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Master thesis:
Participation in dairy value chains and inter-household gender relations in Tanzania

A thesis submitted in partial fulfilment of the requirements for the Degree of *Master of Science (M.Sc.) in Agricultural Economics*

Submitted by
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Statutory declaration

I, Yusuf, Marwa Patrick born on 4th June 1987 Matriculation number 617082, hereby declare on my honor that the attached declaration, Master thesis, has been independently prepared, solely with the support of the listed literature references, and that no information has been presented that has not been officially acknowledged.

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Thesis topic: Participation in dairy value chains and inter-household gender relations in Tanzania.

Semester: 5

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Abstract

Tanzania has the third largest livestock population in Africa but it failed to use that potential such that most its population particularly women remained poor due to gender gap in the access and control of productive assets in livestock sector. This study intended to explore gender dynamics and power relations; and how they shaped the access and control of productive assets and benefits in the dairy value chains of men and women in the intensive and extensive livestock systems since past studies did not cover that part. This study used Net-Mapping methodology and ethnographic methods for identifying actors and/or institutions, their levels of influence, factors and benefits and gender issues in the men and women dairy value chains. The data were analysed by using Visualyzer 2.2 and Nvivo10 -Matrix coding query. Identified factors/productive assets for participation for men and women in each system were community norms and practices, education, membership in dairy farmers' groups, social capital, decision on milk sale, land, decision on livestock health services, decision on livestock selling/ buying, price of milk, mode of payment and knowledge about livestock; and benefits were asset accumulation, getting food, income, paying for school expenses, meeting household expenses, manure, dowry payment and paying for medical bills. Traditions and customs shaped the gender imbalances such that men in both systems were found to have better access and more control on the factors and benefits of participating in the dairy value chains; consequently male-headed households had more access and control over the factors and benefits but this was common in the extensive livestock system where women were worse-off as compared to their counterparts in the intensive livestock system. It was observed that polygamy was prevalent in both systems but it was more common in the extensive system; thus it was found that the access and control of factors and benefits decreased as the number of wives increased in the households. Dairy value chains for men and women were created in each system; it was observed that women chains were smaller than men chains but men chain in intensive was larger than men chain in the extensive; and women chain in the intensive was far larger than women chain in the extensive system. it was hard for inputs to move from one part to another in the women chains.it was recommended that there should be special seats for women in local governments which were responsible for allocating resources such as land, commercial processors should pay through mobile phones to avoid late payment, government should make gender-sensitive livestock policies, destocking to reduce pressure on the environment and NGOs, civil society and government should launch campaigns to educate communities about gender-equity. This study did not cover market analysis (profit margins, concentration ratios etc.) separately for women and men dairy value chains; these were suggested areas for further research in the sector.

Key words: Intensive, Extensive, gender gap, access and control, net map, ethnography.

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List of Abbreviations and acronyms

SAPs	Structural Adjustment Programmes
FAO	Food and Agriculture Organization
AfDB	African Development Bank
GDP	Gross Domestic Product
TDB	Tanzania Dairy Board
TFDA	Tanzania Foods and Drugs Authority
TBS	Tanzania Bureau of Standards
BRELA	Business Registration and Licensing Agency
ASDP	Agricultural Sector Development Programme
CAADP	Comprehensive African Agricultural Development Programme
SACCOS	Savings and Credit Co-operatives
NMB	National Microfinance Bank
CRDB	Cooperative and Rural Development Bank
FINCA	Foundation for International Community Assistance
PRIDE	Promotion of Rural Initiative and Development Enterprise
ILRI	International Livestock Research Institute
UWALU	“Umoja wa Wafugaji Lushoto” Union of livestock keepers in Lushoto
UWATU	“Umoja wa wafugaji Viti”
TDCU	Tanga Dairy Cooperative Union
TFL	Tanga Fresh Ltd

USAID	United States Agency for International Development
DOTF	Dutch Oak Tree Foundation
TZS/TSH	Tanzanian Shillings
SUA	Sokoine University of Agriculture
PADEP	Participatory Agricultural Development and Empowerment Project
VICOBA	Village Community Banks
BRAC	Bangladesh Rural Advancement Committee
NARCO	National Ranching Company
LITI	Livestock Training Institute

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CHAPTER ONE: INTRODUCTION

This part presents the introductory part of this study and it contains the following components as elaborated below:

1.1 Background of the problem and problem statement

Even though Tanzania has the third largest livestock population in Africa with the livestock sector contributing about 5.6% to the GDP whereas 30% of it comes from the dairy industry. The potential of this sector to bring economic development is/was yet to be utilized (Nell et al, 2014 and Tanzania Dairy Industry 2012). Amongst other challenges and threats facing the dairy industry in Tanzania, gender inequality in its dairy value chains limits the full participation of women such that the industry lags despite its potentials. This study thrives to understand the gender dynamics and power relations in the dairy value chains under intensive and extensive livestock systems in Tanzania. Past studies analysed the dairy value chain of Tanzania as if it has a similar structure throughout the country; but dairy activities take place under the two major systems (intensive and extensive) and consequently under different socio-economic contexts where traditions and culture shape the access and control over the factors or productive assets and benefits of participation in the dairy value chains. Thus, this study intends to fill this research gap and it will result into dairy value chains for men and women in each system such that policy makers would design gender-sensitive interventions to achieve inclusive dairy development in Tanzania.

Women in Africa face the problem of "gender gap" with respect to access of productive assets, inputs and or service as compared to men. If at all, women access to productive resources were improved then agricultural and livestock systems were likely to record increased yields by 20% to 30% consequently agricultural output of developing countries would rise by 2.5% to 4% which would see the number of hungry people reduced by 12% to 15%(approximately 100 to150 million people)(FAO,2010-2011); additionally the World bank reported that if barriers that prevented women from having the same access to opportunities and productive assets were removed then this would translate into improved children' education, health and nutrition(World bank, 2012)

At least half of the agricultural labour force in Sub-Saharan Africa is made up of women; 62% of economically active women work in agriculture such that agriculture became the largest employer of women in Africa. Some countries such as Rwanda, Malawi and Burkina Faso; more than 90% of economically active women work in agriculture; despite their high involvement women remained in the least profitable parts of the chains often unrecognized and unsupported such that

the rural wage gap between men and women was estimated to be 15% to 60%(African Development Bank-AfDB, 2015).

Women faced the following major constraints in value chains in Sub-Saharan Africa: Assets' problems(Limited access to land ownership, improved inputs, mechanised farming and processing equipment), Training(limited knowledge and use of agronomic practices, limited processing and business skills, limited market knowledge), poor infrastructure, limited access to financial services, poor and or lack of coordination of market actors, government policies and regulations were insufficiently gender neutral and time constraints due to household chores/duties(African Development Bank-AfDB, 2015).

Gender dynamics, power relations and type of participation determine how benefits of participation in value chains were accessed and distributed among men and women but it needs to be stressed that participation in value chain doesn't necessarily translate to gains as it had been observed in Kenya where women provided 72% of the labour but retained 38% of the income; likewise, non-participation doesn't always equate to lack of benefits of the value chains (Coles and Mitchell, 2011; Dolan 2001). Interventions in improving/upgrading value chains had been gender blind such that it resulted into "quick fixes" at the end of the interventions. if at all gender mainstreaming was felt to be important; these "quick fixes" solved some of the gender inequality but failed to address the underlying dynamics shaping gender relations and institutions (Laven and Verhart,2011).

Institutions present themselves as frameworks of rules and regulations that serve as vehicles of bringing desired socio-economic transformations; the forms that institutions take are called organizations (North, 1990). For decades, much scrutiny and debates had been raised about the role of the state in bringing economic development and eventual poverty reduction (Birner and Wittmer, 2006) such that the state was believed to be a major agent of development especially during the 1960s and 1970s (Wolfensohn and Bourguignon, 2004). But during the 1980s, many countries underwent Structural Adjustment Programmes (SAPs) with the aim of improving trade, getting macroeconomic stabilities, removal of trade barriers and so on such that the role of state was minimized (Wolfensohn and Bourguignon, 2004). But in 1990s focus had been shifted towards institutions and governance for sustainable growth and poverty reduction, which changed the mantra of 'getting prices right' to 'getting institutions right' (Wolfensohn and Bourguignon, 2004: 5). It was believed that three sectors state, market and civil society were complimentary in promoting development where state plays a key role by providing the public goods for other sectors to participate actively. However, the institutions and governance structures were lagging in developing countries (Birner and Wittmer, 2006).

Like many developing countries, Tanzania underwent through several institutional and ideological changes during the 1980s; these changes were common in the dairy industry which changed along with socio-economic policies initiated by the government. The dairy industry was under socialist policy but the status quo changed in 1985 when the country embraced liberal economic policies such that the role of the state was limited to livestock health and regulation of milk and dairy products while private players concentrated with milk production and processing (Kurwijila and Bennett, 2011). There had been impacts on employment opportunities and standards of living because of liberal economic policies such that inequality and power imbalances had been on the rise at both the national and international levels (United Nations, 2010) such that women tended to work in the least valued parts of the value chains and were mostly invisible even though they performed most of the activities; this made it hard to access them or help them (Barrientos et al, 2008; Seguino, 2000). Additionally, businesses owned by women in rural areas faced many constraints as compared to men-owned businesses (Mayoux and Mackie, 2010).

Inequality took many forms such as inequality in opportunity and incomes with gender inequality forming an integral part of social inequality such that people's ability to contribute to prosperity and economic growth was hindered such that the country's efforts in putting a meaningful dent in poverty were not effective (World Bank, 2006). Thus, it was necessary to open opportunities for everyone and gender inequality needs to be curbed to bring economic growth at a significant pace (Laven and Verhart, 2011)

Communities in Rural Tanzania are generally organized under patriarchal socio-cultural norms and values such that gender roles, decision-making patterns, customs and rules regulating access to and ownership over resources constrained women's rights and privileges; this exacerbated gender imbalances in rural communities (Mukangara and Koda, 1997).

1.2 Research objectives

This study has the following main objectives:

(a) To find the factors for participation in dairy value chains of extensive and intensive livestock systems.
(b) To assess the gendered access and control of the factors for participation in dairy value chains of the extensive and intensive livestock systems; and the reasons behind.
(c) To identify the benefits of participation in the dairy value chains of extensive and intensive livestock systems.
(d) To assess the gendered access and control of the benefits of participation in the dairy value chains of extensive and intensive livestock systems; and the reasons behind.

(e) To identify attributes of institutions, households and Communities in the dairy chains and how they shape gender issues.
(f) To identify areas of intervention for gender inclusive dairy development in Tanzania

1.3 Research Questions

This study thrives to address the following research questions as given below:

a) What are the influencing factors for participating in dairy value chains in the extensive and intensive livestock systems?

b) How the influencing factors shape the participation of males and /or females in the extensive and intensive livestock systems?

c) Who (males, females or both) have access to and/or control over the factors of participation in the extensive and intensive livestock systems? And why?

d) What are the benefits of participation in the dairy value chains of extensive and intensive livestock systems?

e) Who (males, females or both) have access to and/or control over the benefits of participation in the extensive and intensive livestock systems? And why?
f) How institutions, households and communities shape gender issues (constraints and opportunities) in the extensive and intensive livestock systems?

1.4 Significance of the study

This study will enable the identification of various factors that influence the participation of men and women in the dairy value chains organized under the intensive and extensive livestock systems; these two systems are organized in different socio-economic contexts such that the factors for participation are more likely to be different. This study will establish how attributes of households, institutions and communities shape the participation of men and women in both systems with a focus on the access and control of the factors and benefits of participation in the dairy value chains. This will enable policy makers to know the areas of intervention and make gender-sensitive and pro-poor policies such that an inclusive dairy development in Tanzania is achieved. This will make dairy industry sustainable and productive because the major part of the population (the poor and women) has limited access and control of the factors and benefits of participation; it is necessary to know how gender dynamics and power relations in the communities shape the gender imbalances embedded in dairy value chain. This study will also serve as basis for further researches concerning with gender issues in livestock systems.

1.5 Scope of the study

This study will look at the dairy value chains of intensive and extensive livestock systems; in each system, the actors will be mapped out as identified by men and women separately, this aims at identifying the actors dealing with men and women in each dairy value chain. This study will then look at the influencing factors for participation as identified by men and women in each system; the access and control of those factors and benefits of participation will be identified and how they are shaped by attributes of households, institutions and communities.

1.6 Organisation of the study

This study report is organized into six different chapters. The first chapter introduces the background and statement of the problem. The second chapter introduces the literature review and an overview of similar studies as well as the status quo of the dairy industry of Tanzania. The third chapter presents the research methodology used in this study; it looks at the study area, methods of data collection and analysis as well as the conceptual and gender frameworks that guided this study. The fourth chapter presents the results of the study; it presents the process-net maps (and their network properties) of men and women in the intensive and extensive livestock system; it describes the actors identified by men and women and their levels of influence; it also gives the characteristics of individuals and households found in the two systems; it also presents the access and control of factors and benefits by gender, type of household head, nature of family and nature of marriage. The fifth chapter presents the discussion of the results; it presents the reasons for different levels of influence among actor identified by men and women; how the access and control of factors and benefits were shaped by gender, type of household head, nature of family and marriage; it also presents the interpretation of properties found in networks/process-net maps and lastly it presents how the participation of men and women were affected by the influencing factors. The last chapter presents the conclusion and recommendations of the study.

CHAPTER TWO: LITERATURE REVIEW

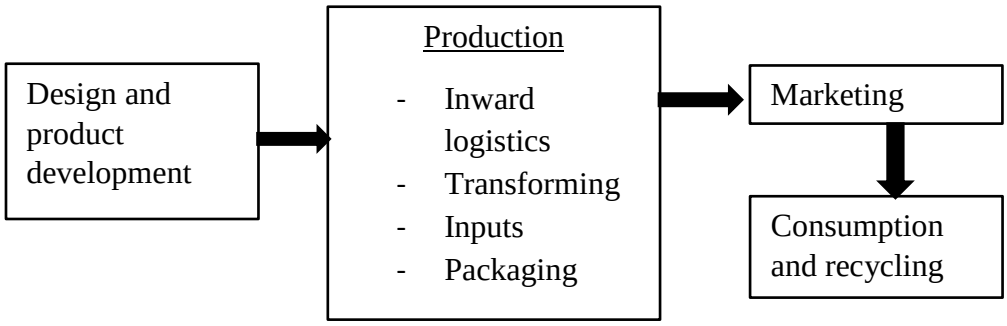
2.1 Definition of value chain key terms and concepts

This part looks at various definitions and/or concepts as used in the study of value chains.

2.1.1 Value chain concepts

Value chain manifests itself as a complete set of activities that range from the inception of a product or service, production and transformation of that service or product, delivering to final consumers and its final disposal after use; however in reality a value chain is rather complex and involves many sectors/ actors. Thus, value chains are rather extended chains than simple chains (Kaplinsky and Morris, 2000).

Figure 1: General structure of value chain



Source: Kaplinsky and Morris, 2000

Like the value chain concept is *filiere analysis* that thrives to describe how inputs and or services flow during the production of a final product (Kaplinsky and Morris, 2000). But major advances were made by Gereffi who introduced global commodity chains that focus on the power relations embedded in the value chains; he argued that many chains are characterised by the presence of dominant actor or groups which determine the overall character of the value chain; two types of chains were obtained *buyer-driven commodity chains* in which buyers play a key role and *producer-driven commodity chains* in which producers are dominant (Kaplinsky and Morris, 2000; Gereffi (1994).

2.1.2 Why value chain analysis is important?

It had become very important to understand the dynamic forces in value chains because with globalisation, the world had seen an increased division of labour and outsourcing of production such that systemic competitiveness and efficient production became very crucial in penetrating global markets and allowing sustainable economic growths (Kaplinsky and Morris, 2000).

2.1.3 Upgrading or improvement of value chain

The improvement of the value chain can take one of the following forms:

Process upgrading: this involves improvement of the internal processes of the value chain

Product upgrading: this involves introduction of new products or improvements of old products of the chain.

Functional upgrading: involving increasing value added through efficient combination of activities in the chains

Chain upgrading: this involves moving to a new chain. (Kaplinsky and Morris, 2000; Humphrey and Schmitz 2001; Bolwig et al 2008:17)

2.2 Gender terms and concepts

Gender is the social category usually associated with being a man or a woman. It encompasses economic, social, political, and cultural attributes and opportunities as well as roles and responsibilities. Gender is defined differently around the world and those definitions change over time (March et al, 1999)

Sex refers to biological characteristics that distinguish males and females. These do not change from one culture to another and can be recognized as independent and distinct from one another (March et al, 1999)

Gender roles are the behaviours, tasks, and responsibilities that are considered appropriate for women and men because of socio-cultural norms and beliefs. They change over time, through individual choices or as a result of social and/or political changes emerging from changed opportunities (more education, different economic environment) or during times of social upheaval (such as disasters, war, and post-conflict situations) (March et al, 1999).Gender can also be defined as the differences between men and women based on social construction and not on the physical or biological differences; gender roles refer to division of activities between men and women depending on the traditions and cultural norms. There are clear links between gender roles and how they impact the access and control over the productive assets and benefits of participating in value chains such that men and women have different access and control over the factors and benefits (Terrillon, 2011)

Gender relations are one type of social relations between men and women that are constructed and reinforced by social institutions. They include the routine ways in which men and women interact with each other in social institutions: in sexual relationships, in friendships, in workplaces, and in different sectors of the economy. Gender relations are socially determined, culturally based, and historically specific. (March et al, 1999)

Gender-based constraints refer to restrictions on men's or women's access to resources or opportunities that are based on their gender roles or responsibilities. The term encompasses both the measurable inequalities that are revealed by sex-disaggregated data collection and gender analysis as well as the processes that contribute to a specific condition of gender inequality (March et al, 1999)

2.2.1 Overview of Gender issues (constraints and opportunities) in agricultural and livestock value chains

Michelle (n.d.) observed that men were dominant in both agricultural and livestock value chains in rural areas of Africa since women face several constraints such as access to capital, cultural norms and values, limited skills, decision power and mobility etc. gender relationships and socio-economic and cultural roles of livestock are not fully understood which in turn results to limited participation of women in the livestock value chains. Several approaches have been proposed to improve smallholder access to inputs and output markets but these will be less effective if these approaches are not gender inclusive.

Economic advancement of women was hindered by laws and customs that limit their access to and control over productive resources. Several authors stress that if welfare, growth, equity and empowerment are to be achieved then women's access to resources has to be secured so that they will be able to take into account of the new agricultural technologies, development interventions (Galie et al, 2015)

Women participation in local politics was very low as compared to men, in the general elections of 2005 and 2010 women candidates were 13% and 22.6% respectively while in the ward elections women candidates were 6.2% and 7.5% for 2005 and 2010. This makes it hard for women to acquire resources such as land because most land was acquired at the village level where men are dominant in decision making (Mutasingwa, 2015)

Men and women showed different preferences to the kinds of livestock depending on their ability to acquire those livestock/livestock products and control the income their sale. Women preferred to keep small livestock such as chickens, goats and sheep while men preferred to keep larger livestock such as cattle. Women preferred to sell eggs and milk especially at farm gates where men preferred to sell livestock at distant markets. This pattern is due to the gendered disparity in assets such as transport and communication, market information, financial services etc. such that men are at advantage as compared to women. Thus there is a need for legal and institutional reforms that would be gender inclusive. (Waithanji et al, 2013).

2.3 Overview of Tanzania dairy industry

This part gives the general picture and environment of the dairy sector in Tanzania.

2.3.1 Tanzania dairy sector overview

Tanzania has an estimated 18 to 22 million head of cattle population which is the third largest in Africa, around 15 million goats (with 40,000 as dairy goats), around 6 million sheep and 1.6 million pigs. Tanzanian short horn Zebu, Boran and Ankole are the main breeds of cattle kept in Tanzania as well as crossbred dairy cattle (3% to 4% of the population) while the main dairy goats kept are Toggenburg and Saanen. Livestock sector employs around 40% of the population and contributes to the GDP by 5.9% whereas 30% of this comes from the dairy sector (Nell et al, 2014 and Tanzania Dairy Industry 2012)

2.3.2 Dairy production systems in Tanzania

Dairy production systems in Tanzania fall into two categories which are the traditional system with local Zebu cattle and the Modern system with grade cattle.

Traditional system has three sub-categories which are pastoralism and transhumance, Agro-pastoralism and small-holder mixed farmers (sedentary). Pastoralism and transhumance system involve pastoralists moving with their livestock from place to place depending on availability of natural pasture. Under Agro-pastoralism cattle are grazed on communal rangelands during the wet season and on crop residues during the dry season and Small holder mixed farmers (sedentary) under which cattle are kept for manure (Nell et al, 2014 and Tanzania Dairy Industry 2012)

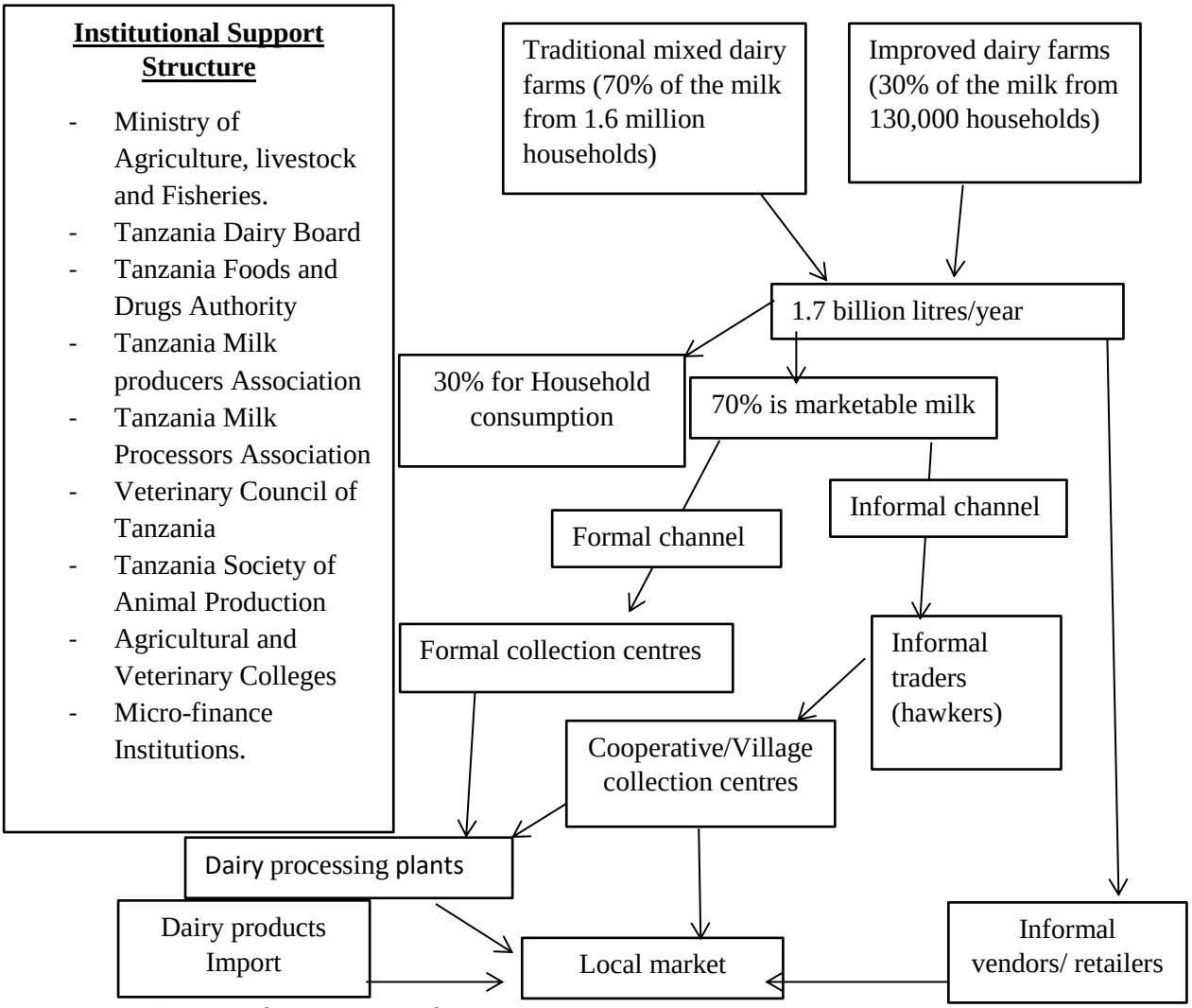
The modern system with grade cattle has three sub-categories which are rural small holder dairy farming, urban small holder dairy farming and medium and large scale dairy farming. Rural small holder dairy farming under which farms keep 1 to 5 cattle which were obtained from livestock development programmes and cattle are fed with crop residues, grown fodder and cut grasses from communal/waste lands. Urban smallholder dairy farming which is like the urban system but the only difference is that it uses more inputs such concentrate feed and animal health services. Medium and large scale dairy farming (private) under which farmers have extensive land for fodder production and conservation, they process milk in the farms or sell to processors (Nell et al, 2014 and Tanzania Dairy Industry2012)

2.3.3 Dairy value chain structure

Milk production in Tanzania is characterised by seasonal variations such that during the wet season more milk is obtained (on average 7 litres per household and 2 litres per cow) and during the dry season less milk obtained (on average 3 litres per household and 1 litres per cow). (Mbiha, 2008). 95% of marketable milk in Tanzania is marketed through informal channels where by hawkers use

motorcycles or bicycles to fetch milk from the farmers. This is the most preferred market channel because hawkers not only pay cash upon receiving the milk and buy milk even in remote areas but also, they offer higher prices as compared to formal traders. Whereas 5% of the marketable milk is marketed through formal market channel under which formal traders buy milk from the dairy farmers and deliver it to the milk collection centres which are owned by formal processors. The milk will then move to the processing plants.

Figure 2: Structure of Dairy value chain of Tanzania



Source: Light Manufacturing in Africa,2011

2.4 Environment of the dairy industry of Tanzania

This part looks at the regulatory, political, technological and economic environments under which the dairy sector of Tanzania operated/operates. This is as portrayed below:

2.4.1 Regulatory and legal environment

Tanzania Dairy Board (formed in 2005) is the regulatory body for the dairy sector in Tanzania; it is responsible for coordination and promotion of the dairy industry. It is also responsible for development of standards and quality control systems, conducting market research and developing

new markets, creating of fair and conducive environment for stakeholders in dairy industry advising the minister responsible for livestock on the issues related to policies and strategies of the dairy industry training and certification of farmers and formation of national stakeholders' associations. 15 regulators under 25 acts and more than 25 regulations regulated/regulates the dairy sector (Katjiuongua and Nelgen, 2014; Dillman and Ijumba, 2011; Kurwijila and Bennett, 2011).

Tanzania Dairy Board (TDB) collaborates with other authorities such as Tanzania Bureau of Standards (TBS) which is responsible for quality and ingredient standards of raw and processed foods for agricultural commodities, Tanzania Foods and Drugs Authority (TFDA) which inspects and registers processing facilities, food products, food import and export certification and food risk analysis and BRELA which is responsible for registering businesses and companies (Dillman and Ijumba, 2011; Kurwijila and Bennett,2011).

2.4.2 Political environment

Tanzania initiated the policy of "Kilimo Kwanza" (agriculture first) under the Agricultural Sector Development Programme (ASDP) which is concurrent with Comprehensive African Agricultural Development Programme (CAADP which was signed in 2003 by African Heads of States in Maputo; this initiative was taken to prioritize the agricultural sector (with livestock included) so as to consequently improve food security and economic growth. If well implemented then "Kilimo Kwanza" will have positive impacts on the dairy industry (Dillman and Ijumba, 2011).

2.4.3 Economic environment

Inflation rate in Tanzania had been on increase since 2011; with less than 6% in January to 17% in October. Bank interest rates range from 18% to 22% which limits people's ability to borrow; unemployment rate fell from 12% in 2001 to 10.7% in 2011; GDP growth rate had been at least 6% in the past few years (Dillman and Ijumba, 2011).

2.4.4 Technological environment

Most milk is produced under extensive systems requiring fewer chemicals; only a small portion of milk is produced in intensive systems. The processing technologies used especially by small-scale processors are out-dated (Dillman and Ijumba, 2011).

2.5 Productive assets for livestock and their access in Tanzania

Assets are stocks of financial, human, natural and social resources that can be acquired, developed, improved and transferred across generations (Ford Foundation, 2004). Land, water, livestock and crops are important productive assets especially to rural livelihoods but men and women have different levels of ownership rights (Galie et al, 2015)

2.5.1 Access to land

Tanzania has 94.5 million hectares of land of which 44 million hectares and 26 million hectares are suitable for agriculture and livestock respectively. All land in Tanzania is public and owned by the government through the head of the state but the villagers control most it under the provisions of Land Act and Village Land Act (both of 1999) (CARE Tanzania, 2010; Njombe et al, 2011). Per Sendalo (2009), land in Tanzania can be categorized into three types which are general land, village land and reserved land but land management and administration is decentralized. The commissioner for land is responsible for administering general land by using the land act. The village land is governed by the village council and the reserved land is administered by the statutory bodies that have power over reserved lands.

Basically, there are two major types of land tenures in Tanzania; the first is the one that the occupant gets a long-term title to the land (under the Land Act of 1999) and the second one is the village land that is un-surveyed and does give formal title to the occupant but an "*Hati ya Kimila*" which is an indigenous land title given to the occupant after the village has approved. (USAID country profile (n.d.) and CARE Tanzania, 2010)

People can acquire land through inheritance (35.9%), buying (32.8%) and free clearing of village land (31.2%). The Land Act of 1999 and Village Land Act of 1999 states that both men and women have equal rights when it comes to holding, using and dealing with land. But customary laws and cultural norms discriminated women regardless of the presence of legislation. When a husband dies or a woman gets divorced then she must move with her children to her parents. She doesn't inherit any land from her husband (CARE Tanzania, 2010)

2.5.2 Access to information and services

Information as an economic resource is essential in bringing economic development such that that" information poverty" is one of the major causes of underdevelopment (Chowdhury 2006; Romer 1993). This is because individuals/households have limited/ costly access to information may be unaware of other resources available to them, may be unable to allocate their resources efficiently or may forgo income enhancing opportunities such as being unaware of the requirements for obtaining loans or available technology or markets for their products (Stango and Zinman 2008)

2.5.3 Access to extension services

The panel data on Tanzania livestock and livelihoods revealed that about 25% of people in the rural areas receive extension services on production practices and animal diseases. The government provided most of the services through the ministry of livestock and fisheries (Katjiuongua and Nelgen, 2014)

2.5.4 Access to credit

Only 6% of livestock keeping households in rural areas receive credit and about 5% are members in savings/credit groups. Most people in rural areas receive credit from savings and credit cooperatives (SACCOs), dairy farmer groups, banks (National Microfinance Bank and CRDB plc.), microfinance institutions (FINCA and PRIDE) (Covarrubias et al. 2012; Mpangalile et al. (2010). People had various sources for initial capital for staring a dairy operation such that 80% of dairy producers obtained it through own saving whereas other obtained initial capital from formal credit (2.5%), family/friend (7.5%), informal credit (7.5%) and pension income (2.5%) (Mbiha, 2008; Mvurungu, 2013).

