	75.7	<0.001***
Borrowing of money	131	66.2	52	26.3	15	7.6	106.4	<0.001***
Use of borrowed money	148	75.9	32	16.4	15	7.7	161.2	<0.001***
Allocation of farm income	341	71.5	113	23.7	23	4.8	338.0	<0.001***
Allocation of non-farm income	313	70.5	112	25.2	19	4.3	305.1	<0.001***
Choice of financial planning for household	294	61.8	94	19.7	88	18.5	173.3	<0.001***
When and where to sell milk and milk products	127	35.8	51	14.4	177	49.9	68.0	<0.001***
Purchase of household equipment	144	30.1	86	18.0	249	52.0	85.5	<0.001***

Note. NB/ *** significant at 0.1%, ** at 1% *, and at 5%. Source: Dairy household survey, 2020.

[21]. Formalization of the milk market denies women this liberty because once milk becomes commercialized, men appropriate the decision-making power [3], [16]–[18].

5. CONCLUSION AND RECOMMENDATIONS

The study showed that men owned and controlled most of the dairy production and marketing tools. Men also performed most of the dairy production activities. Moreover, men dominated the decisions of the enterprise. This implies that dairy is a male enterprise, a finding that agrees with [6], [7], [17], [18], [21]. Women controlled and dominated decisions only on household equipment such as stoves and were in charge of chicken houses. This confirms studies that have shown that men own large livestock, such as dairy, while women own small stocks, such as chickens [3], [4], [7]. This phenomenon is influenced by patrilineal norms that give men de jure ownership rights over large animals [7], [20], [21].

The study recommends that, since dairy is a male-dominated enterprise, research scientists need to design gender-responsive technologies that are tailored to their needs for increased productivity.

CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

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