2.6 Gender issues in the livestock sector of Tanzania

Most dairy producers in Tanzania were around the age of 30 and 64 years old with the proportion men and women being 70% and 30% respectively. Among the dairy producers 50% have secondary education, 37.5% have primary education and around 12 % have post-secondary education and the average household size is around 9 members (Mbiha, 2008; Kimaro et al, 2013; Mvurungu, 2013).

Activities in the household are divided based on gender such that there are “male” and “female” activities; livestock (cattle and goats/sheep) marketing is done by men 76% of the times, crop marketing men dominated by 72% and off-household income generation by 53%, Livestock husbandry (men 50% women -9% jointly 15%) and men herded livestock by 30%. Women dominate activities such as fetching water, collecting firewood, milking and making beer. Male Children were dominant in livestock herding while girl children were prevalent in milking and cooking at home. (Øvensen, 2010; Kimaro et al, 2013; Mvurungu, 2013)

If higher agricultural productivity (livestock included) and poverty reduction were to be achieved, then access to and ownership of resources/assets within and beyond the households must be considered There is high disparity on livestock ownership among men and women such that small livestock such as chicken and goats are more likely to be owned by women while men own larger livestock such as cattle. In Tanzania, the percentage of households in which women own different livestock are as follows: 7%(cattle), 5%(goats), 10%(sheep), 27%(exotic chickens), 15%(local chickens) and 9%(pigs) But these figures might be misleading as livestock can be owned by men, women or jointly by men and women in the households and it was observed that there is even higher gender disparity in livestock ownership among men and women in Tanzania when the data were disaggregated into livestock actually owned by men, women and jointly by men and women.

The following table shows the average number of livestock and their ownerships. (Doss et al, 2011 and Njuki and Mburu, 2013)

Table 1: Gendered ownership of livestock in Tanzania

Livestock type	Joint	Men	Women
Cattle	1.4	3.4	0.2
Pigs	3.5	1.1	0.2
Sheep	1.9	2.6	0.6
Exotic chickens	44.1	65.1	42.7
Goats	2.8	2.9	0.2
Local chickens	4.7	5.7	6.1

Source: Njuki and Mburu (2013)

2.6.1 Livestock acquisition

In Tanzania, livestock could be acquired through different methods such as inheritance, purchase, gift and being born into the herd/flock but these methods differ from one species of livestock to another. 100% of dairy cattle were obtained through purchase while 27%, 35%, 18% and 18% of local cattle breeds are acquired through born into the herd, purchase, inheritance and as gift respectively. About 24%, 67% and 9% of goats are acquired through being born into the herd, purchase and as gifts respectively. 100% of sheep and 100% of exotic chickens are obtained through purchase. About 76% and 14% of pigs are acquired through purchase and being born into the herd. (Njuki and Mburu, 2013)

2.6.2 Decision making concerning livestock

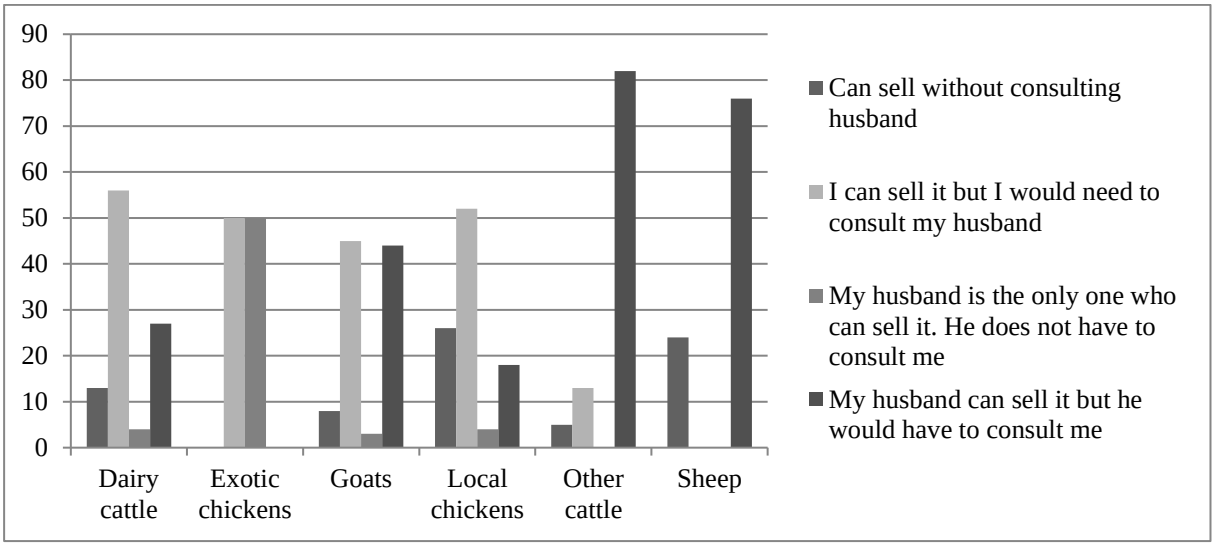
Ownership goes along with decision making in the households; the study explored the pattern of decision making in the households regarding sale, slaughter and giving livestock in Tanzania (Njuki and Mburu, 2013)

Societies in Tanzania are either patrilineal or matrilineal in nature; for the case of patrilineal societies women have very little influence when it comes to decision making at the household/ society level such that men made most decisions (URT and UNICEF, 1990). Husband make decisions on the use of income from livestock (54% of the times) and women make them for about 12% of the times whereas 37% of the times both men and women make joint decisions. (Ishengoma, n.d.)

Men dominated the decisions related to resource allocation in the household such as choice of field for a crop (Husband-72% and jointly-28%), labour allocation (Husband-42%, Wife-2% and jointly-58%), hiring labour (Husband-80% and jointly-20%), amount of excess food to be sold

(Husband-57%, wife-2% and jointly-43%) and choice of market (Husband-8% and jointly-84%) (Ishengoma, n.d.).

Figure 3: Decision making on sale of women-owned livestock in Tanzania



Source: Njuki and Mburu, 2013

2.6.3 Factors influencing differences in livestock ownership and decision making powers

There are several factors that affect the ownership of livestock and decision making powers among women and these do vary from one production system to another.

Culture played a role in women owning assets including livestock because it shapes the limit and choice of assets that could be owned by women. Social capital is defined as being in a group with others; this is known to improve women access to assets that they couldn't own individually. Human capital can be the labour available to the family, education and health. Human capital is very essential to one's opportunities as well as productive capacity and well-being of the whole household. It was observed that women with more education have wider sources of income and have a better bargaining power in terms of resource acquisition and use (Njuki and Mburu, 2013). Additionally, low knowledge of animal husbandry of women compared to men, differences in contribution to family income, religious teachings that put father the head of the family women assistants (Mvurungu, 2013)

2.7 Market participation and income management

This part looks at how livestock contributed to household income and asset, factors influencing income distribution and participation of women in the market.

2.7.1 Contribution of livestock

Livestock also contributes to the overall assets owned by men, women and jointly owned by men and women by 28%, 30% and 58% respectively (Njuki and Mburu, 2013). Livestock and their

products contribute to the household income; the sale of cattle, milk and sheep/goats contribute around 4%, 3% and 9% of the household income respectively. But the access and control of the income differ depending on the kind of livestock in the household. Women control about 44%, 25%, 19%, 56% and 25% of the income from the sale of chickens, eggs, cattle, milk and sheep/goats respectively. (Njuki et al, 2013)

2.7.2 Factors influencing income distribution

Additionally, the type of markets in which the livestock and their products are sold has an influence on the share of income going to men and women. Livestock and their products can be sold at a farm gate (to other farmers), farm gate (to traders), village markets, and distance markets or in outside weekly markets. Women are more likely to participate in the informal market channel whereas men are dominant in formal market arrangements. Women lacked negotiation skills and they benefit more if products are sold to other farmers/neighbours rather than sold to traders but this also depended on the type of livestock and livestock product involved. If chickens were sold at farm gate (to other farmers) and farm gate to traders, then women controlled around 70% and 45% of the income respectively. For the case of cattle, women controlled 31% of the income if animals were sold at a farm gate to other farmers and only 9% of the income if animals were sold to traders. Likewise, women controlled around 75% and 32% of the income if milk was sold to other farmers and traders respectively. (Njuki et al, 2013)

Additionally, share of income from livestock products going to women and men depends on who sold the livestock/ product in the household. If men sold chickens in household, then women get 26% of the income and if women sold the chickens then women get around 97% of the income. In the case of goats and sheep, if men sell sheep/goats then women get 34% of the income and if women sell the sheep/goats then women get 64% of the income. Likewise, if men do milk sale; women get 18% of the income and if a woman does milk sale then she will get around 98% of the income. But for the case of cattle, women are not allowed to sell such that they get around 20% of the income from cattle sale which customarily done by men only. (Njuki et al, 2013)

2.7.3 Factors affecting women participation in livestock markets

Several factors were identified to affect women participation in the markets for livestock and their related products such as low literacy and negotiation skills, limit on mobility since they find it hard to balance reproductive roles and care with market participation, size of land owned, other assets owned by women (apart from land) and limited access to information and infrastructural facilities. These factors have an influence on the women access to and control of the income from the sale of livestock and their products (Njuki et al, 2013)

2.8 Management of Livestock

This part presents how livestock were /are handled, milked as well as dairy processing and challenges faced by processors as depicted below:

2.8.1 Livestock tending

Livestock are fed through zero grazing (60%), semi-grazing (15%) and grazing (25%) whereas 92.5% reported to have used purchased feed before and 7.5% have not used purchased feed before. Livestock could be treated by using purchased drugs (23.1%), taking the animal to the veterinary doctor (10.3%), visited by a veterinary doctor at home (66.7%) (Mbiha, 2008)

2.8.2 Milk handling and preservation

Milk was/is handled by using plastic utensils only (77.5%), aluminium utensils only (15%) and both type of utensils (7.5%). Likewise, 47.5 % of dairy farmers reported to use warm water and soap when cleaning the utensils whereas 37.5% reported to use warm water only and 15% reported to use cold water and soap when cleaning the milk utensils. But all the dairy producers reported to wash hands before milking and strain the milk after milking. Dairy farmers used different methods to treat raw milk; 10.3% used natural fermentation, 76.9% used refrigeration, 10.3% used boiling and none processed the raw milk by using culture. The quality of milk is checked by using alcohol (26.7%), visualisation (20.0%) and tasting (13.3%) while 6.7% of the processors don't do any quality check. Milk was transported by using bicycle (62.5%), on foot (7.5%), own vehicle (7.5%) and 20% of the dairy farmers didn't transport any milk instead they sold at the farm gate to either traders or neighbours who buy directly at home. Milk marketing agents use visual observation, tasting, lactometer/thermometer as methods for quality control; refrigeration and boiling methods are used for preserving the milk before selling. (Mbiha, 2008)

2.8.3 Milk processing

There are two forms of milk processing; formal milk processing which is done mostly by men and informal milk processing which is done mostly by women**.** Overall, milk processing can either be large scale (above 10000 litres/day), medium scale (between 3000 litres/day and 10000 litres/day) and small scale (less than 3000 litres/day). The processing and packaging materials were either imported (60%) or produced in the capita (40%). (Mbiha, 2008; Njombe et al, 2011); Fresh milk, Packed pasteurized milk, Packed fermented milk, Yogurt, Cheese, Cream and Sour milk are the main products from processors (Mbiha, 2008; Njombe et al,2011)

2.8.4 Constraints faced by processors

Several constraints face processors of dairy products such as lack of capital, unreliable market, theft of animals, high operational costs, unreliable labour power, low education levels, competition

with imported dairy products, unreliable power supply, poor machinery, Insufficient milk supply, Low quality of milk, Taxation problems, poor government regulations and Inadequate demand for dairy products among Tanzanians. Males dominated milk marketing in the study area. (Mbiha, 2008)

2.9 Market analysis

This part presents dairy businesses in Tanzania with respect to type of business, marketing techniques and channels as well as analysis of prices, margins, concentration ratios and profits.

2.9.1 Types of business ownership (marketing agents)

Milk marketing agents (businesses) were operated as sole proprietors (70%), partnerships (10%) and associations (20%). Milk marketing agents obtained their initial capital from formal /informal credit, savings and /or family/friends. Large commercial processors such as Tanga Fresh Ltd and ASAS Dairies Ltd. normally give credit to marketing agents in the form of refrigerators. (Mbiha, 2008)

2.9.2 Marketing techniques for processed products

46.7% of the commercial processors market their processed dairy products through promotions by advertisement whereas 20.0% of the processors use school-feeding as a way of promotion. But 33.3% of the processors don't do any marketing at all. (Mbiha, 2008)

2.9.3 Milk marketing channels

Milk is marketed mainly through five different channels that fall under two major categories; formal and informal marketing channels.

Formal milk marketing channel involves either of the following channels: milk producers sell raw milk to milk processors that sell to final consumers, milk producers sell raw milk to collection centres which sell the raw milk to processors, milk marketing agents and to final consumers and milk producers sell raw milk to processors who sell processed dairy products to marketing agents that sell to final consumers. Informal marketing channel involves either one of the following channels: milk producers selling directly to consumers and milk producers sell raw milk to milk marketing agents that sell to the final consumers. Different types of methods were/are used during payments for milk such cash upon delivery/purchase, weekly payments, Mid-month payments and monthly payments (Mbiha, 2008; Njombe et al, 2011; Mvurungu, 2013)

2.9.4 Analysis of prices, margins and market power

Price of milk varies from season to season and along the dairy value chain such that milk price is the lowest at the milk production level and the highest at the processing and marketing levels. Milk

prices were high during the dry season and low during the wet season; the availability of fodder/pasture influences this. Price of milk was determined either by the seller (milk producers), buyers (marketing agents, processors and milk collection centres) and /or by negotiation between the buyers and sellers. The level of the dairy value chain (milk production, processing, marketing and/or consumption) influence the type of actor who is likely to determine the price of milk but this varies from region to region across Tanzania. (Mbiha, 2008; Aniseth, 2014)

2.9.5 Marketing margins realized by value chain actors

Gross marketing margins varied among different actors and from dry season to wet season. Milk processors had the highest marketing margins irrespective of the seasons; they had marketing margins of 73.8% and 80% in the wet and dry seasons respectively. Milk producers (dairy farmers) had the lowest marketing margins irrespective of the seasons; they had the marketing margins of 56.4% and 62.8% in the wet and dry seasons respectively. Marketing agents had marketing margins of 66.6% in all seasons. (Mbiha, 2008; Aniseth, 2014).

2.9.6 Profit margins

The average annual profit margins of milk processors were the highest and three times the profit margins acquired by marketing agents and seven times the profit margins obtained by dairy farmers. (Mbiha, 2008; Aniseth, 2014)

2.9.7 Concentration ratio

Concentration ratio varies along the dairy value and sometimes from dry season to wet season. Producers had the concentration ratios of 68.27% and 58.82% in the wet and dry season respectively. Marketing agents had concentration ratios of 60.83% in both seasons whereas processors had concentration ratios of 81.32 in both seasons. (Mbiha, 2008; Aniseth, 2014)

2.10 Reasons for gender-equity in dairy value chains

There are three main arguments for dairy value chain to be gender inclusive: firstly, basing on social justice, rights and opportunities should not be denied to someone because of her/his sex which means that that there must be a fair distribution of assets, benefits and advantages among all members of the society. Secondly, faced with a fact that approximately 70 % of poor people in developing countries are women then gender equity is crucial in poverty reduction since without it high costs are accrued to economic and human development because women cannot participate fully in the economy. Thirdly, basing on a business perspective, gender inequality is synonymous to a missed business opportunity since women will provide potential clients; improve reputation of companies and profit generation (KIT, Agri-ProFocus and IIRR. 2012). Additionally, gender-

equity in the value chains would improve productivity and profitability, food and nutrition security and sustainability (Meinzen-Dick et al, 2011).

2.11 Challenges faced by dairy producers

In the studies conducted in Dar-es Salaam, Iringa and Tanga, the following challenges were identified: Animals' diseases and deaths (19.1%), Lack of capital (5.3%), Unreliable fodder availability (18.1 %), Low selling prices (6.4%), Unreliable market (7.4%), Theft of animals (14.9%), Lack of improved cattle breeds (3.2%), Consumer payment problems (1.1%), High running costs (12.8%) and Unreliability of labour power (11.7%.). Likewise, different constraints that affect milk market participation were identified but they vary as one move along the dairy value chain. The constraints are high investment costs especially for processors, unreliable milk markets, competition with imported dairy products, unreliable power supply etc. Additionally, Milk consumption in Tanzania is still low and there are several factors that affect milk consumption such low purchasing power, poor quality of dairy products, poor storage and handling equipment etc. (Mbiha, 2008; Aniseth, 2014; Mvurungu, 2013).

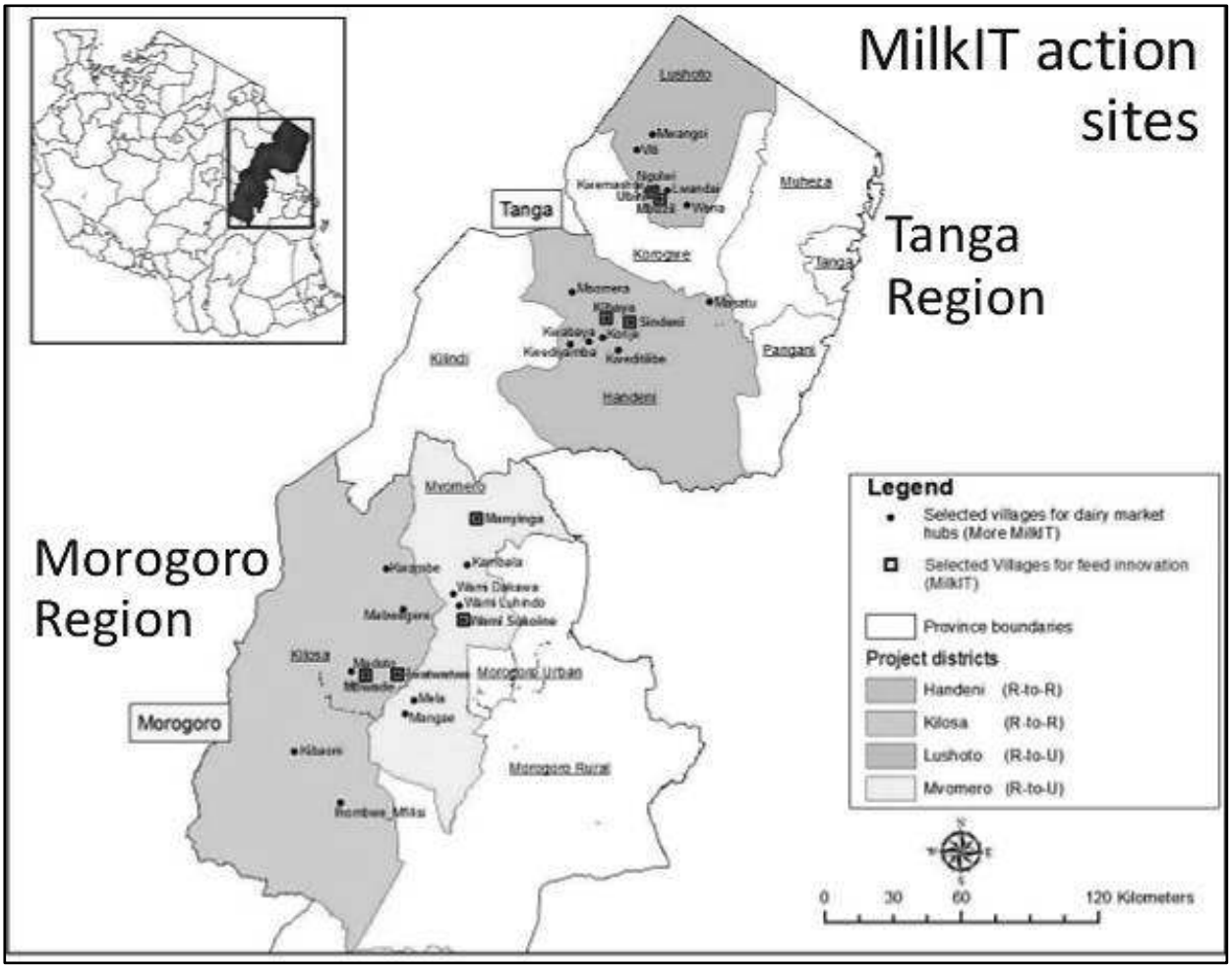
CHAPTER THREE: RESEARCH METHODOLOGY

This part presents the research methodology that was used in carrying out this study; it comprises of four main parts, namely: the study area and sampling procedure, materials and methods for data collection, methods used in data analysis and frameworks of analysis used in the study (conceptual framework of the study and gender analysis framework).

3.1 Study area

This study was conducted in Tanga and Morogoro regions of Tanzania; data were collected in Kilosa and Mvomero districts of Morogoro region; Handeni and Lushoto districts of Tanga region. These sites were chosen because they had dairy farmers that fitted the requirements of the study. Kilosa and Mvomero districts had extensive livestock system while Handeni and Lushoto districts were under intensive or semi-intensive livestock system; this was as identified by ILRI (International Livestock Research Institute).

Figure 4: Study area



Source: Maass, 2014.

3.2 Sampling

This study utilized purposive sampling as directed by ILRI staff and local-government leaders to identify villages of interest for this study; purposive sampling was chosen because it enabled the researcher to identify the villages that fell/fall under each system of livestock keeping. The sampling frame and units used were given as shown in the table below:

Table 2: Sampling frame and units

Tools/methods	District	Production system	No. and name(s) of villages	Market channel
Process net map	Handeni	Extensive	2*: Kwadiambe and Kwenjugo	Rural to urban: formal marketing
	Lushoto	Semi-intensive	2*: Ubiri and Gologolo	Rural to Rural: informal marketing
	Kilosa	Extensive	2*: Ulaya Kibaoni and Kivungu	Rural to urban: informal marketing
	Mvomero	Semi-intensive	2*: Makuyu and Wami-Sokoine	Rural to Rural: informal marketing
Ethnographic methods (Village stays)	Handeni	Extensive	1: Kwadiambe	Rural to urban: formal marketing
	Lushoto	Semi-intensive	1: Ubiri	Rural to Rural: formal and informal marketing
	Kilosa	Extensive	1: Ulaya Kibaoni	Rural to Urban: informal marketing

* One village within ILRI operational area and one outside ILRI operational area.

**Two type of villages with different formal value chain (cooperative, hub approach).

3.3 Materials and methods for data collection

This part presents and describes the materials and methods used in the study during data collection namely; Process net – mapping and ethnographic or village stays.

3.3.1 Process net-maps

Net-Mapping or influence mapping of social networks is a participatory tool that was used during the Focus Group Discussions (FGDs) to map the actors as they had been identified by women and men separately; This is an interview-based methodology which enabled the identification of actors that dealt with men and women separately, how those actors were linked, how influential they are/were and their goals (what they do in a network) (Schiffer, 2007)

The data collection was done by using the "Process Net-Map" method, a participatory mapping tool, which allowed the researchers to identify (1) the steps involved in different implementation mechanisms of the dairy market institutions, (2) the actors who were formally or informally involved in implementation, (3) the influence level of the actors on the outcome; and (4) possible entry points for leakages and elite capture. The numbers of process net maps conducted were as follows: 2 and 1 in Kivungu and Ulaya kibaoni villages of Kilosa district respectively, in Mvomero district 2 process net mappings were conducted in Makuyu village and 2 in Wami-Sokoine village, in the villages of Kwadiambe and Kwenjugo 2 process net mappings were conducted in each village and lastly in Lushoto district two net mappings were conducted in Ubiri and Gologolo villages.

The Process Net-Map involved three phases. In Phase 1, the team asked the respondents to describe the implementation process based on the livestock system or market institution and to identify the actors involved in each step. The actors were written on stickers and placed on a large poster. The gendered differentiation of service providers and producers who received the benefit or service were noted down with men or women. The implementation processes were drawn as arrows between the actor cards. The arrows were marked with numbers, and the respective implementation step corresponding to each number was noted down at the border of the paper. The process Net-map of an implementation process could be quite complicated depicting many actors and steps in the implementation process.

In Phase 2 of the Process Net-Map, respondents were asked to rate the influence of different actors on the outcome of the market institution or livestock system (milk price, input services, quality of services, and timely payment). The rating was done on a scale ranging from 0 to 6 and it was visualized by using number of coins for easy understanding for the respondents. Sticky notes indicated the actors and coins were used to build "towers" indicating level of influence. While performing this exercise, the respondents were also asked to identify why different actors had the influence level that was ascribed to them. This described the attributes of the market institution and related actors as well as their quality of the service and their influence.

In Phase 3 of the Process Net-Map, the respondents were asked to identify where in the implementation process possible problems such as leakages or political influence might occur. Since these were sensitive issues then the interviewer needed to emphasize that it was not the goal to identify problems in the study location but rather to identify potential entry points for problems that were linked to the implementation mechanism used.

This process net map methodology helped to identify the villages with dominant market institution model for further selection for ethnographic study. It also gave the initial ideas (gender issues,

governance challenges) for further detailed investigation. After the focus group discussions, the concepts or notes were compiled for each livestock system or market institution model.

3.3.2 Ethnographic methods or Village stays

Ethnography is qualitative methodology that involves studying social interactions, perceptions and behaviours of a group of subjects as they occur and carry out their daily activities in their natural surroundings; this method utilizes participant observation and semi-structured interviews to obtain rich, holistic insights into views and actions of people as well as the nature of their habitat/surroundings (Reeves et al, 2008; Brewer, 2000; Atkinson et al, 2001).

Village stays were carried out in the villages of Ulaya Kibaoni-Kilosa district, Kwadiambe-Handeni district and Ubiri-Lushoto district; in each village, the investigator stayed for two weeks in one of the households in the village where he participated in the daily activities of the community such as grazing or cutting grasses, fetching water, looking for firewood, milking and so on. This was done while conducting semi-structured interviews and observing the daily activities of the household members. In each village, 8 male-headed households and 8 female-headed households (16 households in total) were surveyed; in each household; a woman/girl and a man/boy were interviewed such that 92 semi-structured interviews in total were carried out during the village stays. This method was chosen because it enabled further and detailed exploration of the gender issues and governance challenges which otherwise could not be captured during the Focus Group Discussions (FDGs) of process-net mappings.

3.4 Data analysis

The process net maps of both livestock systems were drawn by using Visualyzer2.2 software which enabled to map the actors and their links; in each system, net maps for males and females were drawn to compare to see if there were any differences. This software was used to calculate network properties of the net maps or social networks. Then Microsoft-excel were used to describe the levels of influence of the actors or institutions as identified and mapped by males and females in each system as well as the reasons behind the different influence levels among males and females.

The 96 Semi-structured interviews collected during village stays were transcribed and then put into Nvivo 10 software where they were coded into four main themes namely: factors for participation in the livestock system, control over factors of participation, benefits of participation and control over the benefits of participation. The Interviews were then classified based on livestock systems, gender, head of household, nature of family (polygamous family or non-polygamous family), education levels, income levels and so on. This classification enabled

extraction of demographic data and to run the matrix coding query in Nvivo 10 software to obtain data disaggregated based on the above-mentioned classifications and themes. The obtained data were then exported to MS-Excel.

Thus, at the end of the analysis two net maps in the extensive system and two net maps in the intensive system were obtained. The access and control of factors for and benefits of participation in both systems were identified as well the gender issues and governance challenges.

3.5 Frameworks of analysis

This part presents the frameworks used in the study namely: conceptual framework of the study and the gender analysis framework.

3.5.1 Conceptual framework of the study

The study was based on the following conceptual framework which was made up of six main components (parts) as explained below:

The first part of the conceptual framework looked at the factors for participation in the extensive and intensive livestock systems; the factors that were looked at were community norms and practices, decision on Livestock selling or buying, decision on milk sale, education, knowledge about livestock, knowledge about market channel, land ownership, decision on livestock Health services or inputs, livestock ownership, membership in Livestock keepers' groups, mode of payment, physical infrastructure, price of livestock, price of milk, relation with the market channel actor, responsible for livestock management and social capital (Relations with relatives, neighbours and friends).

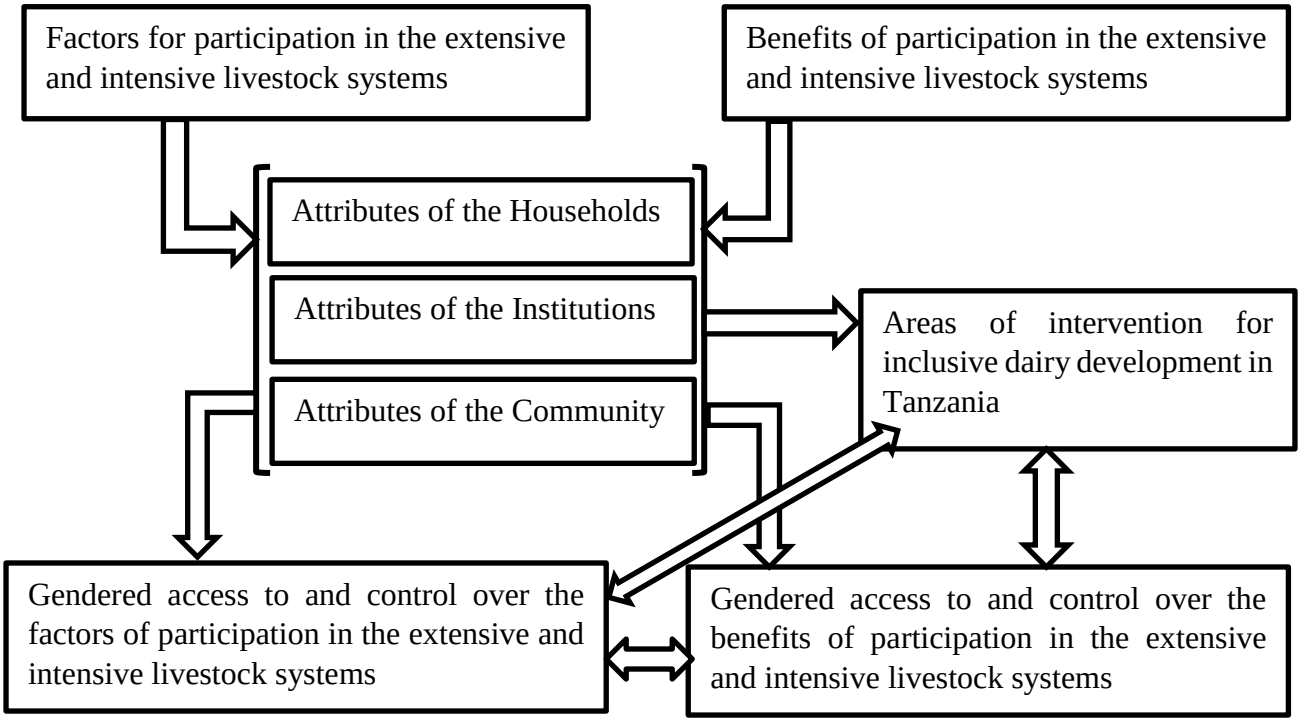
The second part looked at the gendered access to and control of the factors of participation in the extensive and intensive livestock systems; the access and control over the factors for participation were shaped by the group of attributes of households, institutions and communities which formed the third part or component of the conceptual framework.

The fourth part looked at the benefits for participation in the extensive and intensive livestock systems; the benefits that were looked at were: increased dairy income and food security, changes in assets ownership/accumulation of assets and changes in other socio-economic parameters such as paying for school expenses, paying for farm expenses, paying for medical bills, prestige, getting farm manure, insurance, dowry payment and buying of transport vehicles.

The fifth part looked at the gendered access and control of the benefits of participation in the extensive and intensive livestock systems; this component was also shaped by the third part since attributes of the households, institutions and community determined who had access to and /or control over the benefits of participation in the dairy value chains.

The last part looked at the areas of intervention to achieve gender inclusive dairy development in Tanzania.

Figure 5: Conceptual framework of the study



Source: Created by the author, 2015

3.5.2 Gender analysis framework

This study also used the Harvard analytical framework (sometimes called gender roles framework) to conduct the gender analysis of the dairy value chain in Tanzania with a focus on the two main livestock systems namely intensive and extensive livestock systems. The Harvard analytical framework worked as a grid or matrix to collect data at the household level. It consists/consisted of four main parts (tools) namely the activity profile, access and control profile, the influencing factors profile and the checklist for identifying areas of intervention from a gender perspective (Source: March et al, 1999 and Overtholt et al, 1985).

The first tool was the activity profile which was used to look at the productive and reproductive activities at the household level and thrived to answer the question of who does/did what in the household; this profile was as given below:

Table 3: Harvard gender analysis framework - Tool 1: Activity profile

Harvard tool 1: Activity profile		
Activities	Women/Girls	Men/Boys
Productive activities Agriculture: Activity 1 Activity 2, etc. Dairy enterprise: Activity 1 Activity 2, etc.		
Reproductive activities: Water related Fuel related Food preparation, etc.		

Adapted from: Overtholt, Anderson, Cloud and Austin, Gender Roles in Development Projects, Kumarian Press Inc., Connecticut (Source: March et al, 1999 and Overtholt et al, 1985)

The second part identified the resources needed to undertake and benefits obtained by the activities identified in Harvard tool 1; it likewise identified the access and control of the resources and benefits between men and women because the person could have access to a resource but not control over that resource; meaning she or he doesn't/didn't have final decision on that resource including selling it.

Table 4: Harvard gender analysis framework - Tool 2: Access and Control profile

Harvard tool 2: Access and control profile				
Activities	Access		Control	
	Women	Men	Women	Men
Resources(factors): Land Education Memberships, etc.				
Benefits: Income Asset accumulation, etc.				

Adapted from: Overtholt, Anderson, Cloud and Austin, Gender Roles in Development Projects, Kumarian Press Inc., Connecticut (Source: March et al, 1999 and Overtholt et al, 1985)

The third part looked at the various factors or reasons that shaped gender relations and consequently the access and control over resources or factors for carrying out a certain activity; these factors are/were as given in the table below:

Table 5: Harvard gender analysis framework - Tool 3: Influencing factors

Harvard tool 3: Influencing factors		
Influencing factors	Constraints	Opportunities
▪ Community norms and social hierarchy ▪ Demographic factors ▪ Institutional structures ▪ Economic factors ▪ Political factors ▪ Legal parameters ▪ Training etc.		

Adapted from: Overtholt, Anderson, Cloud and Austin, Gender Roles in Development Projects, Kumarian Press Inc., Connecticut (Source: March et al, 1999 and Overtholt et al, 1985)

The fourth part or tool of the Harvard framework used the information obtained from the tool 1 to tool 3 of the Harvard framework to design intervention with a gender perspective to improve the conditions of a group that seemed disadvantaged.

CHAPTER FOUR: RESULTS

4.1 Characteristics of individuals and households in the intensive and extensive livestock systems

This part gives the characteristics of individuals and households as they were found in the intensive and extensive livestock systems; characteristics observed were household size, nature of marriage (polygamous or non-polygamous households), education levels, gendered ownership of productive assets and characteristics of dairy enterprises.

4.1.1 Characteristics of families

Figure 6: Household Size in Livestock systems

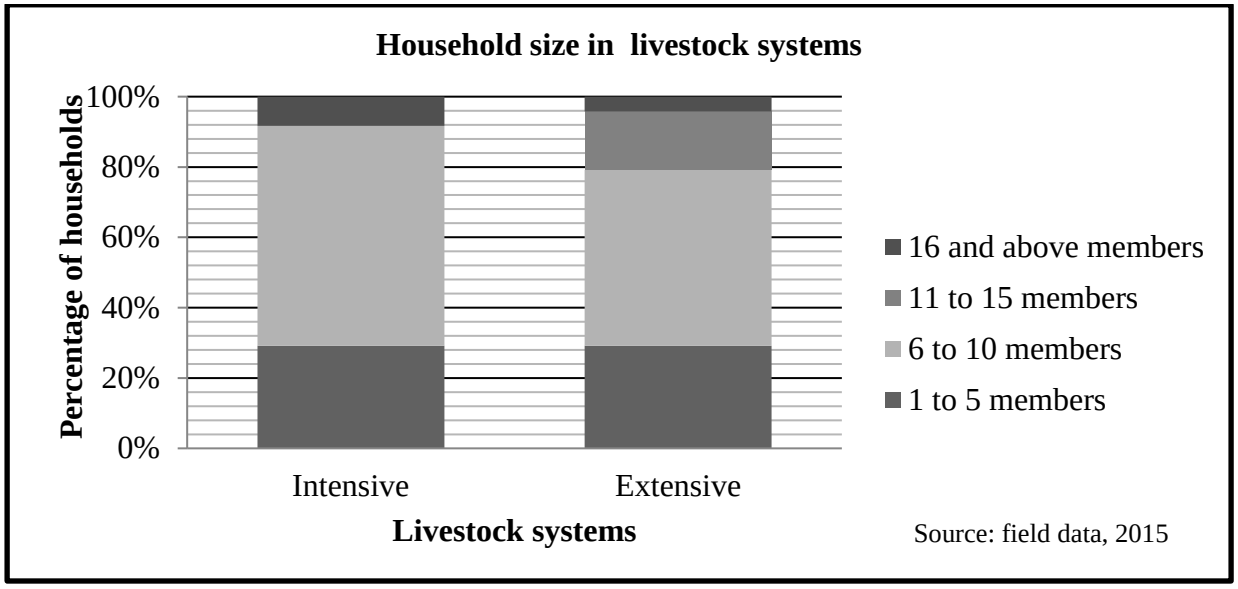
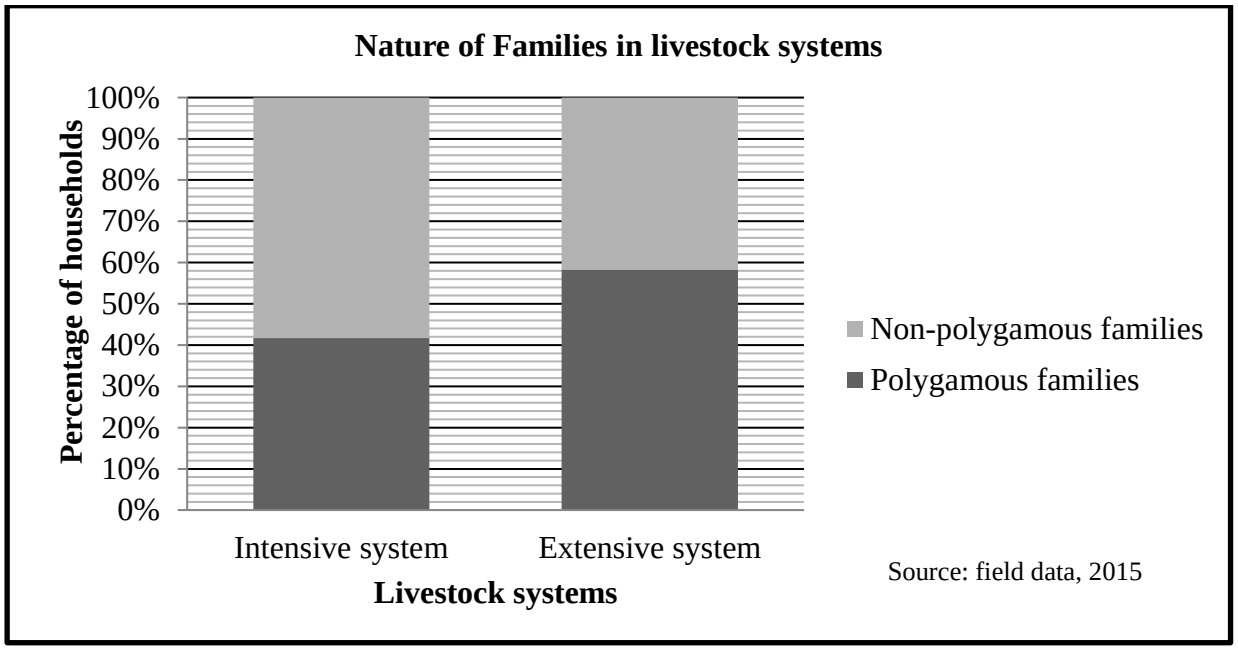


Figure 7: Nature of families in livestock systems



Families were found to be rather large such that about 60% and 50% of households in the intensive and extensive livestock systems respectively were found to have 11 to 15 members in their households. Polygamy was also prevalent in both systems such that about 41% and 59% of households in the intensive and extensive systems respectively were polygamous in. This could be further cemented by the following figure which showed the proportions of wives found in the households of both systems:

Figure 8:Nature of marriage in livestock systems

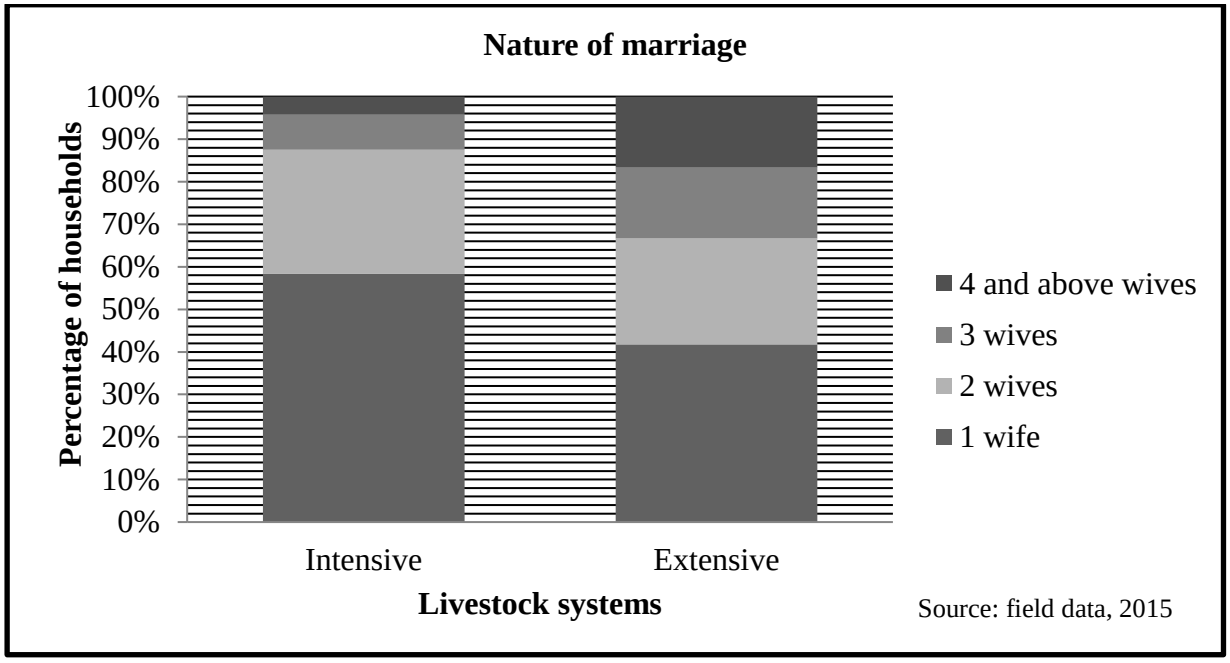
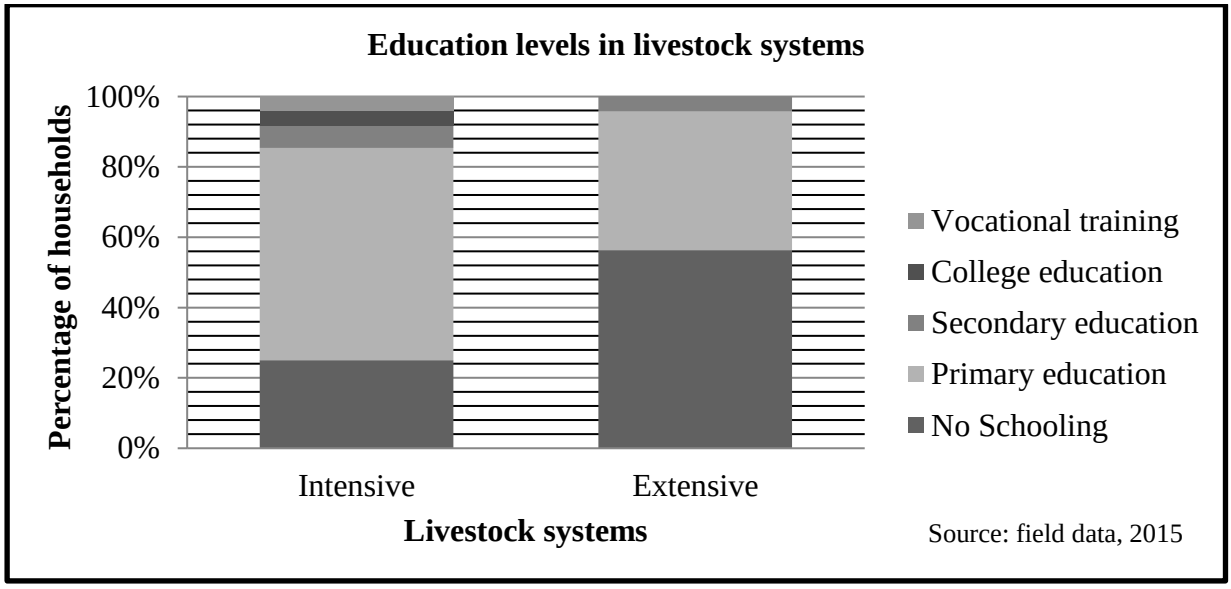


Figure 9: Education levels in livestock systems



About 24%, 61%, 6%, 4% and 5% of individuals in the intensive livestock system had no schooling at all, primary education, secondary education, college education and vocational training

respectively whereas in the extensive livestock system individuals with no schooling at all were about 56%, 41% had primary education and 3% had secondary education.

4.1.2 Livestock herd size and gendered ownership of livestock

Most households in the intensive system had at least 1 to 10 livestock (cattle, goats and sheep or chickens and ducks); most cattle (above 60%) were owned by men, 30% were owned by women and 10% were jointly owned by men and women. Men and women owned Goats and sheep by 50% and 12% respectively whereas joint ownership was about 9%. Additionally, women dominated ownership of chickens and ducks by about 64%. The following charts could depict this:

Figure 10: Distribution of households by livestock herd size - Intensive livestock system

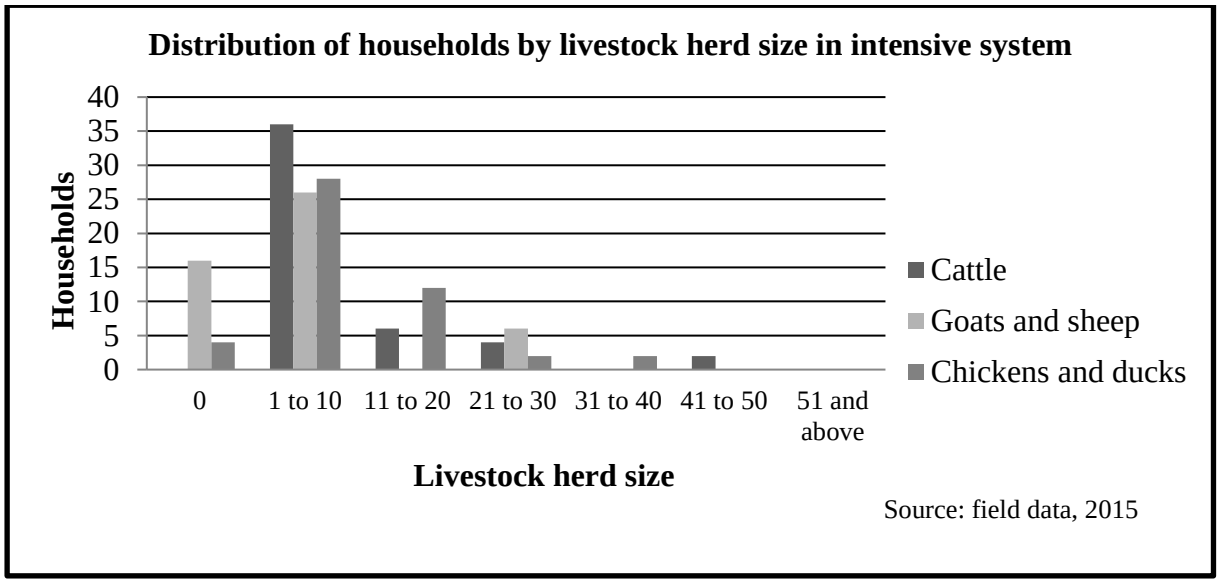


Figure 11: Gendered ownership of livestock in intensive livestock system

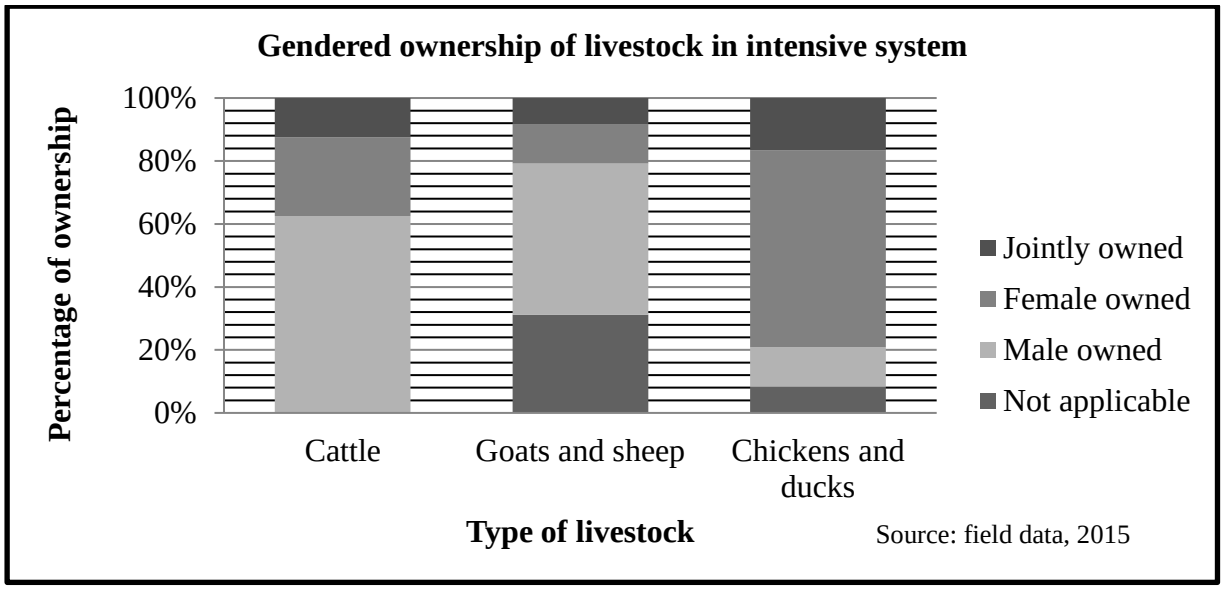


Figure 12: Distribution of households by livestock herd size - Extensive livestock system

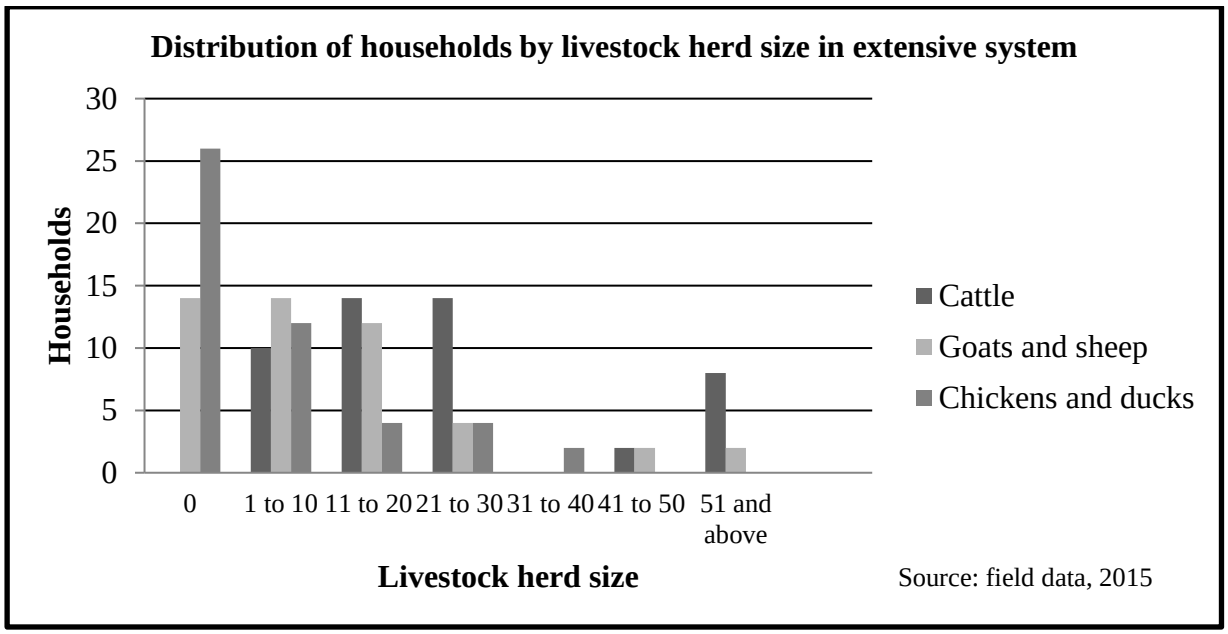
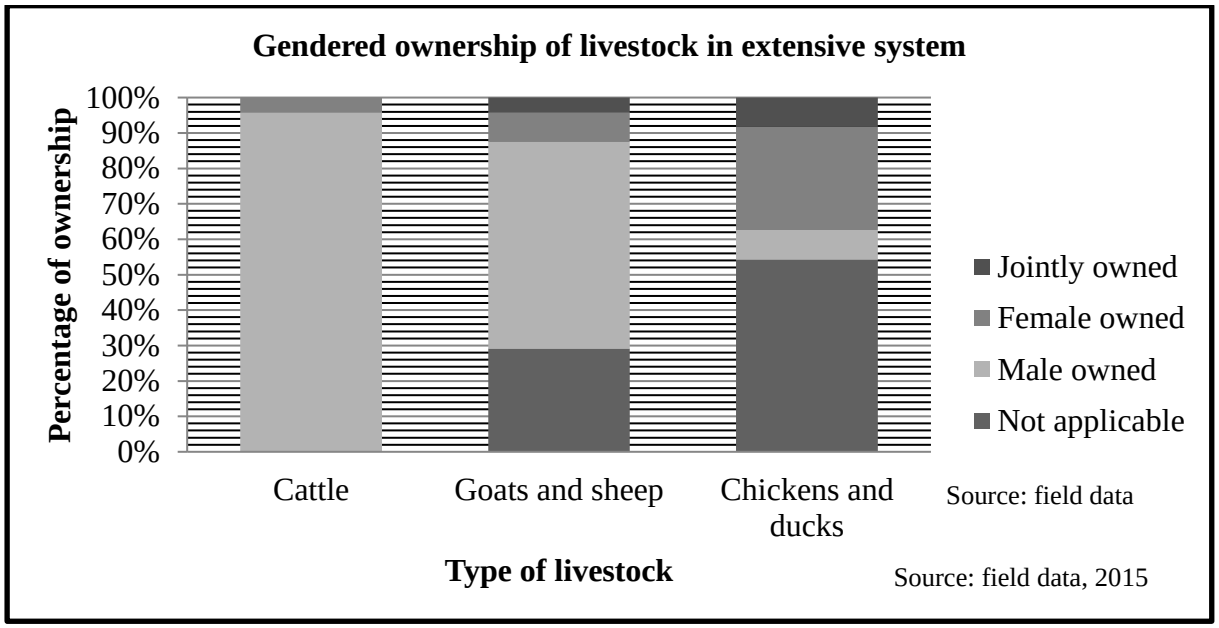
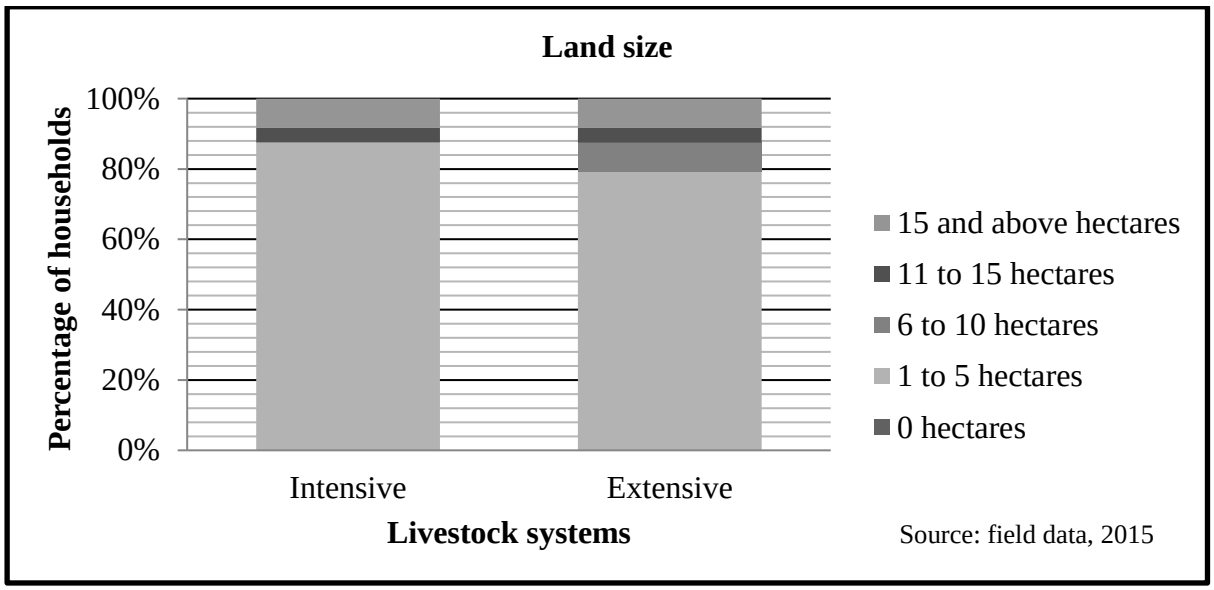


Figure 13: Gendered ownership of livestock in Extensive livestock system



Many families in the extensive livestock system had herd sizes ranging from 10 to 30 heads of each livestock type (cattle, goats and sheep or chickens and ducks) but men owned dominated livestock ownership such that they owned 95% of cattle and the rest were jointly owned; goats and sheep were owned 57% by men, 10% by women and 5% jointly whereas women seemed to own around 30% of chickens and ducks.

Figure 14: Distribution of households by size of land owned



The percentage of households that owned 1 to 5 hectares of land was about 87% and about 80% in the intensive and extensive livestock systems respectively as depicted in the figure above. But there was high disparity in land ownership among men and women in both livestock systems; men owned land in 77% of households, women owned land in about 13 % of the households and joint land ownership was about 10% of households in the intensive livestock system. But in the extensive livestock system, men owned land in about 95% of households and women owned land in about 5% of the households; please see the figure below:

Figure 15: Gendered ownership of land in livestock systems

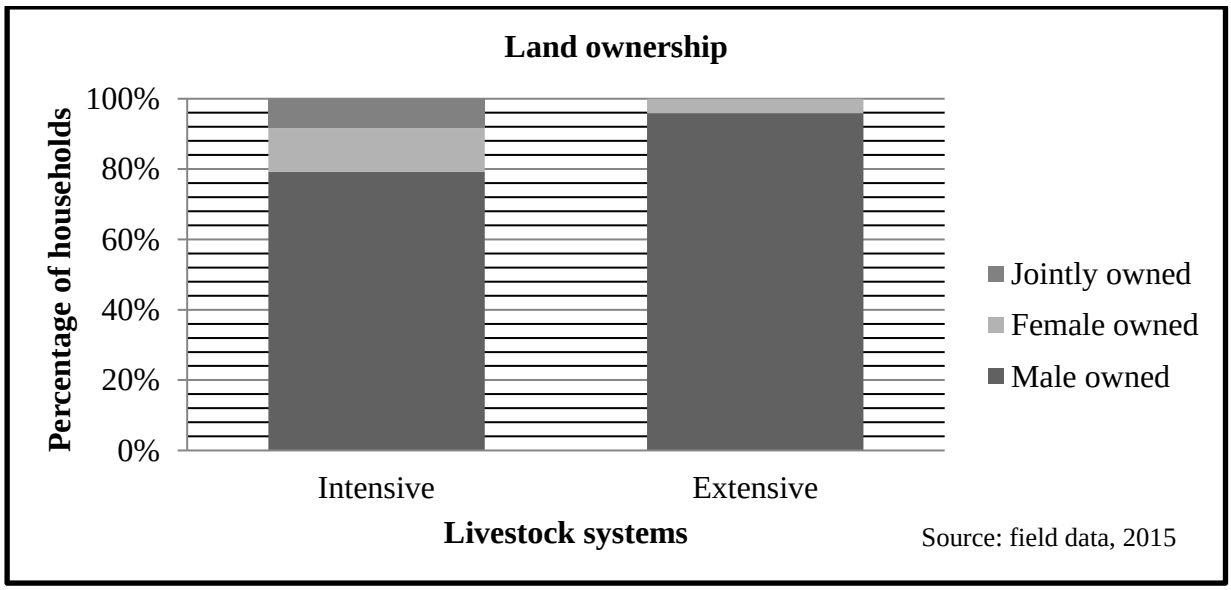
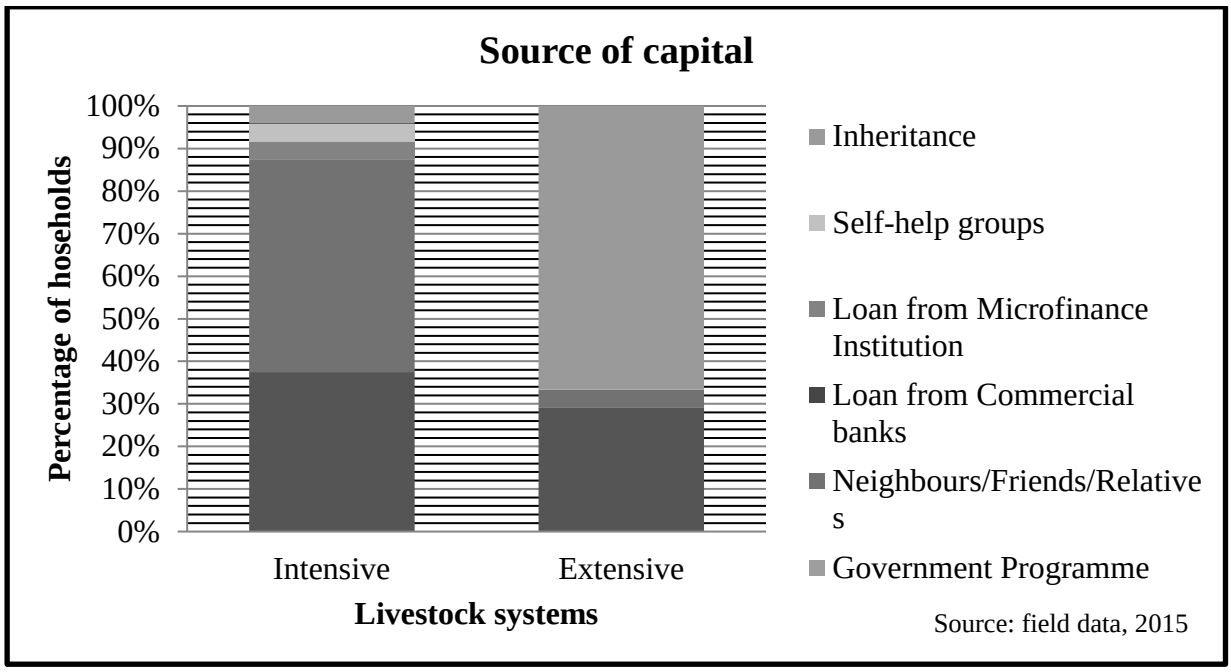
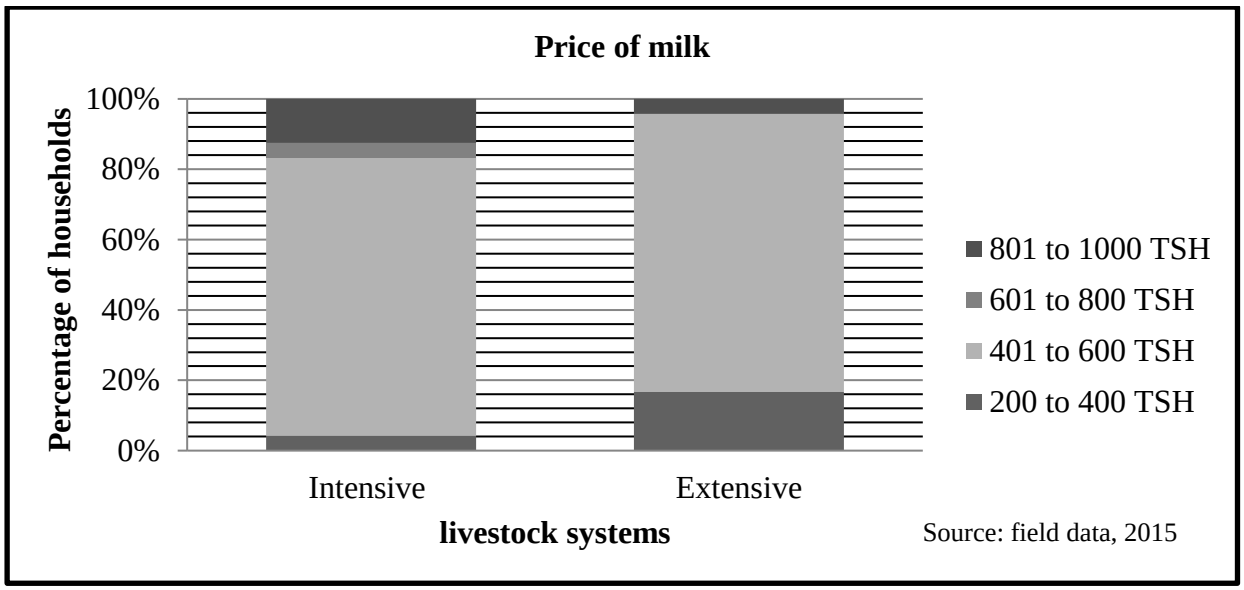


Figure 16: Sources of capital for starting dairy enterprise



About 48% of households in intensive livestock system obtained their first livestock by borrowing from others in the village and about 38% of households used micro-credits to start dairy business; but in the extensive livestock system about 70% of households inherited livestock from their families. The price of milk in the dairy value chains were mostly 400 TSH to 600TSH per litre by about 80% in both livestock systems; monthly payment dominated intensive livestock system by about 71% whereas cash payments prevailed in extensive system by about 81%; the dairy income ranged 50,000TSH to 100,000TSH per month by about 49% and 64% in the intensive and extensive dairy value chains respectively.

Figure 17: Price of milk in livestock systems



NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

Figure 18: Modes of payment in livestock systems

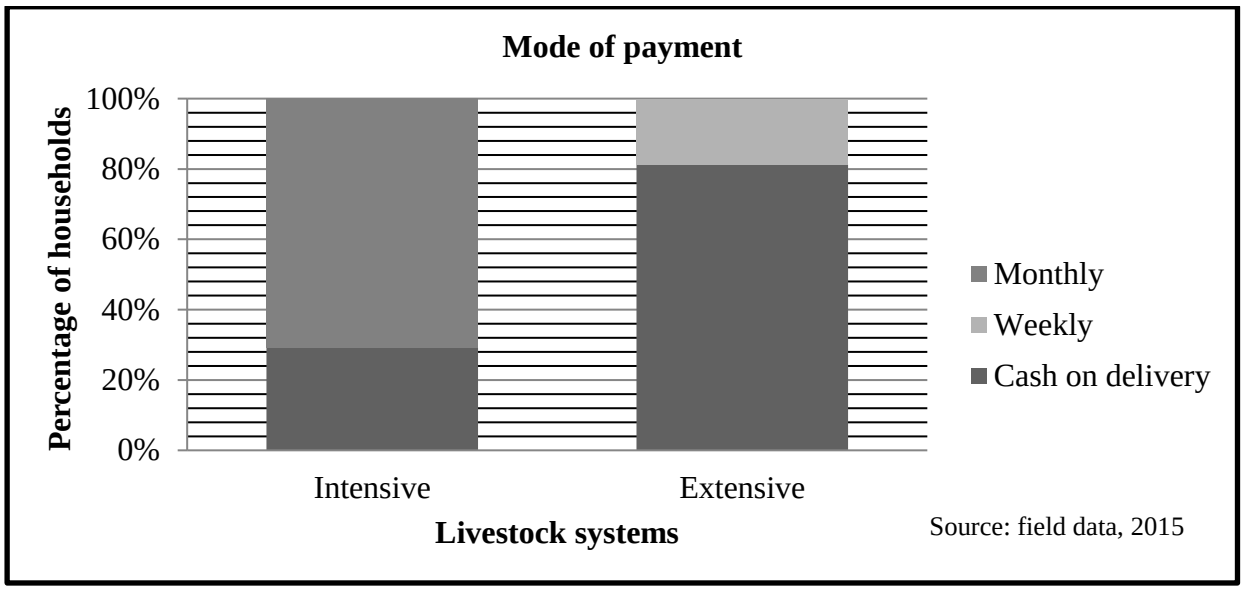
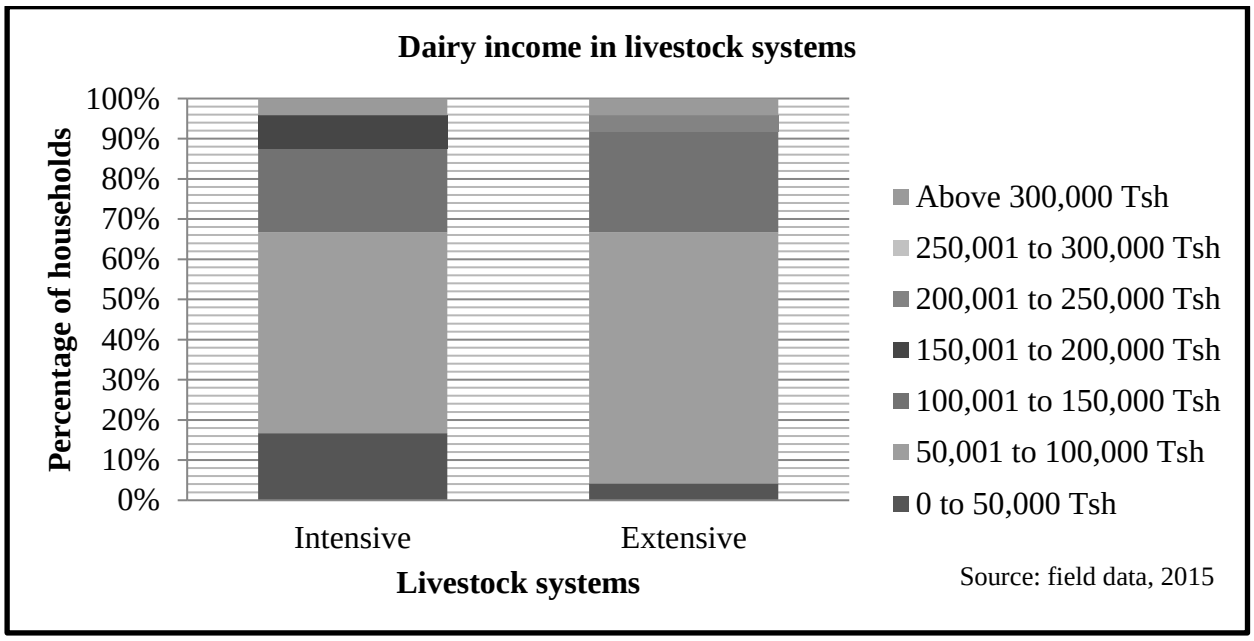


Figure 19: Distribution of dairy income in livestock systems



NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

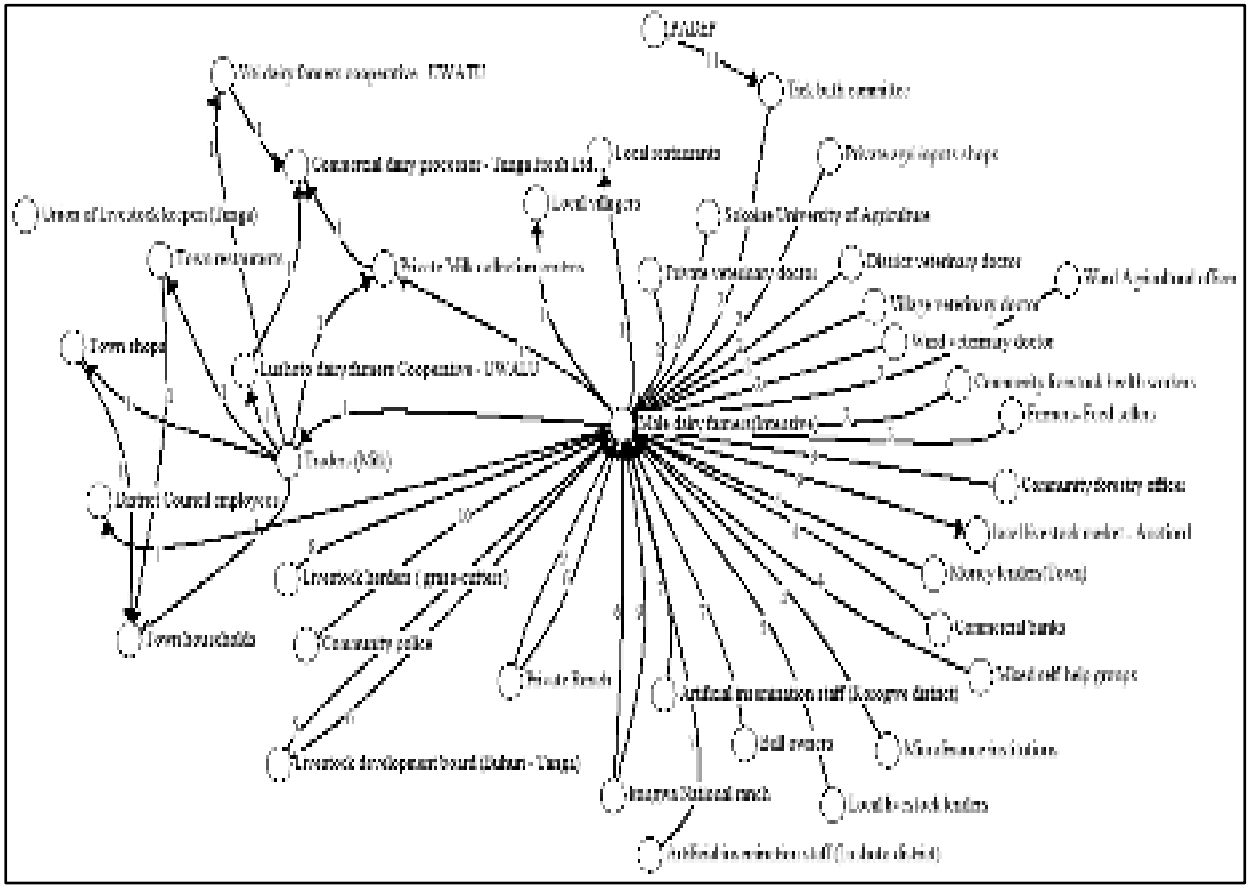
4.2 Process net maps or Social networks

Dairy value chains for men and women in the intensive and extensive lives tock systems were presented as process net maps and/or social networks by the following figures:

4.2.1 Process net maps (Social networks) of Intensive livestock system

The process net maps or social networks of the actors or institutions as identified by women and men separately in the intensive livestock system were as given in the following figures:

Figure 20: Dairy value chain of Men - Intensive livestock system

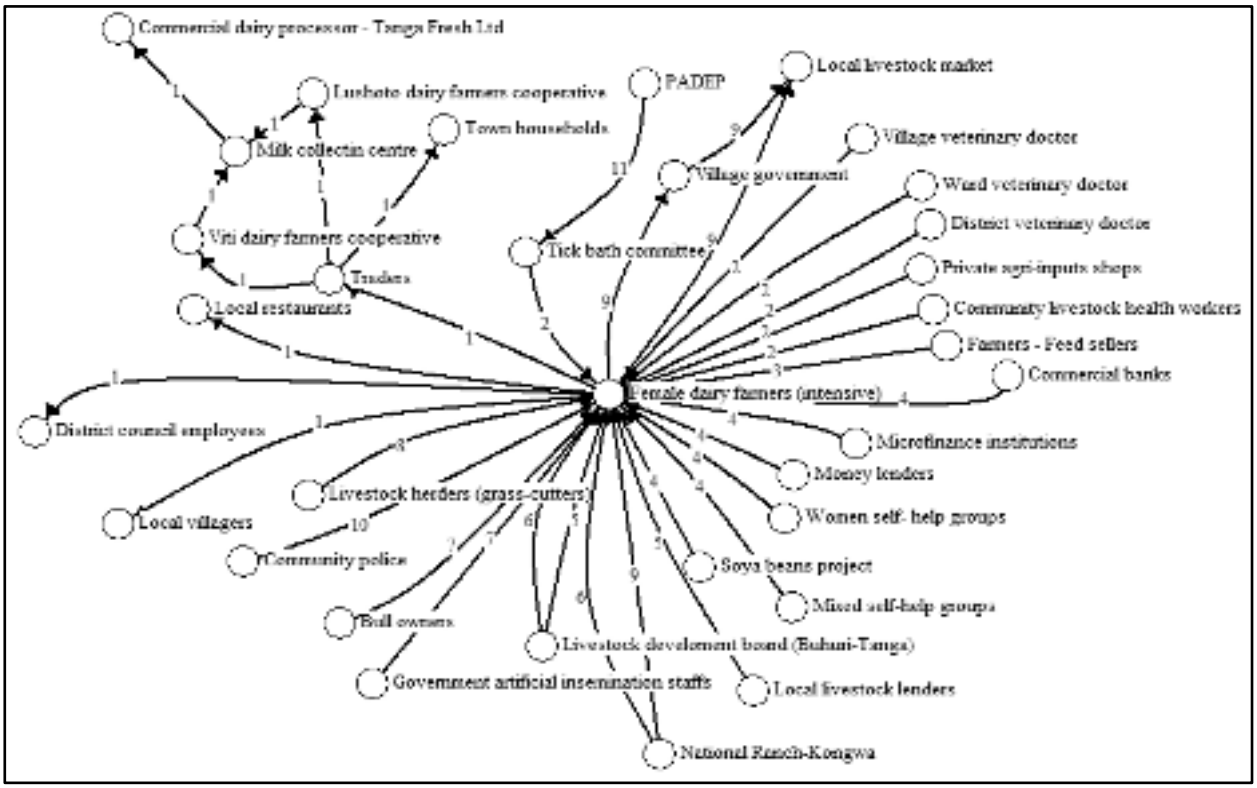


Source: field data, 2015; process net map created by using Visualyzer2.2 software

Key for the links

1-Milk flow; 2-Livestock health services; 3-Feedstock flow; 4-Financial services; 5-Livestock lending/borrowing; 6-Trainings on livestock management; 7-Breeding services; 8-Livestock tending services (grazing, milking or drinking); 9-Livestock selling/buying; 10-Community watch out; 11-Government funding/service; 12-Fees and fines

Figure 21: Dairy value chain of women - Intensive livestock system



Source: field data,2015; process net map created by using Visualyzer2.2 software

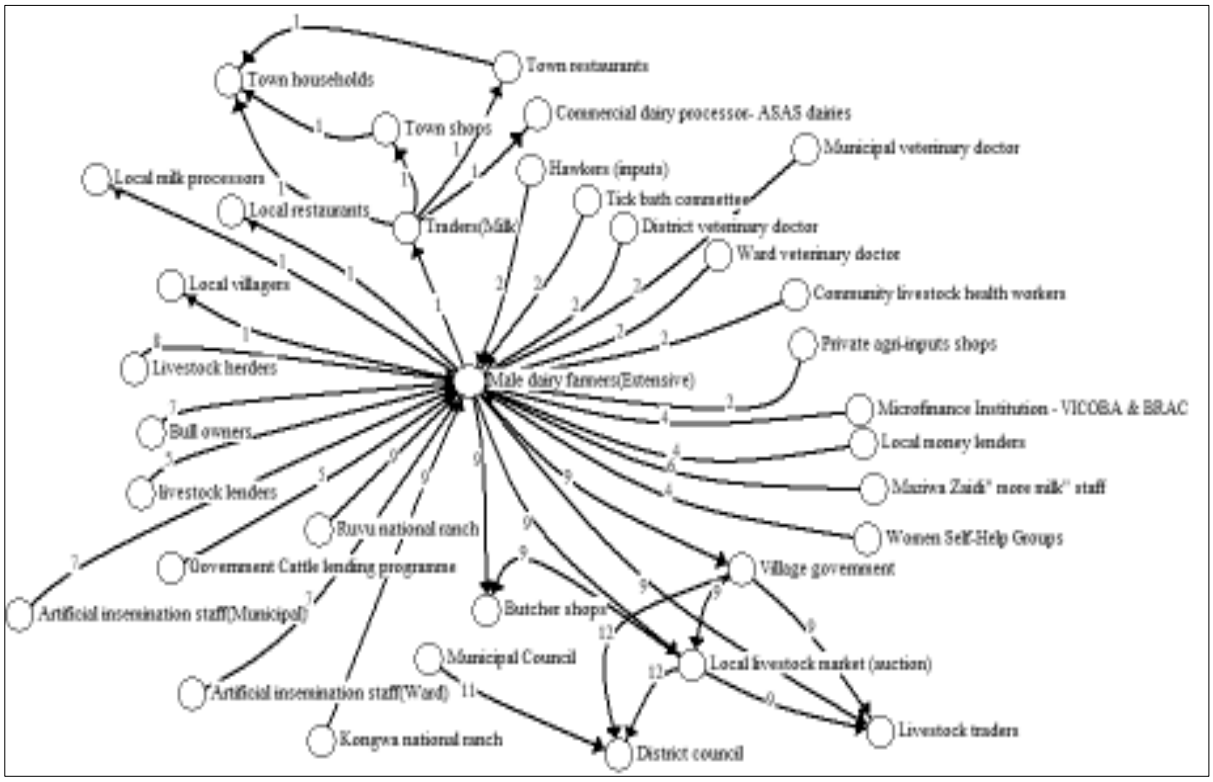
Key for the links

1-Milk flow; 2-Livestock health services; 3-Feedstock flow; 4-Financial services; 5-Livestock lending/borrowing; 6-Trainings on livestock management; 7-Breeding services; 8-Livestock tending services (grazing, milking or drinking); 9-Livestock selling/buying; 10-Community watch out; 11-Government funding/service; 12-Fees and fines

4.2.2 Process net maps (Social networks) of Extensive livestock system

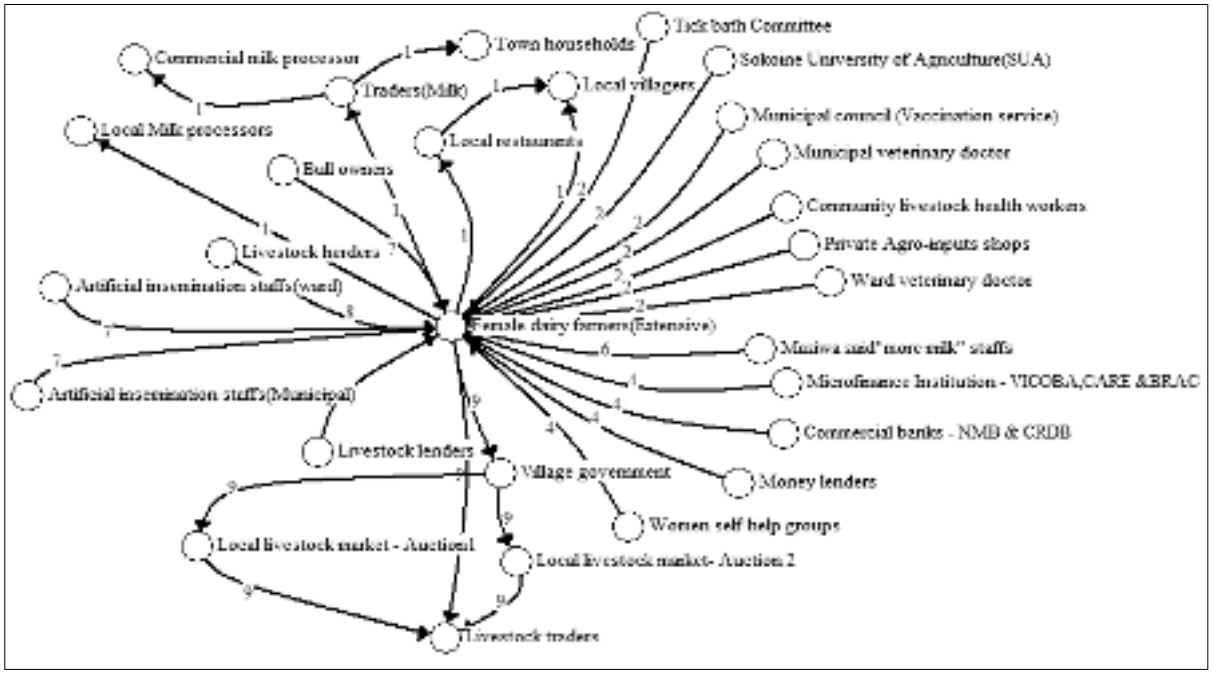
Process net maps (Social networks) of the actors or institutions as identified by women and men separately in the extensive livestock system were as given in the following figures:

Figure 22: Dairy value chain of men - Extensive livestock system



Source: field data, 2015; process net map created by using Visualyzer2.2 software

Figure 23: Dairy value chain of women - Extensive livestock system



Source: field data, 2015; process net map created by using Visualyzer2.2 software

Key for the links

1-Milk flow; 2-Livestock health services; 3-Feedstock flow; 4-Financial services; 5-Livestock lending/borrowing; 6-Trainings on livestock management; 7-Breeding services; 8-Livestock tending services (grazing, milking or drinking); 9-Livestock selling/buying; 10-Community watch out; 11-Government funding/service; 12-Fees and fines

4.2.3 Description of actors identified in intensive and extensive livestock systems

The actors and/or institutions identified by men and women in the intensive and extensive systems had different characteristics as depicted below:

4.2.3.1 Milk market actors or institutions

a) *Local villagers*: these were people who stayed in the village but they did not keep livestock; most of them were small scale farmers. They bought milk from the livestock keeping households at a price of 500TSh (0.20 Euros) to 800TSh (0.35 Euros) per litre. This group comprised of people of all genders.

b) *District council employees*: These were government employees at the district level. They bought milk at the price of 500 TSH and 800 TSH in the rainy and dry season respectively.

c) *Local milk processors*: these were women who stayed in the village or nearby towns; they bought milk from livestock keepers starting at a price of 500TSh (0.20 Euros) to 800TSh (0.35 Euros) per litre and processed it into yoghurt and ghee by using traditional methods. They would carry the yoghurt and/or ghee on their heads by using clay pots and sold them around in the village and /or nearby towns at a price of 1500TSh (0.60 Euros) to 2000TSh (0.80 Euros) per litre. The price of ghee and yoghurt varied from season to season; during the rainy season the prices were cheaper due to availability of more milk while during dry the season the price became expensive due to shortage of milk.

d) *Local restaurants*: these were small food vending outlets that were mostly owned by men but operated by women as cooks and waitresses. They bought milk from livestock keepers at a price of 500TSh (0.20 Euros) per litre. They normally bought their milk on orders and they had established relations with the households that supplied them with milk every morning and/ or evening. They sold a cup of milk at a price of 1000TSh to 1500TSh depending on the seasons and availability of milk in the village. They also made some yoghurt.

e) *Traders (milk)*: these were men who came from nearby towns; they moved around in the village by using motorbikes and /or bicycles with small containers fixed on them. They came to the village in the morning and/or evening depending on the seasons (whether dry or rainy season) and availability of milk and collected/bought milk from livestock keeping households at a price of TSh.400 , TSh.500 or 800TSH in rare cases. They then sold the milk to town households, shops and sometimes to the milk collection centres owned by the commercial dairy processors namely Tanga Fresh Ltd and ASAS dairies Ltd at a price of 800TSh to 1000TSh per litre

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

f) *Town shops (kiosks)*: these were small grocery stores located in town centres and were owned mostly by men. Amongst other things, they also sold milk to households/residents in town at a price of 1200TSh per litre. They bought the milk from the traders and put it in the refrigerators.

g) *Town households*: these were families that stayed in towns; they bought milk and other dairy products from traders, town restaurants and/or town shops. They paid a price of 1000TSh to 1200Tsh per litre of milk. Most of the families that bought milk had younger children and the parents were employed in the town market as traders (crops), government and so on.

h) *Town restaurants*: these were small food vending operations located in town and were mostly operated by women/girls. Amongst other foodstuffs, they also sold milk to town residents. They got their milk from the traders at a price of 800TSh to 1000TSh per litre and sold at the price of 1000TSh to 1200Tsh per litre.

i) *Private milk collection centres*: these were small milk collection centres located in Dumila and Wami-Dakawa towns; they were owned by individual businessmen; they bought milk from traders and livestock keepers found around the community at price of 500TSH or 600TSH and then sold the milk at the price of 700TSH or above to Commercial dairy processors such as Tanga Fresh Ltd, ASAS dairies Ltd, AZAM dairies Ltd and Shambani Graduates Ltd.

j) *Lushoto Dairy farmers' cooperative –UWALU*: this was a small cooperative located in Lushoto town and it acted as a chilled milk collection centre for the community around.

k) *Viti Dairy farmers' cooperative –UWATU*: this was like UWALU; it was also located in Lushoto at Viti village. It used to act as a chilled milk collection centre but it is no longer working.

l) *Commercial dairy processor –ASAS dairies Ltd*.: this was a large-scale dairy processor located in Iringa town

m) *Commercial Dairy processor - Tanga Fresh Ltd*: this was a large scale commercial dairy processor located in Tanga region. TFL was a joint venture between TDCU and a Dutch cooperative society (FriZania Cooperation) from Friesland in the Netherlands. The TFL operated a milk processing plant that was established in 1997; in which the TDCU owned 35% of the total shares (being 20% initial capital by TDCU, 8% famers' contributions through milk deductions, and a 7% grant from Rabo Bank Foundation) and DOTF (Dutch Oak Tree Foundation) owned the remaining 65% of the shares. The TDCU started with a capital of TZS 70,000,000 that increased to the current capital of TZS 753,468,134 which was contributed by the members through their primary societies. TDCU operated 22 chilled

collection points for milk located at primary societies across the Tanga region. Individual members brought milk to the chilled centres on foot, by bicycle and others by motors cycle or ox cart. The society controlled milk quality by carrying out milk tests. In each centre, there was a Quality Assurance expert engaged by the society but trained by the TFL. The societies had special equipment such as lactometer and computers that were used to ensure milk cleanness, determine density and test for alcohol content. All milk collections were received at the centres and were tested for acceptance or rejection and were recorded on acceptance. Dairy farmers were paid for milk sales proceeds twice per month on the 15th and end of the month at a rate of TZS 650 per litre of milk after deducting levies. The society charged a levy of TZS. 23 and the union charged TZS 10 per litre. These deductions were made before the paying members (Sumelius et al,2013).

4.2.3.2 Livestock health services actors or institutions

a) *Hawkers (Inputs)*: these were young men that moved around in the village selling different things such as clothes, Soaps and so on. They also sold different inputs to the livestock keeping communities such as syringes, livestock drugs and so on. Additionally, they came to the livestock auctions/markets to sell livestock inputs. These young men normally bought livestock inputs in private Agro-inputs shops in town and sold them around in the village and /or the livestock auctions/markets.

b) *Sokoine University of Agriculture (SUA)*: this was/is a public university located in Morogoro region in Tanzania. It is/was responsible for conducting various researches concerning agriculture and livestock. It was also responsible for carrying out vaccinations on livestock and took actions in case there was an outbreak of livestock diseases such as Rift-valley fever and so on.

c) *Tick bath committee*: this was a group of men in the village that was responsible for maintaining and managing the tick baths found in the village. They bought chemicals for washing the livestock from the private Agro-inputs shops in town; the tick baths were built by the government and given to the livestock keepers for management and maintenance. Livestock were washed two times per month; Cattle were washed at a price of 100TSh per head of cow and 50 TSH per head of goat /sheep. The fees were used for buying drugs/chemicals and maintenance

d) *PADEP -Ministry of Agriculture & Livestock*: this was a project under the ministry of agriculture and livestock; amongst its functions was to provide iron sheets, timber, cements, water pumps and subsidy for the construction of tick baths.

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

e) *District veterinary doctor*: He was a government employee at the district level responsible for visiting pastoralists and treating their animals. He charged 20,000 TSH to 35,000TSH per visit. The villages overwhelmed him; one of the men told that he was not always available such that his animal died.

f) *Municipal veterinary doctor*: He was a government employee at the municipal level at Handeni town. He rarely visited unless there was an outbreak of a disease. He normally passed information and instructions to the ward vet doctors.

g) *Ward veterinary doctor*: He was the government employee at the ward level. He visited cow sheds, gave advice and treated livestock diseases. He was the senior to the village vet. He visited the village each Tuesday and when there was an outbreak of a disease. He could pay visits to dairy producers for a charge of 11,000 TSH to 20,000TSH per visit.

h) *Village veterinary doctor*: He was an employee of the local government. He was responsible for visiting dairy producers, treating animals and gave advice about livestock He charged 10, 000 TSH to 30,000 TSH per visit. He also sold livestock inputs (drugs, syringes and so on).

i) *Ward Agricultural officer*: He was an employee of the local government. He was responsible for inspecting the meat and milk. He also gave advice about livestock keeping at a price of 5000 TSH per visit.

j) *Private veterinary doctor*: This was a private doctor from Morogoro town. He gave vaccines for East coast fever and advices. He charged 10,000 TSH per visit.

k) *Community livestock health workers*: these were villagers (mostly men) that identified and treated different livestock diseases; they learnt this through experience and observations on their elders and veterinary doctors. They treated livestock by guesswork and sometimes overdosed the livestock; they treated livestock for free most of the times but sometimes they charged 5000TSH for their services.

l) *Private Agro-inputs shops*: these were privately owned Agro-inputs shops located in town centres; they sold livestock inputs such as de-wormers, syringes etc. as well as agricultural inputs such as seeds, pesticides and fertilizers. Private individuals and government veterinary doctors owned these shops. They sometimes gave advice to the livestock keepers.

4.2.3.3 Financial services actors or institutions

a) *Microfinance institutions*: these were non-bank financial institutions that gave micro-credits/loans to villagers (farmers, traders and /or pastoralists) organized in groups. They didn't require collaterals to join the groups but social capital (solidarity) of the group to

guarantee each other. The groups met once per week and each member paid his or her instalment until his or her loan was fully repaid. There were several micro-financial institutions operating in the villages namely: VICOBA, CARE, PRIDE, SACCOS, BRAC and LIMKA.

b) *Commercial banks*: these were private commercial banks located in town centres; they were involved with savings and giving loans to people found in the Community around. NMB and CRDB were the main two banks known to operate in town centres.

c) *Local money lenders*: these were local villagers (men) or people from nearby villagers who were considerably richer than the rest of the villagers; they lent money to others in village during emergencies such as accidents, sicknesses, funerals and so on. They lent money at higher interests. If you borrowed 10,000 TSH then one had to pay back 15,000 TSH at the end of the month. If one failed to pay, then the interest was doubled. But among the Maasai Community the lending does not/didn't involve any interests.

d) *Money lenders (Town)*: these were individuals from town that came to village to lend money to the villagers; they were mostly men and very few women. They came to village when villagers were about to receive money from microfinance institutions which required farmers to have some cash before they could take loans. The money lenders charged an interest of 100%; the farmers borrowed from them so that they could get money to put as collateral in microfinance groups.

e) *Women Self-Help Groups(SHG)*: these were informal groups of women that were formed by relatives, friends and /or neighbours; they chose one or two days in a week to meet and each one contributed a fixed amount of money (For example; 2000TSH) which was given to one woman on that meeting day. The Cycle went on a weekly basis until each woman had received money. These kinds of groups were called "Vibati" or "Upatu" in Swahili. Very few men joined these groups unless they were very poor.

f) *Mixed Self-Help Groups*: these groups were like Women SHGs but these ones consisted of more men and few women; the procedure of lending and/or borrowing was the same as in Women SHGs and the amount of money involved was larger than women SHGs.

4.2.3.4 Livestock trade actors or institutions

a) *Livestock traders*: these were people (men) from other regions that came to village or local livestock markets to buy livestock and transported them in trucks for selling in other regions. They paid different prices depending on the conditions and availability of livestock at a point in time.

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

b) *Local livestock market – auction1*: This was a place where livestock were bought and sold; it was operated by the municipal council which collected fees and fines. Other traders apart from livestock traders participated in selling different stuffs such as clothes, food, livestock drugs and so on.

c) *Local livestock market –auction2*: This was a place where livestock were bought and sold; it is operated by the municipal council which collected fees and fines. Other traders apart from livestock traders participated in selling different stuffs such as clothes, food, livestock drugs and so on.

d) *Butcher shops*: these were small meat shops located in town centres of Kilosa and Handeni. They were privately owned. They bought livestock from livestock keepers or traders in the livestock markets. They then slaughtered the livestock at the municipal abattoir for a fee of 3000 TSH per head of livestock; the meat was then sold to town residents.

e) *Kongwa National Ranch*: This was a ranch under the National Ranching Company Ltd (NARCO) of Tanzania located in Dodoma region in central Tanzania. It kept livestock for beef and dairy purposes; it also sold exotic breeds of bulls and cows at the prices of 1,000,000 TSH & 1,500,000 TSH respectively.

f) *Ruvu National Ranch*: This was another a ranch under the National Ranching Company Ltd (NARCO) of Tanzania located in the Coast region. It kept livestock for beef and dairy purposes; it also sold exotic breeds of bulls and cows at the prices of 1,000,000 TSH & 1,500,000 TSH respectively.

g) *Private ranch*: This ranch was called Mwinyi's Ranch and it was owned by a private individual (who used to be the second president of the United Republic of Tanzania. Amongst other things, this ranch also sold bulls and cows for breeding purposes starting at a price of 450,000TSH per head of cattle.

4.2.3.5 Breeding services actors or institutions

a) *Artificial insemination staff (Ward)*: He was a government employee at the ward level. Villagers don't/ didn't know what he charged since he had served none in the village.

b) *Artificial insemination staff (Municipal)*: This was a male and was a government employee at the municipal. He charged 14,000 TSH per visit. Villagers complained that he was not available on time and charged a high price per visit whether the service was successful or not.

c) *Bull owners*: these were men that had bulls in their herds; they lent them to others for breeding purposes for free but they sometimes charged a price of 5000 TSH per service. Breeding services could also be accessed when the livestock were grazing. If a woman got

a bull, then they sold it for meat or breeding purposes to men because bull handling was considered a man's job due to the needed physical strength.

4.2.3.6 Livestock lending or borrowing actors or institutions

a) *Government cattle lending programme*: This was the project by the government that involved lending cows to the pastoralists and/or dairy farmers to improve their breeds. An individual borrowed a cow and paid back a cow which would be given to the next person; it was called "passing around the gift". This project was carried out at a place called Mbuyuni in Kilosa district –Morogoro region.

b) *Local livestock lenders*: these were individuals that had many livestock in the village; they lent cows to other families for free but the borrowing family looked after the cows and kept the milk for their own household use or sale. If the cow calved a heifer, then that first calf would be given back to the lender and if the cow calved for a second time then the borrower would take that second heifer. The borrowed cow would be returned to the lender when the second heifer calves and starts giving milk.

c) *Livestock development board (Buhuri -Tanga)*: This was a board that operated a Livestock Training Institute (LITI) in Buhuri-Tanga region. It was a government institution; it had donated one exotic bull to the village for breeding purposes. It also conducted some training for a month for the community livestock health workers. The bull was given to one man in the village; for members of the livestock keepers' union paid 1000TSH per service and 1500TSH per service for non-members (this service was available five years back). It also once had a cattle lending programme after training the receiver for one month (or three weeks) who would pay back in a cow (first calf) which would be passed to the next receiver if it was a heifer.

4.2.3.7 Supporting institutions or actors

a) *Village government*: this was an administrative level under the ward; it was headed by an old man as a chairman of the village but it had many women members in its committees. Amongst other functions, it was responsible for solving disputes in the village and giving permits at a price of 1000TSH per head of cattle before it could be sold to traders or in the livestock markets. This served as a way of proving that the livestock being sold are/were not stolen; additionally, the village government could allocate resources such as land for farming and grazing.

b) *District council*: This was an administrative level below the municipal council. Amongst other functions, it was responsible for giving permits to transport livestock to other places.

If livestock were transported out of region, then a permit costed 2500TSH per cattle and if within the region then the permit costed 1500TSH per cattle.

c) *Municipal council*: this was an administrative level of local government above the district council; it was responsible for collecting fees and fines at the livestock markets (a charge of selling/buying a head of cattle was 3000TSH) and abattoirs/slaughter houses. Additionally, it was responsible for vaccinating livestock during an outbreak of livestock diseases through its employees at the village, Ward and Municipal levels.

d) *Maziwa Zaidi "more milk" staffs*: These were people from ILRI that came to the village to train livestock keepers about records keeping, cleanliness during milking, how to construct proper cowsheds, growing grasses and so on. They came to the village only once.

e) *Livestock herders*: these young men were migrant workers from other regions especially Dodoma region who were employed by livestock keeping households to graze the livestock and taking them drinking water or washing in the tick bath. Herders got paid in cash (30,000 TSH to 50,000 TSH per month) or in livestock (a bull in six months or a cow in one year). This job was considered unsuitable for women because it required walking long distances looking for pasture and water or sometimes staying in camps during the dry season.

f) *Farmers-Feedstock sellers*: these were farmers found in the village that grew different crops such as maize, beans, paprika and so on. These farmers did not have livestock such that they sold stalks of maize or beans to livestock keepers after harvest in exchange for cash or manure.

g) *Community forestry officer*: this was a government employee at the district level; he was responsible for managing the forest resources found in Gologolo ward. He was also responsible for giving permission to the dairy farmers to either graze or cut grasses for livestock in the forests.

h) *Community police*: this consisted of groups of men organized by the village government that took turns in patrolling and maintaining security in the community during the night and sometimes during the day. They guarded against livestock thefts. Each man had a turn to participate and it was compulsory. This service was provided for free but if the community police helped to track and find stolen livestock then the owner could give them some small amount of money or reward.

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

4.3 Properties of process net maps (social networks) of livestock systems

Process net maps or social networks of dairy value chains of men and women in the intensive and extensive livestock systems had the following properties:

Table 6: Network properties of dairy value chains in intensive and extensive livestock system

Network properties	Intensive livestock system		Extensive livestock system	
	Network by males	Network by females	Network by males	Network by females
Node type	Actor	Actor	Actor	Actor
Total nodes number	39	33	34	28
Enabled nodes number	39	33	34	28
Isolates number	1	0	0	0
Dyads number	0	0	0	0
Components 3+ number	1	1	1	1
Number of groups	0	0	0	0
Diameter	4	6	5	4
Average Geodesic distance	2.2418	2.3996	2.2781	2.1693
Density	0.0607	0.0682	0.0713	0.0794
Fragmentation	54.431%	52.992%	51.714%	50.088%
Cohesion	45.569%	47.008%	48.286%	49.912%
Degree centralization	98.799%	99.194%	98.674%	99.145%
Closeness centralization	80.052%	72.714%	77.879%	83.897%
Betweenness centralization	89.704%	94.934%	94.232%	96.184%
Gender composition				
Male	20 (51.282%)	15 (45.455%)	17 (50.000%)	15 (53.571%)
Female	0 (0%)	2 (6.061)	2 (5.882%)	3 (10.714%)
Both	19 (48.718%)	16 (48.485%)	15 (44.118%)	10 (35.714%)

Source: field data, 2015; calculated by using Visualyzer 2.2 software

4.4 Influence ranking of actors in the livestock systems

After the process-net mapping was carried out then the participants ranked the identified actors or institution; the levels of influence were based on the outcome of the market institution or livestock system (milk price, input services, quality services, and timely payment). The rating was done on a scale ranging from 0 to 6 and it was visualized by using number of coins for easy understanding for the respondents. The rankings of actors based on influence levels amongst men and women were given as follows:

Figure 24: Gendered levels of influence of actors and/or institutions - Intensive livestock system

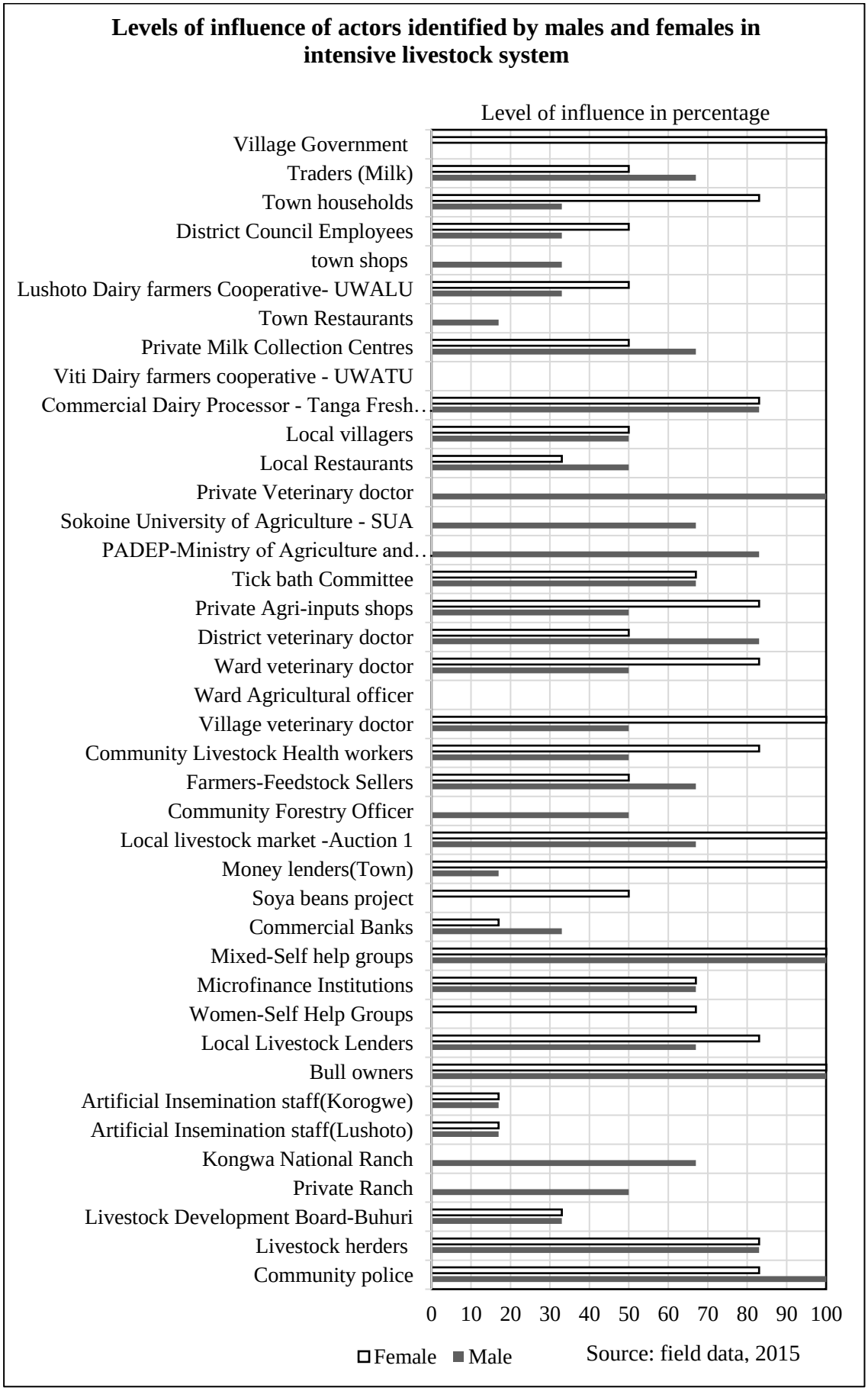
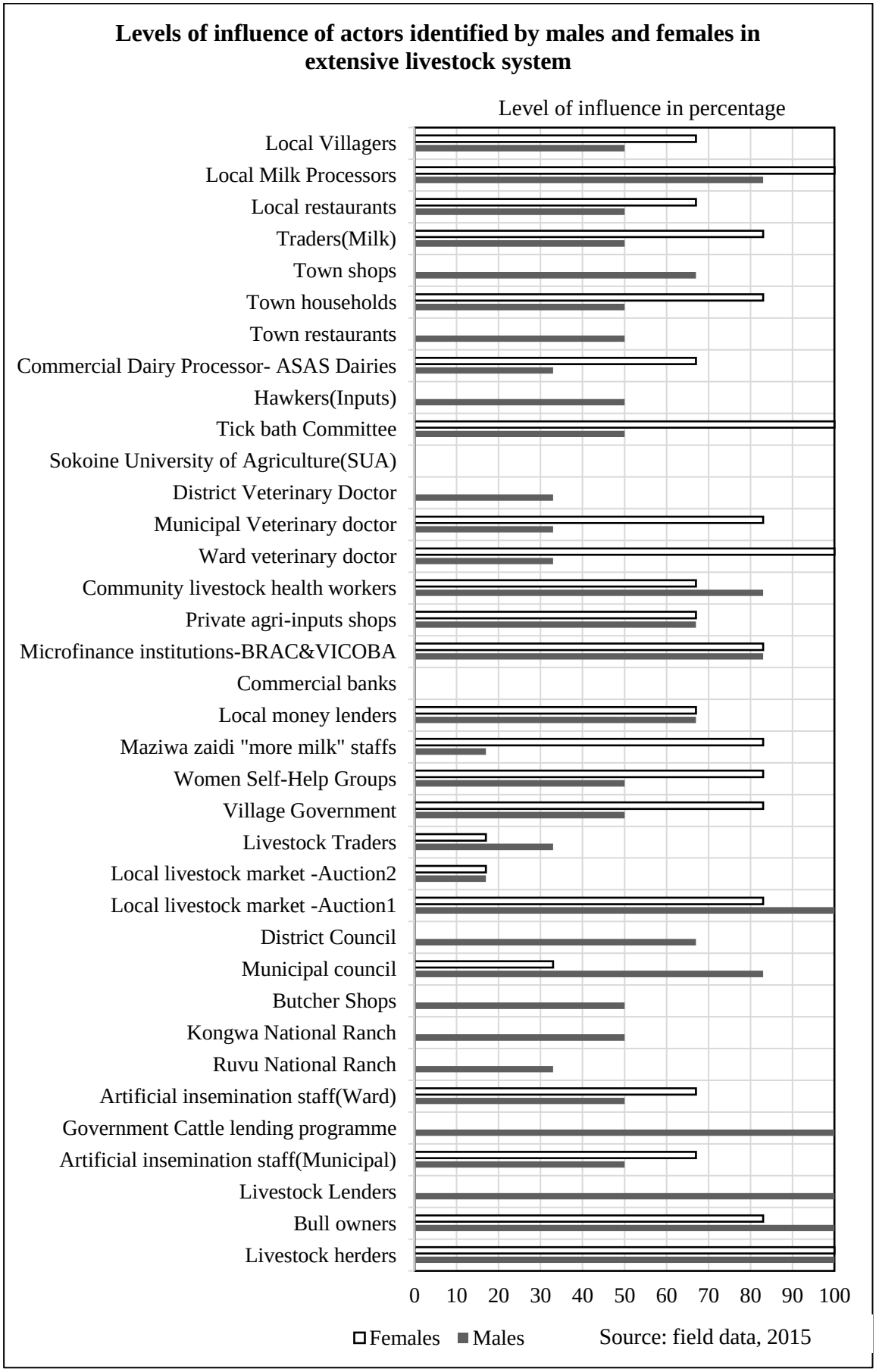


Figure 25: Gendered levels of influence of actors and/or institutions - Extensive livestock system



4.5 Access of factors of participation

The access of factors of participation was disaggregated by gender of an individual, gender of the household head, nature of family(polygamous or non-polygamous family) and it was further disaggregated according to number of wives found in the household so as to get a clearer picture of the access of factors/productive resources. This was potrayed by the following charts:

Figure 26: Gendered access of factors of participation - Intensive livestock system

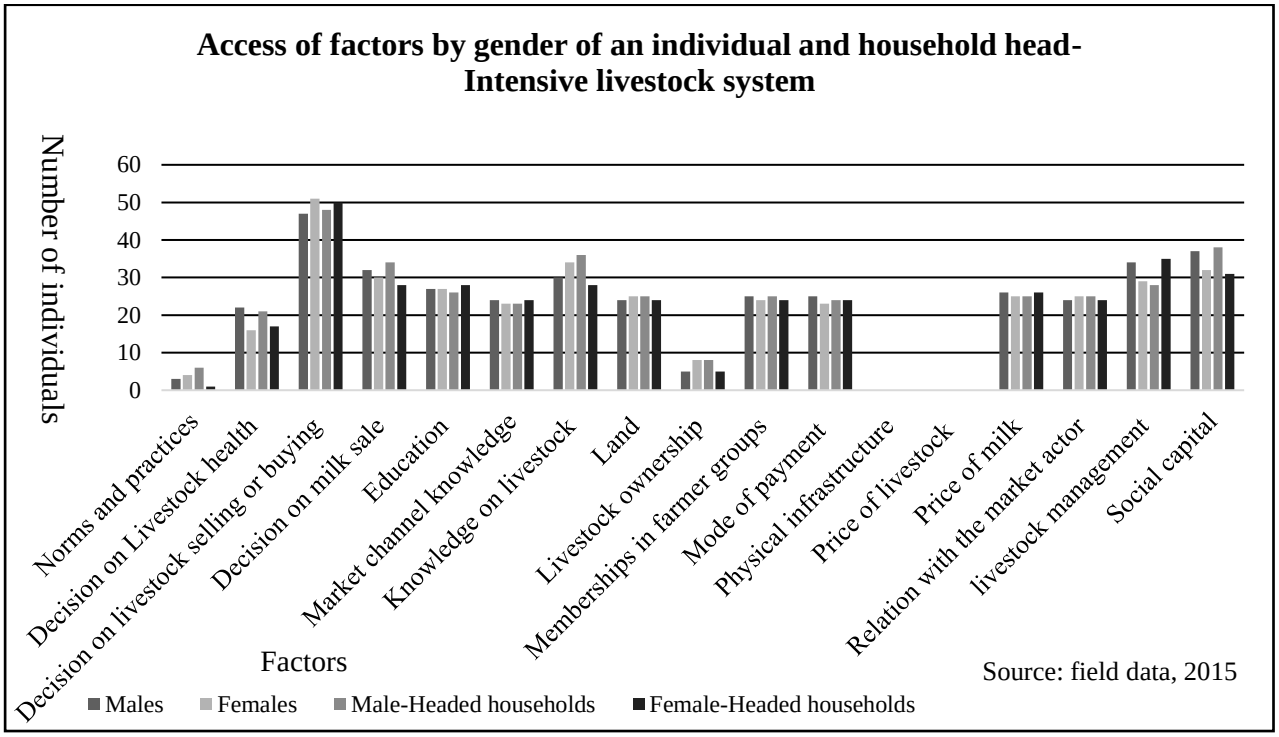


Figure 27: Gendered access of factors of participation - Extensive livestock system

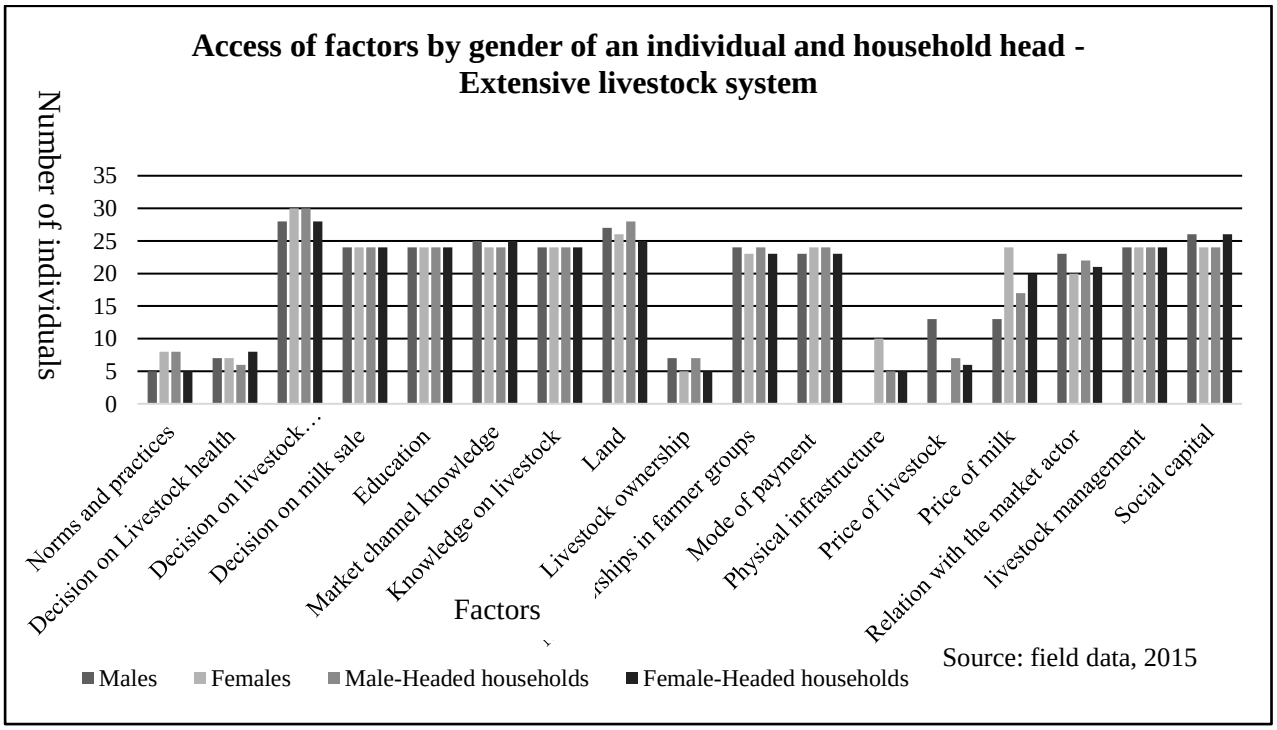


Figure 28:Access of factors of participation by nature of marriage - Intensive livestock system

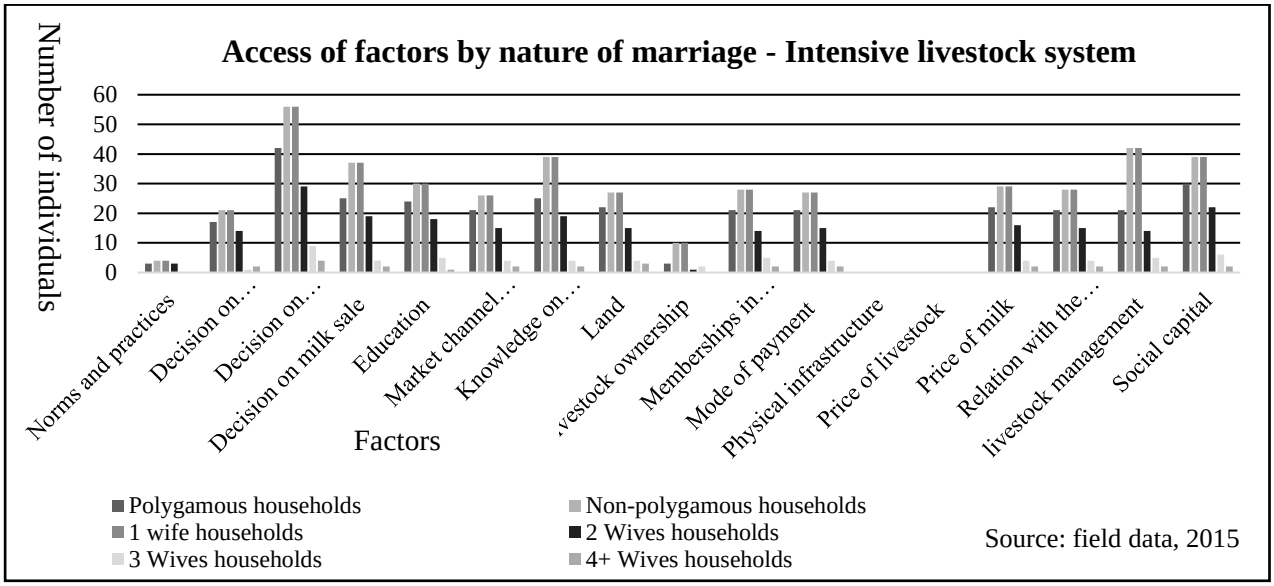
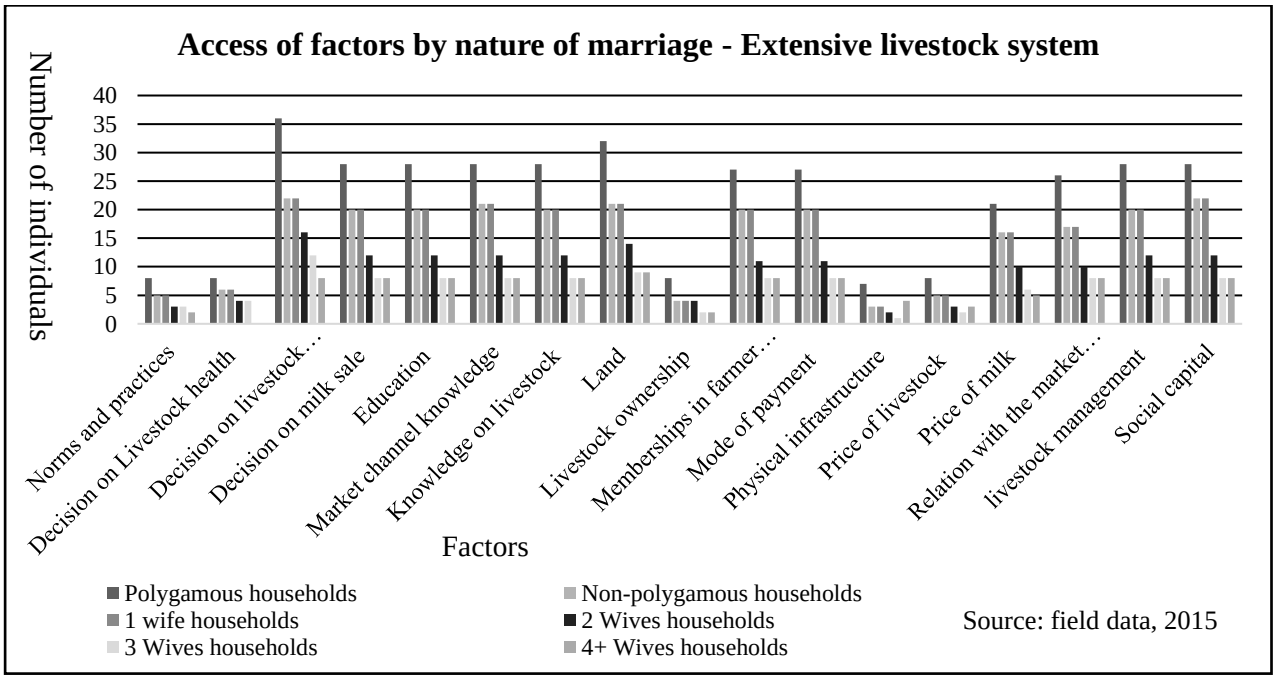


Figure 29: Access of factors of participation by nature of marriage – Extensive Livestock system



4.6 Control of factors of participation

The control of factors of participation was disaggregated by gender of an individual, gender of the household head, nature of family(polygamous or non-polygamous family) and it was further disaggregated according to number of wives found in the household so as to get a clearer picture of the control of factors/productive resources. This was potrayed by the following charts:

Figure 30: Gendered control of factors of participation - Intensive livestock system

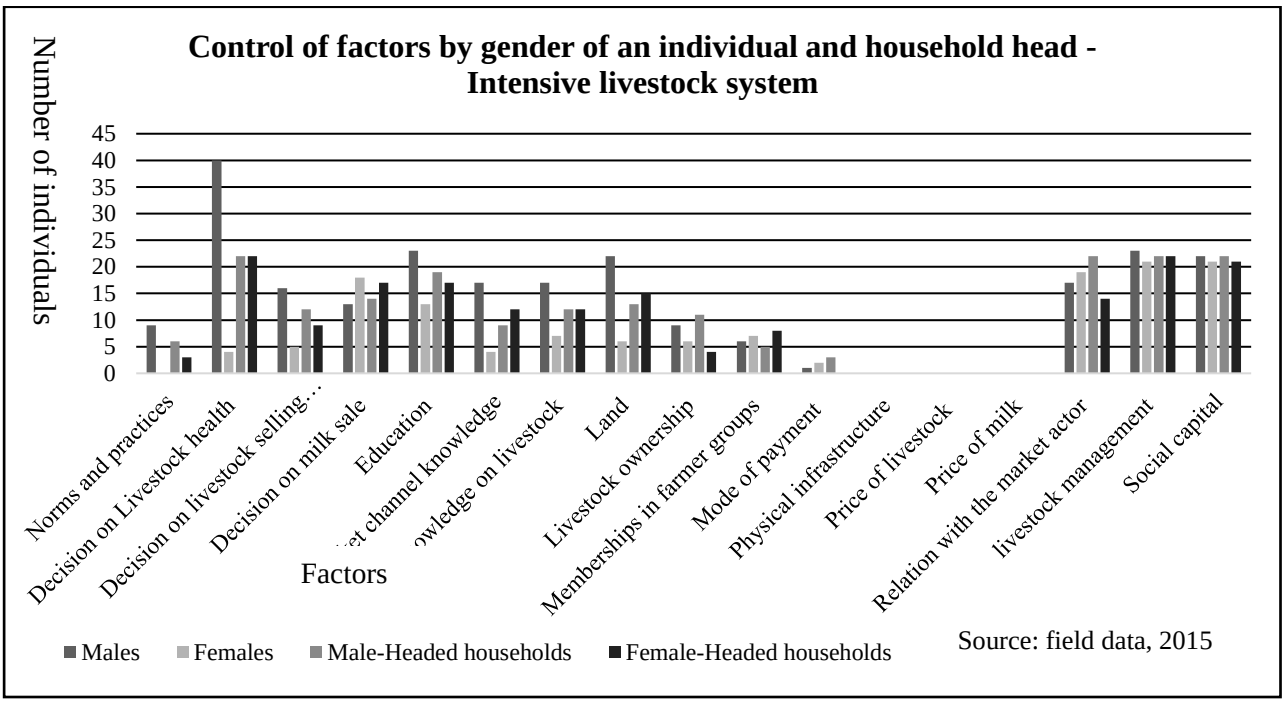


Figure 31: Gendered control of factors of participation - Extensive livestock system

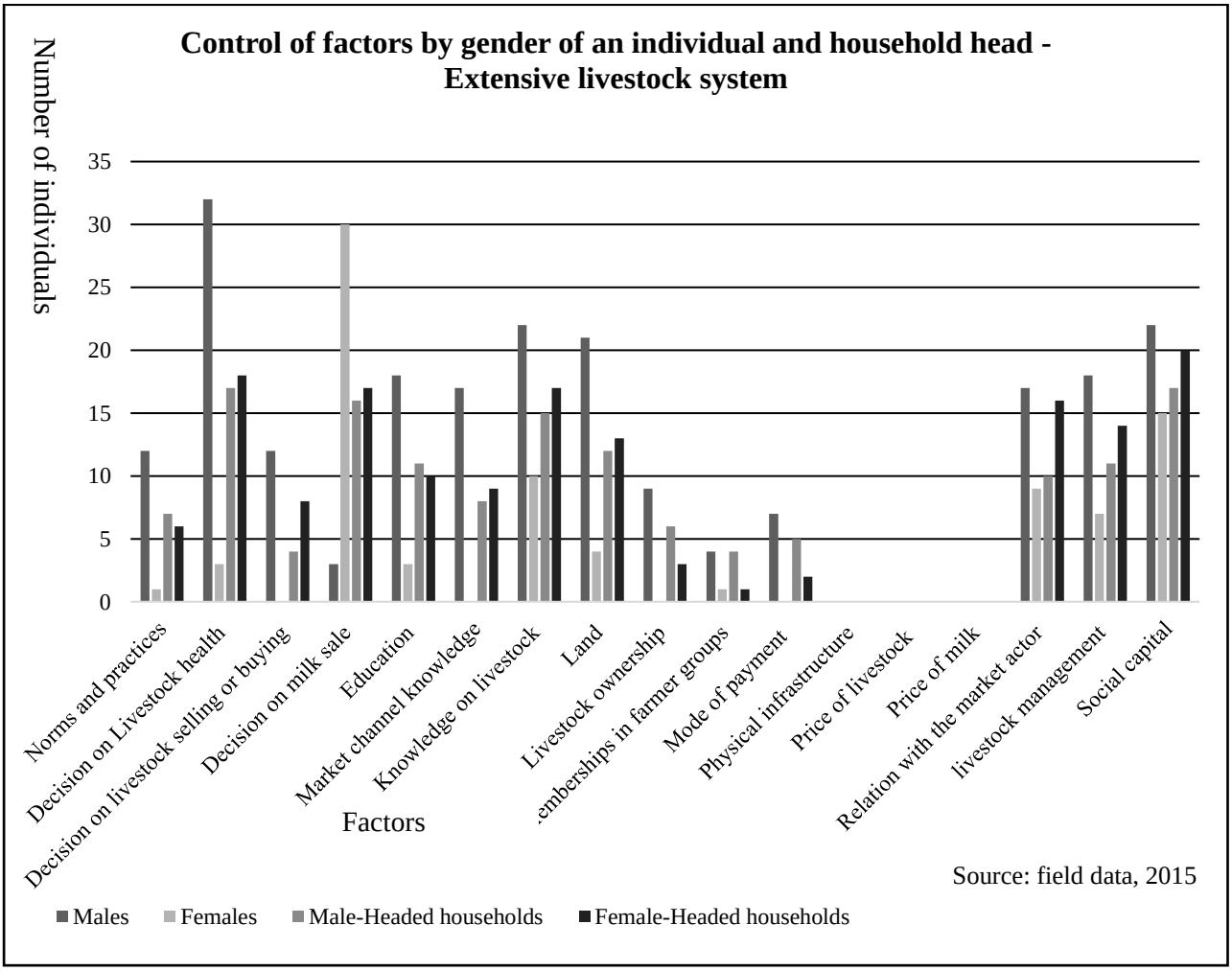


Figure 32: Control of factors of participation by nature of marriage - Intensive livestock system

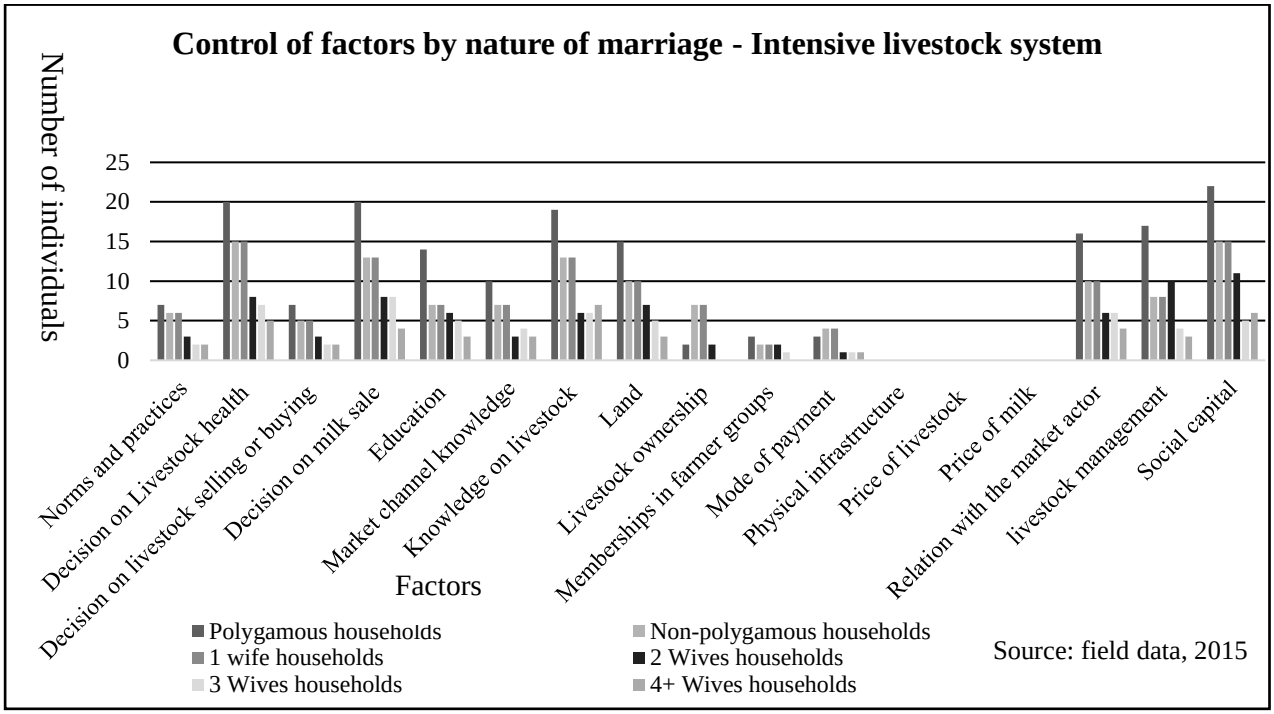
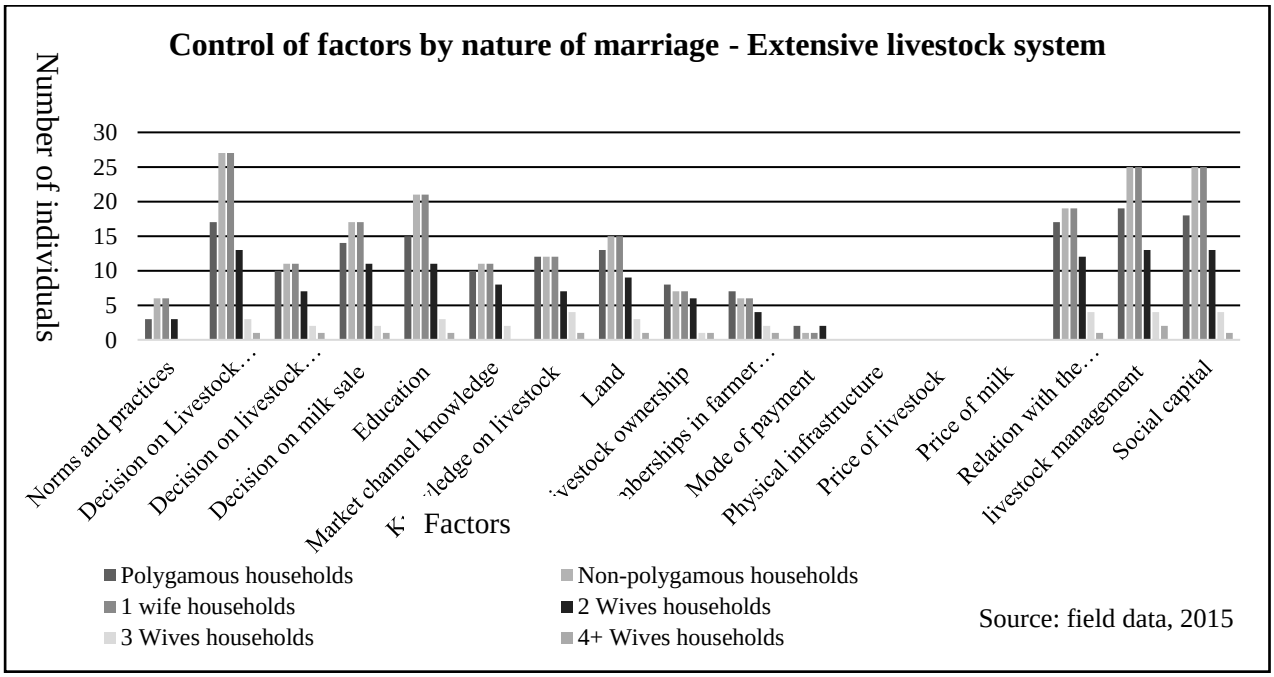


Figure 33: Control of factors of participation by nature of marriage - Extensive livestock system



4.7 Access of benefits of participation

The access of benefits of participation was disaggregated by gender of an individual, gender of the household head, nature of family(polygamous or non-polygamous family) and it was further disaggregated according to number of wives found in the household so as to get a clearer picture of the access of benefits. This was potrayed by the following charts:

Figure 34: Gendered access of benefits of participation - Intensive livestock system

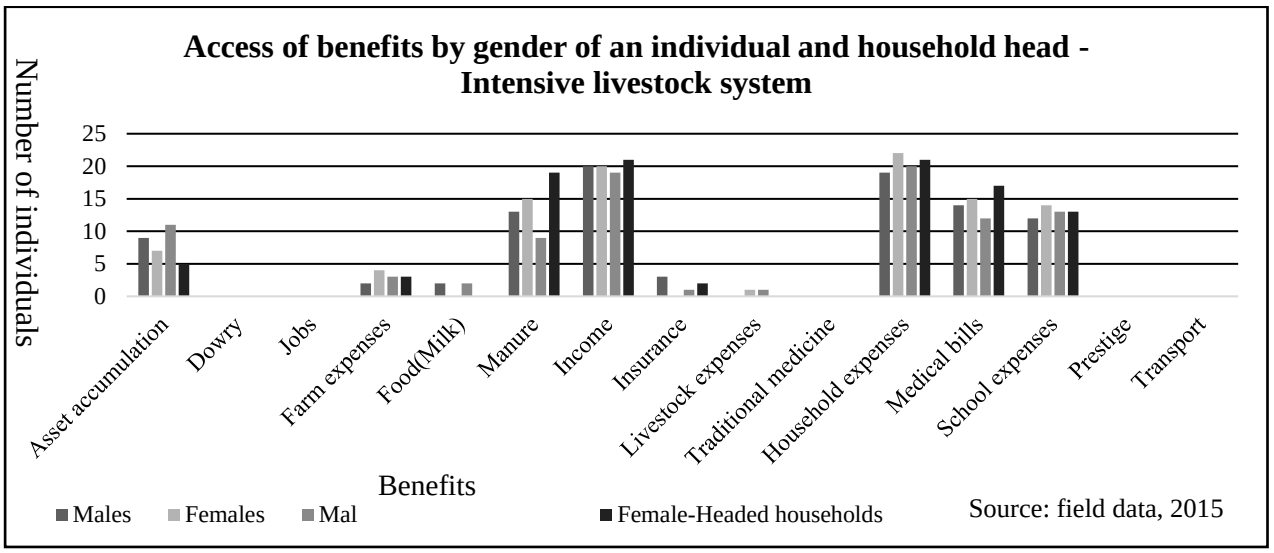


Figure 35: Gendered access of benefits of participation - Extensive livestock system

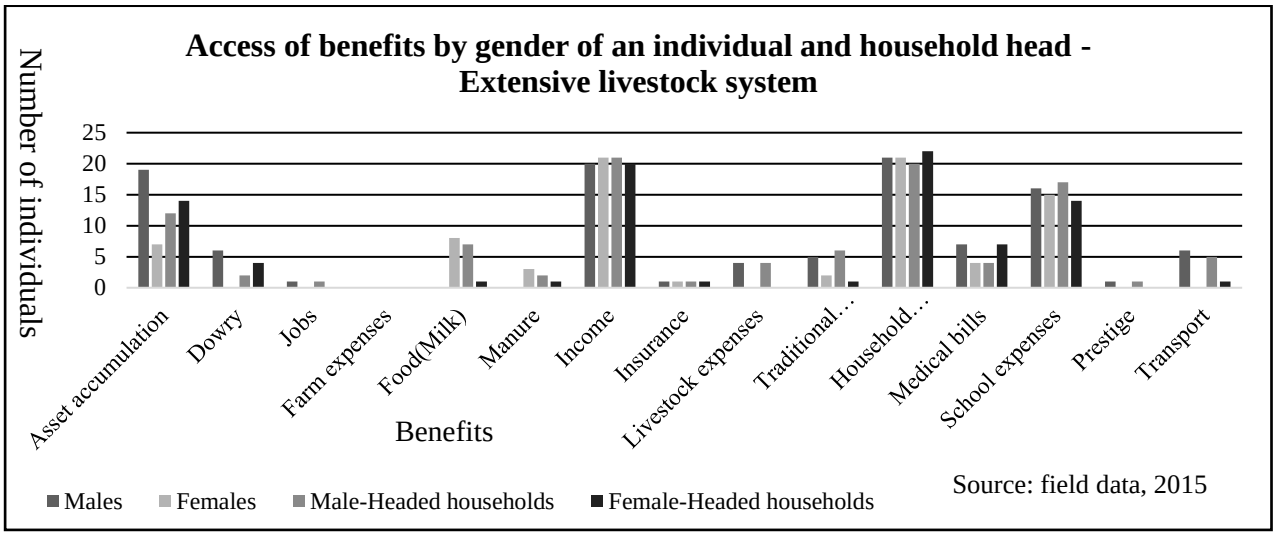


Figure 36: Access of benefits of participation by nature of marriage - Intensive livestock system

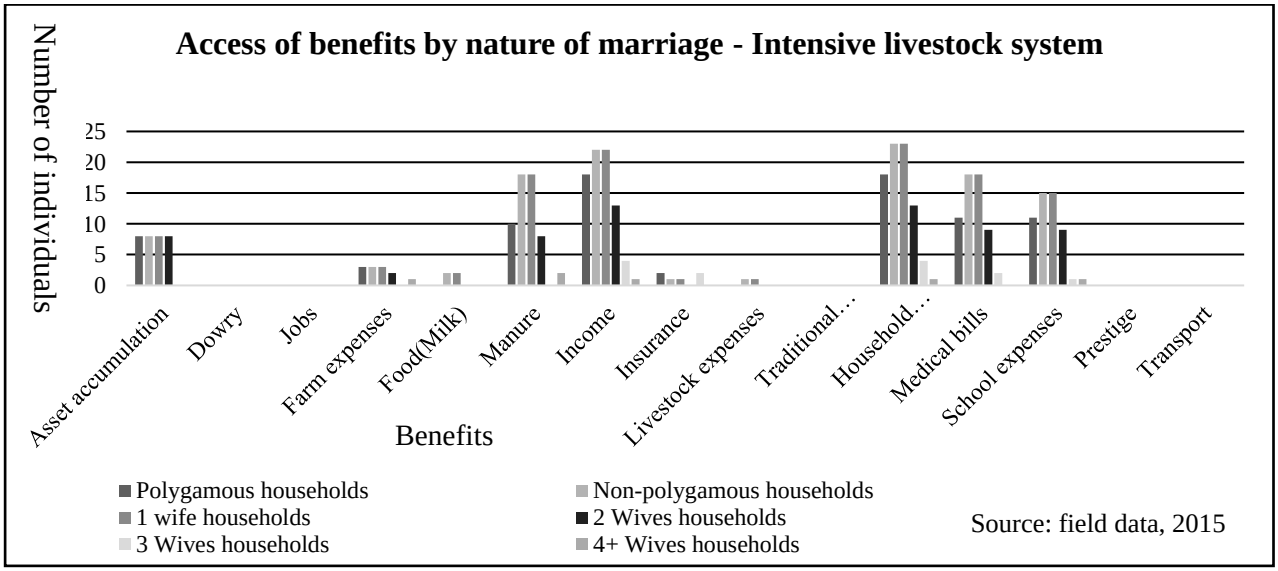
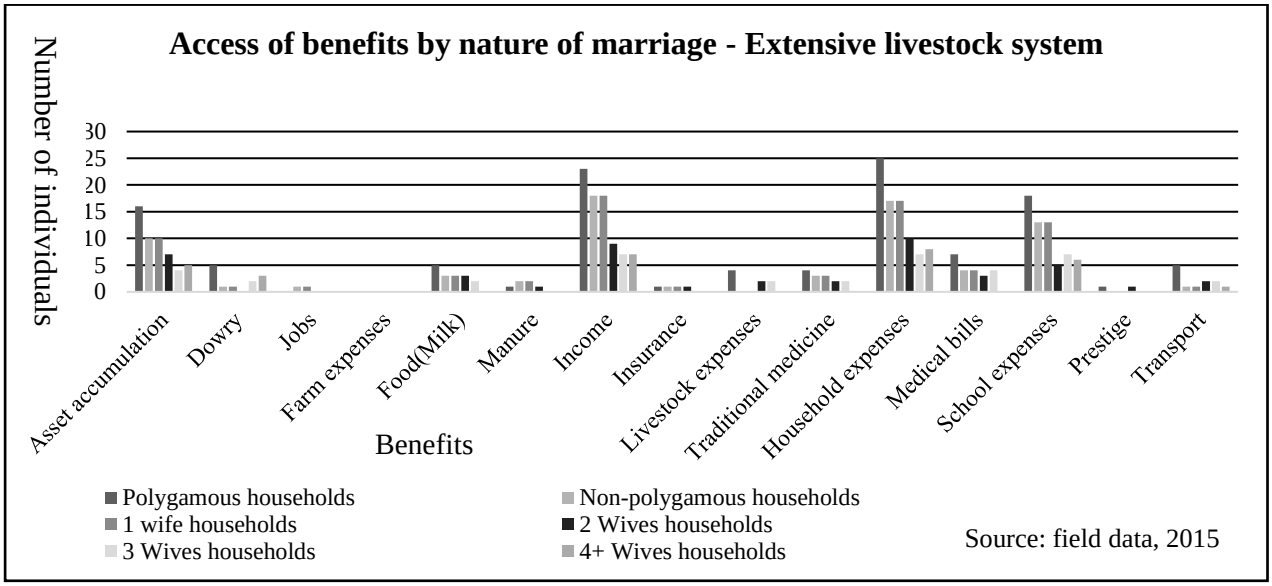


Figure 37: Access of benefits of participation by nature of marriage - Extensive livestock system



4.8 Control of benefits of participation

The control of benefits of participation was disaggregated by gender of an individual, gender of the household head, nature of family(polygamous or non-polygamous family) and it was further disaggregated according to number of wives found in the household so as to get a clearer picture of the control of benefits. This was potrayed by the following charts:

Figure 38: Gendered control of benefits of participation - Intensive livestock system

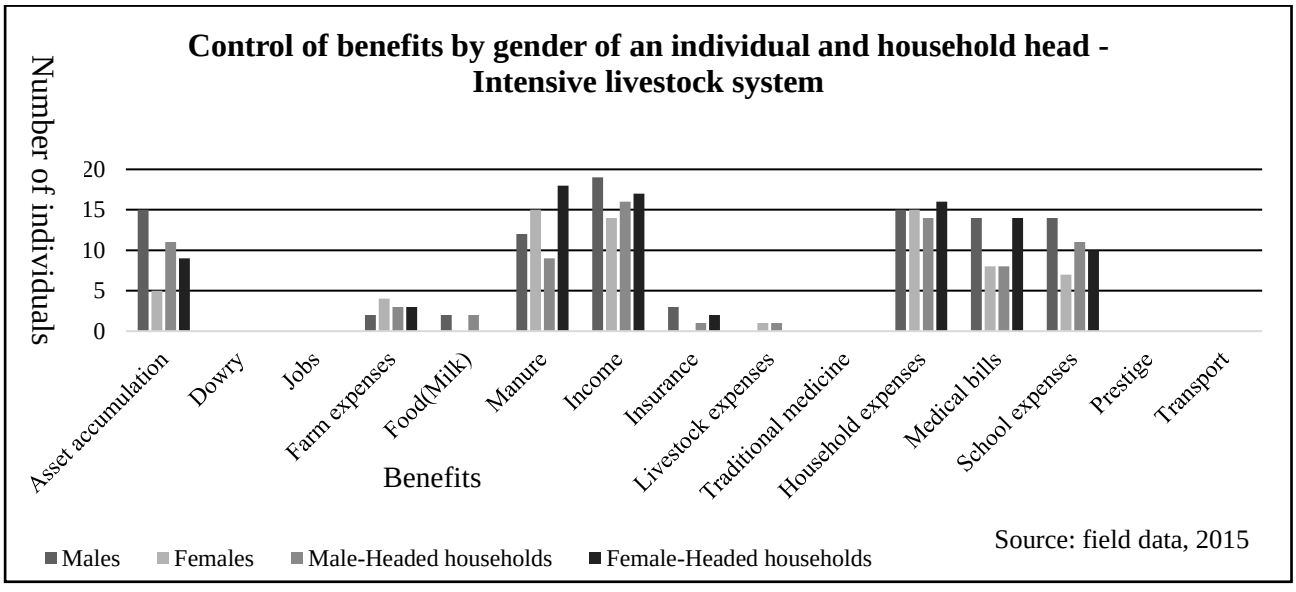


Figure 39: Gendered control of benefits of participation - Extensive livestock system

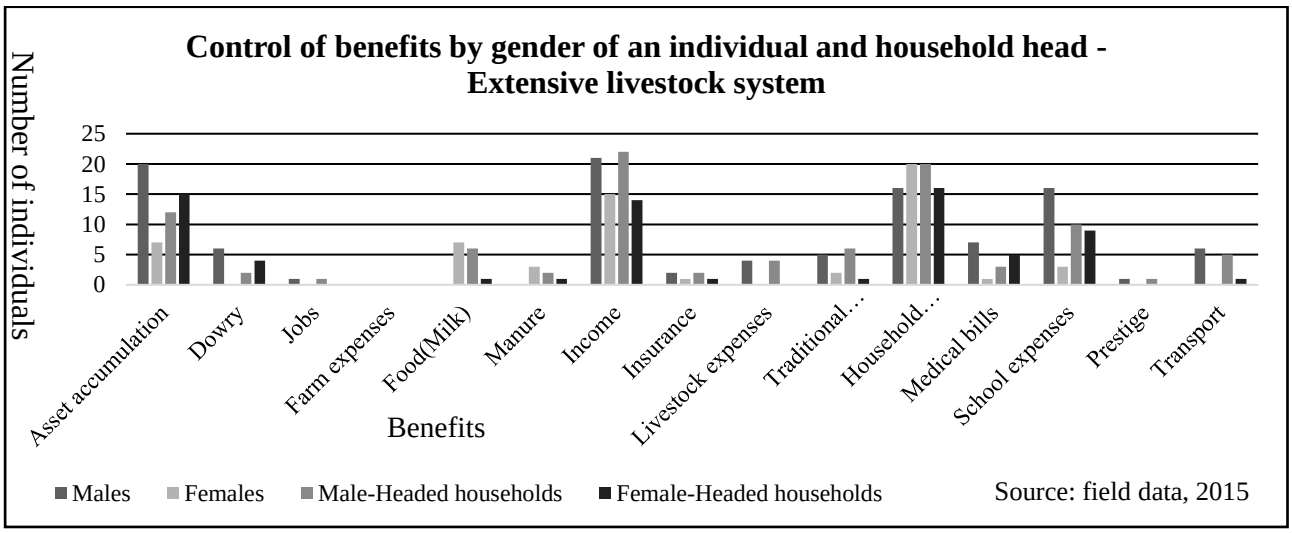


Figure 40:Control of benefits of participation by nature of marriage - Intensive livestock system

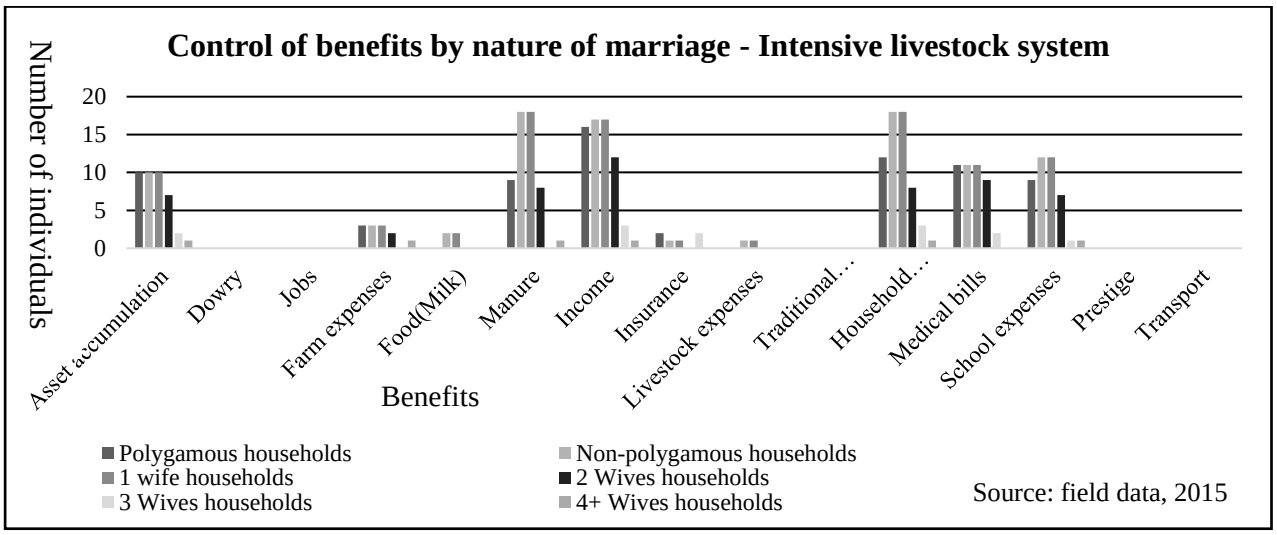
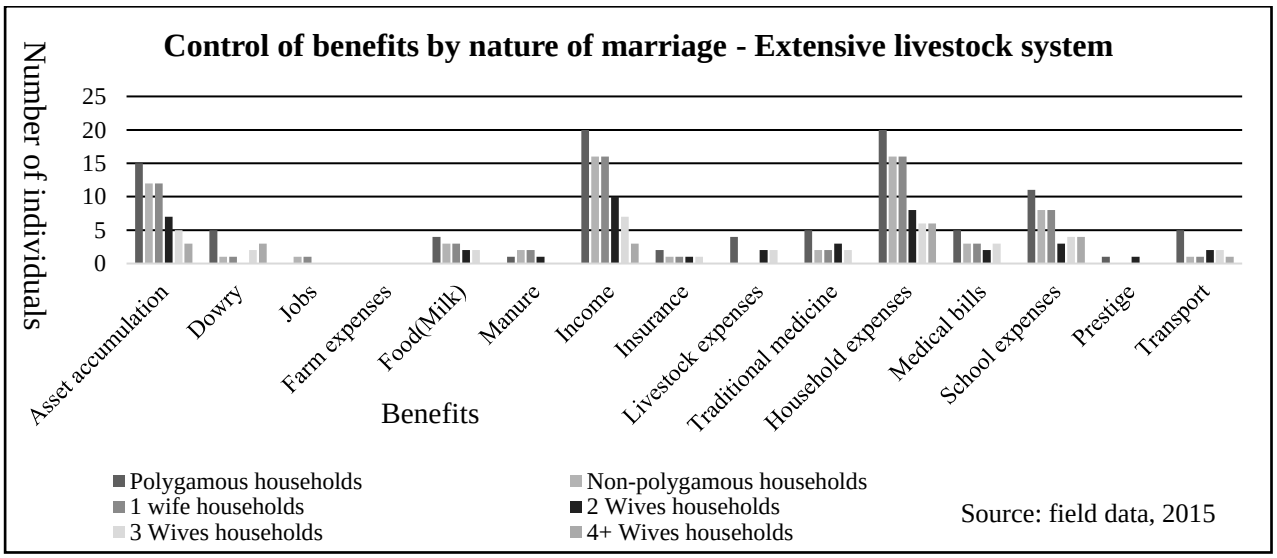


Figure 41: Control of benefits of participation by nature of marriage - Extensive livestock system



4.9 How factors for participation affect men and women?

Factors of participation were found to affect the participation of men and women differently based on the livestock system; the effects were depicted as shown in the following table(more details were shown in appendix 4):

Table 7: Gendered effects of factors of participation in intensive and extensive livestock systems

Effects of factors on participation	Extensive livestock system		Intensive livestock system	
	Number of Men	Number of women	Number of Men	Number of women
Factor: community norms and practices				
Milk and milk business is considered women's' job	12	0	0	0
Not allowed to inherit from deceased or divorced spouse	2	10	1	3
Not allowed to own assets(women)	0	11	1	3
factor: decision on livestock selling or buying				
Can sell and or buy livestock	7	0	12	5
Cannot sell or buy livestock	0	7	6	10
Keeping money from livestock sale	6	0	2	0
Factor: decision on milk sale				
Decide to sell or consume the milk	6	26	7	12
Doesn't decide to sell or consume milk	21	2	9	7
Doesn't keep the milk money	15	2	16	11
Doesn't sell the milk	1	0	4	0
Keeping the milk money	4	23	18	28
Factor: education				
Able to attend trainings	2	1	5	3
Cannot read or write	5	20	1	10
Read and understand instructions on inputs or service use	16	3	20	13
Factor: knowledge about livestock				
Identification and or treatment of different livestock diseases	21	4	10	5
Identification only diseases	1	12	0	0

Unable to treat or identify different livestock diseases	3	8	16	20
factor: knowledge about market channel				
Knowing Limited milk markets	7	21	11	23
Factor: land ownership				
Building house and cowshed	11	1	0	0
Cannot use as Collateral	4	15	5	3
Getting farm income to supplement livestock income	7	1	6	6
Getting feedstock for the livestock	4	4	21	18
Getting income to buy calves or cows	3	0	2	4
Growing food crops for the family	8	9	13	16
Husbands makes all final decisions on land	2	14	0	2
Factor: livestock health services or inputs				
Calling or paying for services or inputs	21	1	15	2
Limited access to calling or paying for inputs or services	1	24	8	23
Own treatment of Livestock diseases	14	2	1	0
Factor: membership in livestock keepers' groups				
Cannot attend trainings	0	12	3	9
Trained on feeding, cleanliness and proper milking	3	2	6	8
Training on dairy enterprise management	3	0	2	3
Factor: mode of payment				
Prefers to receive cash only	11	6	0	0
Factor: price of livestock				
More active in livestock market than in milk market	13	0	0	0
Factor: price of milk				
Discouraged	3	15	8	8
Going to sell milk less often	0	12	0	0
Factor: relation with the market channel actor				
Easier to sell or buy livestock	17	1	1	0
Selling milk with walking distance	2	7	8	14
Factor: responsible for livestock management				

Grazing finding grasses and or drinking	24	8	20	18
Milking	2	19	13	15
Factor: social capital (relations with relatives, neighbours and friends)				
Getting feedstock from others	0	0	12	5
Getting help with livestock treatment	17	14	4	1
Helped in grazing and or drinking for livestock	11	9	3	3

CHAPTER FIVE: DISCUSSION OF RESULTS

5.1 Why men and women ranked the identified actors differently in the intensive and extensive livestock systems?

Men and women had different dairy value chains in both livestock systems; the actors and /or institutions were identified and given levels of influence by men and women separately. There were several reasons for such differences in ranking among men and women since they face different challenges shaped by gender issues. These reasons were discussed as follows:

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

5.1.1 Reasons for rankings of milk market actors/institutions

a) Local villagers: these had the level of influence of 50% as ranked by both men and women in the intensive livestock system because they bought or buy milk at very low price of 500 TSH per litre but they were important because women could sell milk within a walking distance. But the local villagers were ranked 50% by males and 67% by females in the extensive livestock system because men considered them to be the market for the women's milk such that the income obtained could be used for household expenses; additionally, both men and women reported that local villagers paid their milk bills late and sometimes did not pay at all.

   The Customers come to buy milk at my house; I don't have to walk far – A woman in Kwadiambe Village.

b) District council employees: these were present in Intensive livestock system and they were ranked 33% by men and 50% by women; this was due to the reason that these district employees had tendency of not paying for the milk they buy from the pastoralists and it was impossible for both the men and the women to follow-up their debts because of their status as government officials.

   We are afraid of asking for our money from district employees – A woman at Wami Sokoine village.

c) Local restaurants: these small food outlets in the village were ranked 33% by women and 50% by men in the intensive livestock system; men preferred them because they provided a reliable market for the milk even though the price they offered were very low (400TSH to 500TSH) per litre. Likewise, in the villages with extensive livestock system, local restaurants had an influence level of 50% by men because men were not

much involved with the milk business due to low price while women ranked them 67% because they could sell the milk near their households.

These small hotels buy milk on credit and sometimes do not pay us – A Maasai woman at Ulaya Kibaoni village.

d) Traders (Milk): these were ranked 67% by men and 50% by women in the intensive livestock system; this was because these traders bought milk at very low price of 400TSH and normally paid very late (paid after 40 days instead of 30 days or one month), additionally it was very hard to trust these traders because they are coming from town and women especially married ones found it hard to deal with them as it was considered disrespectful for a woman to deal with a man who was/is not her relative. Whereas men and women in the extensive livestock system ranked the milk traders as 50% and 83% respectively; women ranked them higher than men because milk business was considered a woman's job such that she could keep the proceeds from milk sale for the household use and men didn't have to give money for household use.

This trader always pay late and doesn't give our bonuses from Tanga Fresh Ltd – A woman at Ubiri Village.

e) Town shops (Kiosks): only men in both systems could identify these actors and they ranked them 33% in the intensive system because these shops bought very little milk and they were located far away from the village but men in the extensive system ranked these shops 67% because they bought milk at higher price of 800TSH to 1000TSH per litre even though they were located far from the village such that men with bicycles were the ones that could access them.

It is uneconomical to take 4 litres of milk to sell in town – A Man at Kwadiambe Village.

The town is very from the village; I cannot be that far away from my house – A Woman at Kwadiambe Village.

f) Town households: these were ranked 33% by men and 83% by women in the intensive system whereas they were ranked 50% by men and 83% by women in the extensive livestock system.; women ranked them higher because despite the long distance between them the price offered was higher than selling in the village and they could easily deal with women in those households since were the ones responsible for buying milk.

g) Town restaurants: these actors were only identified men in both systems but they were ranked 17% and 50% in both systems due to long distances involved in accessing them.

h) Commercial dairy processor –Tanga Fresh Ltd: this commercial dairy processor was identified by dairy farmers in the intensive livestock system only and was ranked 83% by both men and women; this was since this actor provided reliable market throughout the year even though the price was low and late payments were made often. But people with more cows could find it profitable because this actor bought/buys as much milk as possible.

i) Lushoto Dairy farmers' cooperative –UWALU; This cooperative was only identified in the intensive livestock system and was ranked 33% by men because it gave late payments and bought milk at the same price despite the changes of seasons and 50% by women because this cooperative was supposed to be the link between the farmers and the processor but there was very poor communication between the farmers and the commercial dairy processor; only men could work in the cooperative.

Women cannot participate in the decision making in this cooperative – A Woman at Ubiri Village.

j) Viti Dairy farmers' cooperative –UWATU: this actor was identified by both men and women in the intensive system but was given an influence level of 0% because the cooperative was no longer operating such that it was hard to find the market for the milk. This actor was not present or identified in the extensive livestock system.

We have no place to sell milk – Villagers at Gologolo Village.

k) Private milk collection centres: this actor was identified only in the intensive system and were ranked 67% by men and 50% by women because they were located far away from the village and they don't buy milk from women unless through traders.

l) Local milk processors: these actors were identified only in the extensive livestock system and they were ranked 83% by men because they provided reliable market for the milk and 100% by women because these local processors come to buy the milk at home and most of them were women such that it was easy to deal with them.

Local milk processor "Mtengeneza mtindi" is my sister in-law and she comes every day at my house to buy milk – a co-wife at Kwadiambe village.

m) Commercial dairy processor –ASAS dairies Ltd: this actor was identified in the extensive livestock system in which men ranked it 33% because the company promised to build a milk collection centre in the village such that women didn't have to walk long distances but it never did and the company has its own ranch which met most of its milk demand; and women ranked the company 67% because they could sell their milk to it through the traders but they had to walk long distances to find the road where they meet the traders.

The company was given land to build a milk collection centre but it never showed up again – A man in Ulaya Kibaoni Village.

5.1.2 Reasons for rankings of livestock health services actors or institutions

a) Sokoine University of Agriculture(SUA): this institution was identified by men only in the intensive system was ranked 67% because it was helping them during outbreaks of livestock diseases and selling to the farmers bulls for breeding but the prices for these services were high and sometimes livestock died due to the vaccinations provided by SUA whereas women only were able to identify this actor in the extensive livestock system and ranked it 0% because the services provided by SUA were not accessible to them due to the fact that issues concerned with livestock health had to be decided by men only in the households.

Livestock died after being vaccinated by SUA staff – A Maasai man at Makuyu Village.

b) Tick bath committee: this was ranked 67% by both in the intensive system; 50% by men and 100% by women in the extensive system.

The tick bath is no longer operating; there is no water in the bath – A man at Kwenjugo Village.

c) PADEP -Ministry of Agriculture &Livestock: this institution was identified and ranked 83% by men and 0% by women in the intensive system because men acknowledged that it gave iron sheets, timber, cements, water pumps and subsidy for the construction of tick bath but women were not involved because taking livestock to the tick bath was considered men's job such that this actor had no influence on women.

Only men got money from the ministry to build tick baths – a Woman at Wami Sokoine Village.

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

d) District veterinary doctor: This actor was ranked 83% by men and 33% by women in the intensive livestock system; men ranked him higher because he was the one that helped in livestock treatment(very few people in the village knew how to treat livestock) but charged higher price of 35 or 45 thousands Tanzanian shillings and he was not available on time and women ranked him lower because they were not responsible for livestock health in the households such that they needed men or male relatives to contact the veterinary doctor. But only men identified this actor in the extensive livestock system and was ranked 33% because he charged higher price and was not needed much because of the traditional knowledge of livestock treatment possessed by men.

e) Municipal veterinary doctor: this actor was identified in the extensive livestock system only and was ranked 33% by men and 83% by women because she rarely visited the pastoralists unless there was an outbreak of livestock diseases and women ranked her high because she is a woman such that it was easier to deal with her.

f) Ward veterinary doctor: this actor was ranked 50% by men and 83% by female in the intensive system because he visited the dairy farmers often and can be access by all despite the higher price he charged whereas he was ranked 33% by men and 100% by women in the extensive livestock system because considered themselves to have higher knowledge about livestock than him.

g) Village veterinary doctor: This was ranked 50% by men and 100% by women in the intensive system; men ranked him lower due to the higher price of 20,000TSH per visit while women ranked him higher due to the service he provided

h) Ward agricultural doctor: only men identified this government employee in the intensive system and was ranked 0% because he sometimes didn't have enough knowledge about livestock because he was only responsible for agriculture but he had to work as a vet due to the shortage of staffs.

I know more about livestock than him; it not necessary to call him because he doesn't know much – A Maasai man at Makuyu Village.

i) Community livestock health workers: these were ranked 50% by men and 83% by women in the intensive system; men ranked them lower because community livestock health workers didn't have any training but they treated livestock by guesswork which sometimes resulted to deaths of livestock. But men in the extensive livestock system

ranked them 83% because they helped with livestock treatment especially when they are away and women ranked them 67%.

j) Private Agri-inputs shops: these were ranked 50% by men and 83% by women in the intensive livestock system because they were easily accessible and could provide inputs during emergencies even though most of these shops were owned by businessmen with little or no veterinary training such that it was sometimes hard to get advice from them. These actors were ranked 67% by both men and women in the extensive livestock system because they were located far from the village such that only men could access them.

k) Hawkers (Inputs): these actors were identified in the extensive livestock system only and were ranked 50% by men because they sometimes sell expired inputs to the dairy farmers even though at cheaper prices.

5.1.3 Reasons for rankings of financial services actors or institutions

a) Microfinance institutions: these were ranked 67% by both men and women in the intensive livestock system; Men felt that these institutions were for women only which women found it easier to deal with them because they don't involve collaterals or complicated procedures whereas these institutions were ranked 83% by both in the extensive livestock system because there were no formal banks in the village and microfinance institutions filled this gap.

b) Commercial banks: they were ranked 33% by men and 17% by women in the intensive livestock system because banks required formal assets as collaterals and men had assets such as land with informal titles which were not accepted by the banks and it was even harder for women to access their services because major decisions of taking loans needed consent of men in the households. But banks were ranked 0% because they were completely absent in the villages with extensive livestock system.

They don't give loans to people with traditional land titles – an Old man at Ubiri village.

I am afraid of them because they sell people properties – A man at Kwadiambe village.

c) Local money lenders: these were ranked 67% by both men and women in the extensive livestock system because they helped during emergencies but they charged very high interest rates (Up to 100% in some cases).

d) Money lenders (from town): these were ranked 17% by men because they charged very high interest rates but women ranked them 100% because they received small deposits from these money lenders which helped them to join microfinance groups; women could borrow money from these money lenders to pay their debts.

If I borrow 10,000 TSH then I must repay 20,000 TSH. That is too much interest – A man at Kwadiambe village.

e) Women Self-Help Groups: these were ranked 67% by women in the intensive system because they involved no collaterals but they couldn't get much money whereas in the extensive system they were ranked 50% by men because these groups were considered women stuff and they didn't give much money and 83% by women because these groups were the only way to access credit for women.

Vibati (Women Self-Help groups) are for women only because they give small money – A man at Kwadiambe village.

Women join Vibati groups secretly without telling their husbands otherwise the men will take the money at home – Women at Kwadiambe village.

f) Mixed Self-Help Groups: these groups were ranked 100% by both men and women because they gave larger credits than other forms of self hep groups and they didn't need collaterals or complicated procedures; for one to get had just to be in good terms with the others.

NB: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

5.1.4 Reasons for rankings of livestock trade actors or institutions

a) Livestock traders: these were ranked 33% by men and 17% by women in the extensive system because men received lower prices for the livestock sold while women couldn't deal with them directly because livestock selling or buying was considered men's job such that women could not know the income obtained from livestock sale.

b) Local livestock market – auction1: this was ranked 67% by men and 100% by women in intensive system because it provided the main source of income for the households; in the extensive the market was ranked 100% by men because it was/is the main source of their incomes and 83% by women because they would sell food.

c) Local livestock market –auction2: was ranked by both 17 in the extensive livestock system due to lack of security during market days.

d) Kongwa National Ranch: this was ranked 67% by men and 0% by women in the intensive system because it located far away and high prices of livestock, women couldn't access it. But was also ranked 50% by men in the extensive system due to the long distance and livestock breeds sold by the ranch could withstand the village conditions (Most of them died).

e) Ruvu National Ranch: this was ranked 33% by men in the extensive system because it located far away from the village and the livestock it sells/sold were of high price (1,000,000TSH) per cow. **NB**: Exchange rate – 1USD/ 2159.21 TSH, Source: Central Bank of Tanzania, 2015.

f) Private ranch: this was ranked 50% by men in the intensive system because the ranch sold/sells livestock at very high price and the bulls sold were normally weak and of poor quality.

The bulls from that ranch are normally castrated – A Maasai man at Makuyu Village.

g) Butcher shops: these were ranked 50% by men in extensive system because they bought livestock at very low prices. Women couldn't identify this actor because they couldn't sell livestock in their households without the consent of their husbands or other male relatives.

A woman doesn't have the authority of selling livestock even if I am away. I am the only one who can call for services because my wife is not supposed to talk to other men – A man at Kwadiambe Village.

The husband has the final decision on livestock purchase or sale; I only take the milk – A woman at Ubiri village.

5.1.5 Reasons for rankings of breeding services actors or institutions

a) Artificial insemination staffs (Ward and Municipal): he was ranked 17% by both men and women in the intensive livestock system because he was rarely available and charged very high price whereas was ranked 50% by men and 67% by females in the extensive system because he helped with improving the breeds of livestock but charged a higher price and was not available on time when the livestock were on heats.

When the cows are on heat, "the bottle reproduction" guy is nowhere to be found – an Old woman at Kwadiambe Village.

b) Bull owners: these were ranked 100% by both in the intensive system because their services were readily available and free sometimes; whereas bull owners in extensive system were ranked100% by men and 83% by women because they were the only way of breeding in most of the cases and the services were free.

Bull owners can lend their bulls for free – a man at Ulaya kibaoni village.

5.1.6 Reasons and rankings of livestock lending or borrowing actors or institutions

a) Local livestock lenders: these were ranked 67% by men and 83% by women in the intensive livestock system because women who couldn't buy livestock could borrow livestock through their sons or mal relatives and keep the milk and the second born-calf. In the extensive system, men ranked livestock lenders 100% because they could borrow livestock for free; women ranked them 83% because the borrowed livestock could provide milk for the family or sale.

After my divorce, I and my son borrowed a cow from my friend – an old woman at Ubiri village.

b) Livestock development board (Buhuri -Tanga): this actor was ranked 33% by both in the intensive system because it had stopped to lend livestock to the dairy farmers and when it was operating women couldn't benefit because it required farmers to stay away from their homes for more than a month which was hard especially for married women.

c) Government cattle lending programme: this was ranked 100% by men in the extensive livestock system because they could get exotic breeds for improving their herds.

5.1.7 Reasons and rankings of supporting institutions or actors

a) Village government: this was 100% by women because it able to keep account and price of the livestock sold while men ranked it 50% because they needed to have permit before they could sell livestock and 83% by women in the extensive system because it helped to organize community police for maintaining security in the village.

Through village government I can know the price of cow sold by my husband – A woman at Kwenjugo village.

b) Livestock herders: These were ranked 83% by both men and women in the intensive system but women headed households couldn't easily access them because they have

fewer cows and they were 100% by both men and women in the extensive system because they gave them time to do other income generating activities.

I can go farming vegetables because our livestock will be taken care by the herder – a Woman at Makuyu Village.

c) Farmers-Feedstock sellers: these were ranked 67% by men and 50% by women because they provided grasses during the dry seasons in exchange for manure or cash.

d) Community forestry officer: this was ranked 50% by men in the intensive system only; this was because he sometimes stopped dairy farmers from cutting grasses in the forest or grazing livestock in the forests.

e) District council: this was 67 by men in the extensive livestock only because it was responsible for managing the livestock auctions as well as fines and fees at the auctions but never improved the infrastructure of the livestock markets and didn't give enough security during market days; additionally, the council built a substandard dam such that it was hard to find water for livestock during the dry seasons.

f) Municipal council: was ranked 83% by men because it provided vaccinations for the livestock while women ranked it 33% because they could not decide on the issues of livestock health and couldn't build wells in the village as it had done in the farmers' village.

g) Maziwa Zaidi "more milk" staffs: these were ranked 17% by men and 83% by women in the extensive livestock system because they trained the villagers only once and never showed up again.

h) Community police: these were ranked 100% by men and 83% by women in the intensive livestock system because they helped to maintain security in the village and prevent thefts of livestock.

5.2 Interpretation of network properties

Men in the dairy value chains of both livestock systems identified more actors or institutions than women; men were identified 6 more actors or institutions than women but individuals in the dairy value chain found in intensive livestock system identified more actors than those found in extensive livestock system (number of actors or institutions identified by men and women in intensive system were 39 and 33 respectively whereas men and women in the extensive system identified 34 and 28 actors respectively).

Male actors dominated dairy value chains of both genders in each of the two livestock systems such that the proportions of male actors in the male and female dairy value chains of intensive livestock system were 51.282% and 45.455% respectively while the proportions of female actors in the male and female dairy value chains were 0% and 6.061% respectively. Likewise, in the extensive livestock systems, male actors dominated the dairy value chains of both genders; the proportions of male and female actors in the male dairy value chain were 50.000% and 5.882% respectively whereas in the female dairy value chain the proportion of male actors was 53.571% while female actors were 10.71%.

The diameter of a social network (process-net map) shows how far apart the farthest two nodes (actors or institutions) are/were; this depicts how long it would take to transmit information, inputs and or services from one extreme actor or institution to another of the social network (Visualyzer 2.2 manual, 2014). There were few differences in diameters of the dairy value chains but it was worthy to note that the diameter of female dairy value chain was greater by 2 than that of male dairy value chain in the intensive system which meant that flow of information, inputs and or services took much longer to reach women than men. But in the extensive system; the diameter of male dairy value chain was greater by 1 than that of female dairy value chain; this could be attributed to the fact that women in this system dealt mostly with milk business which was limited near their households where men had large networks. Additionally; all social networks had no isolates except for male dairy value in the intensive system; this means most of the actors identified by both men and women were well linked to each other.

Two nodes (actors or institutions) could be connected by one or several links, paths or relations which could differ in length such that the shortest path between the actors is called *geodesic*. The geodesic distance depicts the cheapest route between a pair of nodes or actors (Visualyzer 2.2 manual, 2014). The average geodesic distance was about 2.1 in all the dairy value chains of men and women which meant that there were at least two shortest paths or links between a pair of actors or institutions in each dairy value chain

Density of Social network (process-net map) depicts the percentage of relations or links found in that network (process-net map) such that for an "all to all" connected network the density would be =1.0(Visualyzer 2.2 manual, 2014). Dairy value chains of women in both systems showed slightly higher densities as compared to male dairy value chains; women chain had the density of 0.0682 while men chain had 0.0607 in the intensive system while women chain had the density of 0.0794 and men chain had 0.0713 in the extensive livestock system. This meant the actors in women dairy value chains were slightly more connected than in men dairy value chains.

Fragmentation of the social network depicts the extent of mutually reachable actors as each actor is removed from the social network; it is in fact measures in inverse the amount of connectedness or connection redundancy in a network (Borgatti, 2003; Makagon et al, 2012). Dairy value chains of men in both systems showed higher percentage of fragmentation than dairy value chains of women; men chain showed 54.4331% while women chain showed 52.992% in the intensive livestock system; this meant that the reachability of actors in the men chain was greater by about 2% than the reachability of actors in women chain when one by one actor in chain was removed. But the percentages of fragmentation in men and women dairy value chains were 51.714% and 50.088% respectively in the extensive system. Thus, the flow of inputs, services and or information was more likely to continue in men chains than in women chains by about 2% when an actor was removed in each chain.

Cohesion of the social network depicts how actors or institutions in a network (process-net map) are groups based on strong relationships amongst themselves (Wasserman and Faust, 1994). The dairy value chains of women in both systems showed more cohesion than those of men; in the intensive system men chain had 45.569% cohesion while women chain had 47.008% cohesion whereas in the extensive system men chain had 48.286% cohesion while women chain had 49.912%. This meant that actors in women dairy value chains had slightly more relationships as compared to the actors in the men dairy value chains.

Betweenness centralization looks at the extent to which few actors are necessary in maintaining the cohesiveness of a social network; degree centralization looks at the percentage in which a social network or chain is centred on one or two highly connected actors. Closeness centralization looks at how information, services or inputs could flow among different groups; the higher the closeness centralization the faster the flow (Makagon et al, 2012). The degree centralization was above 98% in the dairy value chains of men and women in both livestock system; this meant these chains were mostly centred on one or a few actors. Women dairy value chains had more Betweenness centralization than men dairy value chains by about 4% more. But the dairy value chains of both men and women showed closeness centralization of 70% and above.

5.3 How gender of an individual, gender of household head, nature of family and nature of marriage shape the access and control of the influencing factors for participation?

The percentages were found by dividing the number of individuals by 96(total number of people interviewed to get the overall access and /or control of factors and benefits)

Community norms and practices

Men showed more control to the norms and practices than women in both livestock systems while women accessed (more affected) by the norms than men; men's controlled norms and practices by 9 to 12% while women controlled norms by 0 to 1 % (whereas men accessed norms by 3 to 5% while women accessed norms by 4 to 8%. Consequently, male-headed households accessed and controlled norms by 6 to 8% and by 6 to7% respectively while female-headed households accessed and controlled norms by 1 to 5% and by 3 to 6%respectively. But polygamy played a role in shaping access and control of the factors; polygamous and non-polygamous households accessed norms were 3 to 8% and 4 to5%respectively whereas polygamous and non-polygamous controlled norms by 3 to7% and by 6% respectively. Consequently, But it was worthy to note that nature of marriage also played a role such that households that had 1 wife showed more access and control of norms than households with at least 2 wives; the access of norms by "1 wife" households ranged from 4 to5% and that of "2 + wives" households ranged from 0 to 3%; the control of norms by "1 wife" households was 6% while that of "2+wives" households ranged from 0 to 3%.

If a woman owns assets, then she becomes rude. Girls can inherit assets if only they don't have boys in their family but if boys are present then all the assets will be passed down to the boys – a man at Ubiri Village.

There is no need for a woman to own asset since she will be take care of by her last-born son – A Maasai man at Ulaya Kibaoni village.

Decision on Livestock health inputs or services

Men dominated the access and control over decision making concerning livestock health, inputs and or services such that men accessed livestock health services or inputs by 7 to 22% while women accessed services or inputs by 7 to 16%; this could be attributed to men's control of 32 to 40% on the decision about livestock health services as compared to women's control of 3 to 4%. Thus, male-headed households accessed livestock health services by 6 to 21% whereas female-headed households accessed such services by 8 to 17% but interestingly male-headed and female-headed households displayed almost identical control over the decision on livestock health services of 17 to 22%; but decisions in female-headed households were mostly likely done men or male relatives. It was worthy to note that non-polygamous households had more access and control on the livestock health services than polygamous households; polygamous households accessed services by 3 to17% while non-polygamous households accessed such services by 4 to 21% and the control on services was 3 to 17% by polygamous households and 6 to 27% by non-polygamous

households. But interestingly, "1 wife" households had more access and control on the decision concerning livestock health as compared to "2+ wives" households; the access of "1 wife" households ranged from 6 to 21% and that of "2 + wives" households ranged from 0 to 14%; the control of "1 wife" households were 15 to 27% while that of "2+wives" households ranged from 1 to 13%.

I am the only one who can call for services because my wife is not supposed to talk to other men – A man at Kwadiambe village.

Decision on livestock selling or buying

Women had slightly more access to the decision of selling or buying livestock than men but men had greater control on making the final decision on buying or selling livestock at the household level; men accessed decision making on livestock buying or selling by 28 to 47% while accessed such decision making by 30 to 51%; but men controlled this decision by 12 to 16% while women by 5%. Additionally, male-headed households accessed this decision by 30 to 48% while female-headed households accessed it by 28 to 50%; likewise, male-headed households controlled this decision by 4 to 12% whereas female-headed households had 8 to 9%. Non-polygamous households had more access and control on deciding about livestock sale or purchase than polygamous households; non-polygamous households had the access of 22 to 56% while polygamous households had the access of 36 to 42%. Consequently, the access of "1 wife" households ranged from 22 to 56% and that of "2 + wives" households ranged from 4 to 29%; the control of "1 wife" households was 5 to 11% while that of "2+wives" households ranged from 1 to 7%.

I might want to sell a cow but if my husband refuses then I can't do it because he is the head of the household and if he is away then I must ask my son – A woman at Ubiri Village.

Decision on milk sale

Men and women didn't have much difference on the access of deciding to sell or consume milk; they all showed an access of 24 to 32% on this decision. However, women had more control than men on deciding whether to sell or consume the milk; women controlled this decision by 18 to 30% while men controlled it by 3 to 13%. Consequently, female-headed and male-headed households had similar access (24 to 34%) to deciding on milk sale but female-headed households had the control of 17% which was more than that of male-headed households of 14 to 16%. Non-polygamous households had an access of 20 to 37% of deciding on milk sale which was more that of polygamous households of 25 to 28%; but polygamous households had control of 14 to 20%

which was slightly higher than that of 13 to 17% in non-polygamous households. But "1 wife" households had more access and control on milk sale decision than "2+ wives" households such that the access of "1 wife" households ranged from 20 to37% and that of "2 + wives" households ranged from 2 to 19%; the control of "1 wife" households were 13 to 17%while that of "2+wives" households ranged from 1 to 11%.

Education

Men and women had similar access (24 to 27%) to education in the households but men more control than women on making final decision on who gets or paying for education in the households; Men's control on this decision was 18 to 23% while that of women was 3 to 13%. Consequently, female-headed and male-headed households had similar access to education but male-headed household controlled it by 11 to 19% which were greater than the control on education by female-headed households (10 to 17%). There was no much difference in access and control amongst polygamous and non-polygamous households but when the number of wives found in a household was considered then it was found that the fewer the wives in a household the more the access and control on education a household had; consequently. The education access of "1 wife" households ranged from 20 to 30% and that of "2 + wives" households ranged from 1 to 18%; the control of "1 wife" households was 7 to 21% while that of "2+wives" households ranged from 1 to 11%.

I can read brochures, expiry dates and attend trainings on livestock because I can read and write – A woman at Ubiri Village.

Knowledge about in market channel:

Men and women had similar access of 24 to 25% than women to the knowledge about market channel but men had more control of market channel knowledge; men had the control of 17% while women had 4%. There was not much difference in the access and control of market channel knowledge among female-headed and male-headed households even though female-headed households had slightly more control on the market channel knowledge (the access to knowledge was 23 to 25%; the control was 8 to 9% and 9 to 12% for male-headed and female-headed households respectively. The access and control on market channel knowledge among polygamous and non-polygamous household were more similar but when the number of wives in a household was considered it was observed that the more the number of wives the less were the access and control of market channel knowledge such that the access of market channel knowledge of "1 wife" households ranged from 21 to 26% and that of "2 + wives" households ranged from 2 to

15% ; the control of "1 wife" households was 7 to 11% while that of "2+wives" households ranged from 0 to 8%.

Social capital

Men had slightly more access and control on social capital (relations with relatives, friends and /or neighbours) than women; men accessed social capital by 26 to 37% while women accessed it by 24 to 32% whereas men controlled social capital by 22% and women by 15 to 21%. Consequently, male-headed and female-headed households had similar access and control on the social capital; the access ranged 24 to 38% in male headed households while in female headed households it ranged from 26 to 31% and the control in male headed household ranged from 17 to22% while in female headed households it ranged from 20 to 21%. Likewise, the number of wives in a household had a role of the access and control of social capital; the more the wives the less the access and control on social capital such that the access social capital of "1 wife" households ranged from 22 to 39% and that of "2 + wives" households ranged from 2 to 22%; the control of "1 wife" households was 15 to 25% while that of "2+wives" households ranged from 1 to 13%.

I get help in grazing my livestock from others – An old woman at Kwadiambe village.

If my husband is away, then I can call my in-laws to help me with treating livestock – A Maasai woman at Ulaya Kibaoni village.

Knowledge about livestock:

Both men and women showed similar access (24 to 34%) to the knowledge about livestock but men showed more control than women on livestock knowledge; men controlled this knowledge by 17 to 22% while women controlled it by 7 to 10%. Male-headed household accessed this knowledge by 24 to 36% which was higher than female-headed households of 24 to 28% but female-headed households showed slightly higher control on livestock knowledge than male-headed households; control in male headed household ranged from 12 to 15% while in female headed households it ranged from 12 to 17%. Non-polygamous households had more access to livestock knowledge than polygamous households (polygamous households had 25 to 28% while non-polygamous had 20 to 39%) but polygamous household controlled this knowledge by 12 to 19% which was slightly higher than the control of non-polygamous households of 12 to 13%. Consequently, households with fewer wives had more access and control on livestock knowledge such that the access of "1 wife" households ranged from 20 to 39% and that of "2 + wives" households ranged from 2 to19%; the control of "1 wife" households were 12 to 13% while that of "2+wives" households ranged from 1 to 7%.

I learnt of how to treat livestock from my Maasai friend – a man in Kwadiambe village.

Price of milk:

Women had more access to the price of milk than men because milk business was considered women's job; women accessed it by 24 to25% while men by 13 to 26% whereas none had control on the prices because it was taken as given by the market. Consequently; the access of milk price ranged 25 to17% in male headed households while in female headed households it ranged from 26 to 20% and the control was 0% in male –headed and female-headed households. But the access of milk price was around 16 to 29% among female-headed and male-headed households but when number of wives was considered then the access of milk price of "1 wife" households ranged from 16 to 29% and that of "2 + wives" households ranged from2 to 16%; the control of "1 wife" households was 0 while that of "2+wives" households ranged from 0%.

The price of milk is very low but we cannot do anything – A woman at Kwadiambe village.

Land:

The access to land amongst men and women was similar and it was around 24 to 27% while men had much greater control on land than women such that men controlled land by 21 to 22% while women by 4 to 6%. There was not much difference in the access and control of land among female-headed and male-headed households but polygamous households had slightly more access and control on land (the access wa around 24 to 28% and the control was 12 to 15%) but households were disaggregated by the number of wives they had then households with fewer wives had more access and control on land than households with at least 2 wives; the access of land of "1 wife" households ranged from 21 to 27% and that of "2 + wives" households ranged from3 to 15%; the control of "1 wife" households was 10 to 15% while that of "2+wives" households ranged from 1 to 9%.

I farm on my portion of land and co-wives farm on their portions but the land belongs to our husband – A woman at Kwadiambe village.

Livestock ownership:

There was no much difference in the access to livestock ownership among men and women but men showed more control on livestock ownership than women; the access to livestock was 5 to 8% while men controlled ownership by 9% and women by 0%. Thus, male-headed households had more access and control on livestock ownership than female-headed households; the access ranged 7 to 8% in male headed households while in female headed households it was 5% and the

control in male headed household ranged from 6 to 11%while in female headed households it ranged from 3 to 4%. Additionally, the access of livestock ownership of "1 wife" households ranged from 4 to 10% and that of "2 + wives" households ranged from 0 to 4%; the control of "1 wife" households was 7% while that of "2+wives" households ranged from 0 to 6%. Thus, the more the wives a household has the less the access and control of livestock ownership.

Memberships in livestock keepers' ´groups:

Men and women had similar access and control over being a member in livestock keepers' group (the access was 23 to 25% and the control was 1 to 7%) such that male-headed households and female-headed households had similar access and control on memberships (the access was 23 to 25% and control was 1 to 8%). Likewise, polygamous and non-polygamous households had similar access and control of memberships but households with more wives had less access and control of memberships; the access of memberships "1 wife" households ranged from 20 to 28% and that of "2 + wives" households ranged from 2 to 14%; the control of "1 wife" households were 6 to 2% while that of "2+wives" households ranged from 1 to 4%.

I attended a training on milking, record keeping and livestock feeding – A man at Ubiri village

Physical infrastructure:

Physical infrastructure affected more women than men because women and or girls were the ones responsible for carrying the milk to the market (10 women; 20% were affected/accessed while 0% men did). Polygamous households were affected by 7%while non-polygamous were affected by 3%. But none had control on the physical infrastructure.

It is hard to walk to the market while carrying the bucket of milk during the rainy season because the road becomes sticky and water-logged – A woman at Ulaya Kibaoni village.

The nearest milk collection tank is at Mbamba village which is far from here; the centre is no longer operating – A woman at Ulaya kibaoni village

Price of livestock:

Men access price of livestock by 13% while women had 0%; consequently, male-headed households accessed this price by 7% while female-headed households accessed it by 6%. Polygamous households accessed the price by 8% while non-polygamous households accessed it by 5%; but the access of livestock price of "1 wife" households ranged from 0 to 5% and that of "2 + wives" households ranged from 0 to 3%; the control of "1 wife" households was 0% while

that of "2+wives" households ranged from 0%. The price was taken as given such that none had control on it at the household level.

Mode of payment:

Men and women had similar proportions in accessing the mode of payment but men could control it by 6% more than women such that the access of the mode of payment was nearly equal in male-headed and female-headed households even though male-headed households controlled it by 3 to 5% which was greater than 0 to 2% in female-headed households. But the access to mode of payment by "1 wife" households ranged from 20 to 27% and that of "2 + wives" households ranged from 2 to 15%; the control of "1 wife" households was 1 to 4% while that of "2+wives" households ranged from 0 to 2%; this emphasized that as the number of wives increased then households lost their control on the mode of payment.

Responsible of livestock management:

Men had more access and control on the responsibilities of livestock management such as grazing; counting and so on as compared to women but the control was more prominent such that men controlled the responsibilities of livestock management by 18 to 23% while women controlled them by 7 to 21%. It was worth noting that female-headed households had slightly more access and control on responsibilities than in male-headed households. The number of wives found in a household shaped the access and control of this factors such that the access to the responsibilities of livestock management by "1 wife" households ranged from 20 to 42% and that of "2 + wives" households ranged from 2 to 14%; the control of responsibilities by "1 wife" households were 8 to 25% while that of "2+wives" households ranged from 2 to 13%.

I go to cut grasses three times per day and my husband is responsible for selling milk and /or livestock – a woman at Ubiri village.

Relation with the market channel actor:

Relation with the market channel actor for the case of milk business was more controlled by women than men; women controlled this factor by 9 to 19% while men controlled it by 17%. But male-headed households had slight more access and control on this factor than female-headed households by about 1 and 2. Polygamous households accessed and controlled this factor by about 2% more than non-polygamous household but when more disaggregated was done then it found that the access to relation with market channel actor by "1 wife" households ranged from 17 to

28% and that of "2 + wives" households ranged from 2 to 17%; the control of this relation by "1 wife" households was 10 to 19% while that of "2+wives" households ranged from 1 to 12%.

I can ask the trader for loan because he is my relative – A man at Ubiri village.

5.4 How the participation of men and women were shaped by the influencing factors for participation?

The percentages here were found by dividing the number of individuals by 48(number of women or men interviewed) to get the percentage of men and women separately.

Community norms and practices shaped the participation of men and women in the dairy value chains in such a way that 2 to 3(6%) men and 4 to 9(18%) women considered livestock buying or selling to be man's job; 1 to 2(4%) men and 3 to 10(21%) women reported that women couldn't be allowed to inherit from deceased or divorced spouse consequently 3 to 11(23%) women were not allowed to own assets. Lastly, 3 to 9(18%) men and 3 to 10(21%) women considered men to be final decision makers in the households.

Participation of men and women was shaped by the decision on selling or buying livestock such that 7 to 12(25%) men could sell or buy livestock while 0 to 5(10%) women could do the same whereas 7 to 10(21%) women couldn't sell or buy livestock. Consequently 0% women could keep money from livestock sale.

Decision on milk sale affected the participation of men and women such that 12 to 26(54%) women could make final decision on selling or consuming milk whereas only 6 to 7(14.5%)men could do the same; consequently 23 to 28(58%) women could keep the milk money while 4 to 18(37.5%) men could keep the milk money.

The participation of men and women in the dairy value chains were affected by education such that 10 to 20 (42%) women could not read and or write thus couldn't understand the instructions written on inputs whereas only 1 to 5 (10.4%) men faced this problem; but 3 to 13(27%) women could read and understand instructions while the proportion of men was larger (16 to 20; 42%)

Knowledge on livestock enabled 10 to 21(44%) men to be able to identify and treat different livestock diseases while only 4 to 5(10.4%) women could do the same but 12(25%) women could only identify livestock diseases but could not treat them.

Knowledge on market channel lacked among most women such that 21 to 23(48%) women had limited knowledge about milk markets but men were more knowledgeable on livestock market such that 6 to 17(35%) men were more active in livestock markets than in milk markets.

Land ownership shaped the participation of men and women in such a way that 11(23%) men could find a place to build cowshed and house while o women could do the same; consequently 5 to 15(31%) women could not use land as collateral; 4 to 21(44%) men could access feedstock from the land while 4 to 18(38%) women could do the same but 9 to 16(33.33) women could grow food crops for the family. Lastly, 14(29%) women considered men to be final decision maker on land issues because they owned the land.

Decision on livestock health services enabled 15 to 21(44%) men to be able to call for services or buy inputs while 1 to 2(4%) women could do the same; consequently, 23 to 24(50%) women had limited access to calling or paying for livestock health services while men with the same problem was only 1 to 8(17%).

Social capital enabled 4 to 17(35%) men and 1 to 14(29.4%) women to get help with treating the livestock from other people in the village; likewise, 3 to 9(19%) women and 3 to 11(23%) men could get helped with grazing.

Responsibilities on livestock management enable 10(21%) women and 17(35.4%) men to be responsible for counting the livestock; 20 to 24(50%) men and 8 to 18(38%) women were responsible for grazing; and 15 to 19 women (40%) dominated the milking responsibility.

8 to 14 women (29%) could sell milk within a walking distance while 17(35.4%) men could easily sell or buy livestock due their relations with the market channel actors.

Price of milk discouraged 8 to 15(31%) women and 3 to 8(16.6%) men such that 12(25%) women sold their milk less often due to the low price.

Price of livestock influenced 13(27%) men to be more active in the livestock market than in the milk market.

Physical infrastructure (Road) affected the participation of 10(21%) women because they could not deliver milk during the rainy season because the roads become swampy and impassable; the rainy season was when the women had more milk to sell.

Mode of payment made 5 to 8(16.6%) women and 1 to 4(8%) men be discouraged by late payments such that 6(12.5%) women and 10(21%) men preferred to receive cash on delivery rather than being paid after a month.

By not being a member in livestock keepers' groups 9 to 12(25%) women couldn't attend trainings on livestock management but 2 to8(16.6%) women and 3 to 6 12.5%) men were trained on feeding, cleanliness and proper milking for them being members in livestock keepers' groups.

Livestock ownership affected 7(14.6%) men such that they could sell livestock and making all final decisions concerning livestock while o women could do the same; consequently 2 to5(10.4%) could keep all the money from livestock sale while 2(4.2%) women could do the same.

5.5 How gender of an individual, gender of household head, nature of family and nature of marriage shape the access and control of the benefits of participation?

The percentages were found by dividing the number of individuals by 96(total number of people interviewed to get the overall access and /or control of factors and benefits).

Asset accumulation

Asset accumulation was accessed and controlled more by men than women in the dairy value chains of both systems; men accessed it by 9 to 19% while women accessed asset accumulation by 7% whereas men controlled it by 15 to 20% while women controlled asset accumulation by 5 to 7%. Consequently, male-headed households had more access and control over asset accumulation as compared to female-headed households. Polygamous households had more access and control on asset accumulation as compared to non-polygamous households; polygamous households accessed asset accumulation by 8 to16% and non-polygamous households accessed it by 8 to 10%; likewise, polygamous households had control over asset accumulation by 10 to 15% while non-polygamous households had 10 to 12%. But the number of wives in a household took an opposite direction with respect to asset accumulation such that "1 wife" households had more access and control on asset accumulation than "2+ wives" households; "1 wife" households accessed asset accumulation by 8 to 10% while "2+ wives" households accessed it by 0 to 8% whereas "1wife" households controlled asset accumulation by 10 to 12% while "2+ wives" households controlled it by 1 to7%.

If a woman owns assets, then she becomes rude. Girls can inherit assets if only they don't have boys in their family but if boys are present then all the assets will be passed down to the boys – a man at Ubiri Village.

I farm but the land belongs to my husband; It is okay for a husband to own everything because he is the household head – A woman at Ubiri Village.

Dowry payment

Men had more access and control on dowry payment than women because men were supposed to pay dowry (15 livestock) to the girl's family; men accessed and controlled dowry payment by 6% while women accessed and controlled it by 0%. But males (sons) in female-headed households had more access and control on dowry payment than men in male-headed household by 2%. As expected polygamous households had more access and control on dowry payment than non-polygamous households; polygamous household accessed and controlled dowry by 5% while non-polygamous households accessed and controlled it by 1. Consequently; "2+ wives" households accessed and controlled more dowry by 3% which greater than 1% belonging to "1 wife" households.

I can marry a girl for 15 cows – A Maasai man at Ulaya Kibaoni.

For households with many livestock but don't have any son then they can get a son for 10 cows – an old Maasai man at Ulaya kibaoni.

Employment

Men had slightly more access and control of being employed as livestock herder women in both systems; men access and controlled employment by 1 while women accessed and controlled employment by 0%; consequently, male-headed households accessed and controlled employment by 1% while female-headed households had 0%. Additionally, this access and control of employment was found in non-polygamous households with "1 wife" and absent in polygamous households with "2+" wives.

Farm expenses

Women showed more access and control than men on being able to pay for farm expenses from the milk and or livestock sale; women showed an access to this by 4% while men accessed this benefit by 2% and the pattern was similar with the control on paying farm expenses from milk sale or livestock sale. The access and control on paying for farm expenses was 3% among male-headed and female-headed households, polygamous and non-polygamous households but "1wife" households had the access and control on farm expenses of 3% which was slightly greater than that of 1 to 2% in "2+wives" households.

Food (Milk)

Women had more access and control on food (milk) than men in the dairy value chains of both systems; women accessed and controlled food (milk) by 7 to 8% while men accessed and controlled it by 0 to 2%. But individuals in male-headed household accessed and controlled more food (milk) their counterparts in female-headed households; male-headed households accessed milk by 2 to 7% while in female-headed households the access was 1% and the control of milk in male-headed households was 2 to 6% while in female-headed households was 1%. The access and control of milk was similar in polygamous and non-polygamous households but the households with fewer wives had more access and control on milk than their counterparts with "2+ wives".

If I get 3 litres of milk, then I sell 2 litres and consume the rest – an old man at Ubiri village.

Getting farm manure

Farm manure from livestock was accessed and controlled more by women than in both livestock systems; women accessed and controlled manure by 3 to 15% while men by 0 to 13%. As a result, female-headed households had more access and control on manure than male-headed households; individuals in female-headed households accessed and controlled manure by 1 to 19% while their counterparts in male-headed households accessed and controlled manure by 2 to 9%. Manure was more accessed and controlled by non-polygamous households by 2 to 18% while in polygamous households accessed and controlled manure by 1 to 10%; consequently, the access and control of manure decreased as the number of wives increased in the household such that "1 wife" households accessed and controlled manure by 2 to 18% while the "2+ wives" households did it by 0 to 8%.

Our land here is not so fertile due to continuous farming for generations; if we don't use any manure then we get poor crops – an old woman at Ubiri village.

Income (Dairy)

Dairy income was accessed by men and women in nearly similar proportions but it was worthy to note that men had more control on dairy income than women; men controlled dairy income by 19 to 21% while women controlled it by 14 to 15%; likewise, male-headed and female-headed households accessed dairy income in nearly similar proportions but individuals in male-headed households controlled it by 16 to 22% which was greater than 14 to 17% of their counterparts in female-headed households. Even though polygamous households had a slight more access and control of dairy income but it was worthy to not that number of wives also played a role in giving

a clearer picture such that "1 wife" households accessed and controlled income by 18 to 22% and by 16 to 17% which was greater than 1 to13% and 1 to 12% in "2+ wives" households.

The income I get per month is like the government employee – a man at Ubiri village.

Case

One guy who have 4 cows and 3 sheep and selling milk 20 litres per day and earning about 300000/month which he feels that he is earning more than the educated and employed persons; he felt confidence of dairy livelihood. He come this level through borrowing one cow long back. He has built a house with concrete roof; he uses the land which belongs to his family sharing with brothers. He feels that he can marry other women because he is earning more to give dowry to another beautiful woman? This norm exists that men with wealth leave wife and marry another.

Insurance during emergencies

Insurance from livestock was more accessed and controlled by men than women in the households; men accessed insurance by 1 to 3% while women accessed it by 1% whereas men controlled this by 2 to 3% and women by 1%. It was interesting to note that individuals in female-headed households had slightly more access to insurance than their counterparts in male-headed households but they both had similar control on insurance. Additionally, polygamous households accessed and controlled more insurance than their counterparts in non-polygamous households; consequently "2+ wives" households accessed and controlled insurance by 2% while "1 wife" did it by 1%.

In case of death then I can sell livestock to cover the funeral expenses – a witchdoctor at Kwadiambe village.

Livestock expenses

Paying for livestock expenses from dairy income was more accessed and controlled by men than women; men accessed and controlled these payments by 4% while women did it by 1%; as a result, individuals in male-headed households accessed and controlled paying for livestock expenses by 1 to 4% while female-headed households had none. Polygamous households accessed and controlled this payment by 4% while non-polygamous accessed and controlled livestock expenses by 1%; consequently "2+wives" households had slightly more access and control over livestock expenses as compared to "1 wife" households.

Making traditional medicine

Traditional medicine was made from livestock blood and milk; this was given to pregnant women and injured individuals for quick recovery. Men had more access and control than women on this because it involved slaughter of livestock; men accessed and controlled this by 5% while women accessed and controlled this medicine by 2%; consequently, individuals in male-headed households accessed and controlled this medicine by 6% while in female-headed households it was accessed and controlled by 1%. As expected the usefulness of this medicine in polygamous households which accessed this medicine by 4% and controlled it by 5% which were greater than the access of 3% and control of 2% in non-polygamous households.

Paying for household expenses

Using dairy income for meeting household expenses was more accessed and controlled by women than men; women accessed this benefit by 21 to 22% while men accessed this benefit by 19 to 21% whereas women controlled this benefit by 15 to 20% while men controlled it by 15 to 16%. Individuals in female-headed households accessed this benefit by 2% more than in male-headed households but individuals in male headed households controlled this benefit by 2% more. Lastly, households with fewer wives had more access and control on meeting household expenses by dairy income such that "1 wife" households accessed this benefit by 17 to 23% while "2+wives" households accessed it by 1 to 13% and when it came to control "1 wife" households had the control of 16 to 18% which was greater than 1 to 8% of "2+wives" households.

Paying for medical bills

Women showed slight more access to paying medical bills from dairy income than men but men had more control on this benefit because it might involve livestock sale if the milk money wasn't enough; men controlled this benefit by 7 to 14% while women did it by 1 to 8%. But it was worthy that individuals in female-headed households had more access and control than their counterparts in male-headed households; female headed households accessed this benefit by 7 to 17% while male-headed households accessed it by 4 to 12% whereas the control of this benefit was5 to 14% in female-headed households and 3 to 8% in male-headed households. But households with fewer wives accessed this benefit by 4 to 18% as compared to 0 to 9% in households with more wives; households with fewer wives could control this benefit by 3 to 11% while their counterparts with more wives did it by 0 to 9%.

I can sell livestock and go to Dar es Salaam for treatment – an Old man at Kwadiambe village.

Paying for school expenses

Men and women had similar proportions when it came to accessing the benefit of paying for school expenses with dairy money or livestock sale but men had more control than women when it came to making decision on paying these expenses; men controlled this decision by 14 to 16% while women controlled this by 3 to 7%. Thus, male-headed households had slightly more access and control on school expenses than female-headed households. Lastly, "1 wife" households accessed and controlled more this benefit than "2+wives" households; "1 wife" households accessed this benefit by 13 to 15% while "2+wives" did it by 1 to 9% and the control was 8 to 12% in "1wife" households and 1 to 7% in "2+wives" households.

My first-born son is studying in Tanga town by using the money from milk sale – a man at Kwadiambe village.

My other son is in University "Chuo Kikuu" but I paid for his education in primary and secondary schools – a woman at Ubiri Village.

Prestige

This benefit was only accessed and controlled by men only found in male-headed polygamous households with "2+wives"

Transport buying

This was also accessed and controlled by men only (by 6%) found in male-headed polygamous households with at least 2 wives.

I bought that motorbike from selling livestock – a man at Ulaya Kibaoni.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study was carried out to identify the structure of dairy value chains of men and women in the intensive and extensive livestock system, the influencing factors and benefits of participation in the dairy value chains and how their access and control amongst men and women were shaped by gender, type of household head, nature of family (polygamous or non-polygamous family) and nature of marriage by the number of wives found in the households/family.

Both men and women in the two livestock systems identified the actors that they were dealing with in their value chains; but the men could identify more actors than women. Most actors in dairy value chains of men and women were mostly male and few female actors identified were only found in the milk flow channel; men dominated the chain in the livestock health, breeding, livestock trade and financial parts as well as the milk business that went far away from the village.

In both systems, it was found that men had more control and access to the factors of participation than women, thus male-headed households had more access and control on the factors and benefits of participation in the dairy value chains; likewise, non-polygamous households had more access and control on factors and benefits but to get a clearer pattern of polygamous the households were also classified by the number of wives found in a household. It was found that as the number of wives increases in a household the access and control on the factors and benefits decreases such that it was observed that individuals in "1 wife" households had much more access and control on the factors than "2+ wives" households. The access and control of factors and benefits were much lower among women found in the extensive system than their counterparts in the intensive system. The access and control of factors and benefits were mostly shaped by cultural norms and practises such that women were not allowed to inherit or own assets, were married early, couldn't buy or sell livestock and couldn't make major decisions in the household even if she was the head such that if her was dead or divorced then male relatives or sons would make decisions instead. This led to major disparity in asset ownership amongst men and women.

There was gender disparity in livestock ownership among men and women; men tended to own most of the cattle and sheep or goats while women owned chickens and ducks; this gender disparity of livestock ownership was more prominent in the extensive livestock system due to higher influence cultural norms and practices such as polygamy and early marriage.

6.2 Recommendations

Basing on the results and discussions of this study as well as personal experience in the field, it was worthy to recommend the following to done by stakeholders of the dairy industry:

- Dairy should be given support to build milk collection centres in Kivungu, Ulaya kibaoni, Kwadiambe and Wami-Sokoine villages; these villages had more milk during the rainy seasons but it was hard to sell due to lack of infrastructure.
- Village governments should reserve seats for women; this government level was responsible for allocating land (each villager could get up to 50 acres but women didn't get most of the time because there were no women in village council.
- Commercial dairy processor should use mobile money transfer such as M-PESA, TIGO-PESA and Airtel money to pay the dairy farmers directly instead of paying them through the traders who always delayed the payments.
- Support to build wells in the village to help women from wasting time looking for water
- Government livestock lending programmes should train people by following them into their villages directly; women couldn't attend the training because they were supposed to be far away by a month. These trainings and livestock lending should put a quota of women who should participate.
- The government should introduce the law to criminalize polygamy as it was associated with less access and control of resources
- NGOs, Government and other stakeholders should start campaigns to educated women and the whole community about the rights of women to inheritance in case of death of the spouse and /or divorce; they should also give legal services to the unprivileged women.
- The government, NGOs and other stakeholders should empower the local community through participatory planning, monitoring and evaluation of livestock related projects so as to prevent elite capture and embezzlement (especially by government officials) on the public funds set aside for constructing tick baths, dams, wells and so on.
- Government and formal financial institutions should create administrative procedures that would recognize traditional land titles as collaterals for loans
- Dairy farmers especially in the extensive system should be encouraged to destock so as to prevent environmental degradation due large herds.
- Research organization such as ILRI that sometimes train farmers on livestock management should observe gender balance.

6.3 Areas for further research

Even though this study looked at the gender dynamics and power relations in the extensive and intensive livestock systems as well as how they shaped the access and control of benefits and factors of participating in the men and women dairy value chains; It didn't cover the market analysis (Market share, profit margins, concentration ratios and so on) of men and women dairy value chains separately. These would-be areas for further research about dairy value chains; there is a need to do market analysis of men and women dairy value chains separately.

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APPENDICES

APPENDIX 1: NETWORK PROPERTIES

The network properties for Intensive livestock social network (for men)

The graph is not connected!
The graph is directed.
Node types: actor
Total nodes: 39
Enabled nodes: 39
Isolates: 1
Dyads: 0
Components 3+: 1
Groups: 0
Relations: "Breeding services", "Community watch out for thieves", "Feeding materials", "Financial services", "Government funding", "Livestock health services", "Livestock lending", "Livestock Selling/Buying", "Livestock tending service (grazing/grass-cutting, milking and drinking)", "milk flow", "Training on livestock management"
Current relations: "breeding services", "milk flow", "livestock health services", "feeding materials", "financial services", "training on livestock management", "community watch out for thieves", "livestock tending service (grazing/grass-cutting, milking and drinking)", "livestock lending", "livestock selling/buying", "government funding"
Total links: 45
Current links: 45
Current enabled links: 45
Link weight summary:

* link type:	AVG	STD	MIN	MAX
breeding services	1.000	0.000	1.000	1.000
milk flow	1.000	0.000	1.000	1.000
livestock health services	1.000	0.000	1.000	1.000
feeding materials	1.000	0.000	1.000	1.000
financial services	1.000	0.000	1.000	1.000
training on livestock management	1.000	0.000	1.000	1.000
community watch out for thieves	1.000	0.000	1.000	1.000
livestock tending service (grazing/grass-cutting, milking and drinking)	1.000	0.000	1.000	1.000
livestock lending	1.000	0.000	1.000	1.000
livestock selling/buying	1.000	0.000	1.000	1.000
government funding	1.000	0.000	1.000	1.000

Diameter: 4
Average geodesic (distance): 2.2418
Density: 0.0607
Fragmentation: 54.431%
Cohesion: 45.569%
Degree Centralization: 98.799%
Closeness Centralization: 80.052%
Betweenness Centralization: 89.704%
* all measures for undirected graph
* Multiple links between two nodes are counted as a single link.
Node attributes summary:

* numeric:	AVG	STD	MIN	MAX
* categorical:	Value	Count	Proportion	
Gender				
	Male	20	51.282%	
	both	19	48.718%	

Source: field data, 2015

The network properties for Intensive livestock social network (for women)

The graph is connected.
The graph is directed.
Node types: actor
Total nodes: 33
Enabled nodes: 33
Isolates: 0
Dyads: 0
Components 3+: 1
Groups: 0
Relations: "Breeding services", "Community watch out for thieves", "Feeding materials", "Financial services", "Government funding", "Livestock health services", "livestock lending", "livestock selling", "livestock tending services (grazing or cutting grasses, milking and drinking)", "Milk flow", "Training on livestock management"
Current relations: "livestock tending services (grazing or cutting grasses, milking and drinking)", "breeding services", "milk flow", "livestock health services", "livestock selling", "financial services", "feeding materials", "livestock lending", "training on livestock management", "government funding", "community watch out for thieves"
Total links: 36
Current links: 36
Current enabled links: 36
Link weight summary:

* link type:	AVG	STD	MIN	MAX		
livestock tending services (grazing or cutting grasses, milking and drinking)	1.000	0.000	1.000	1.000		
breeding services	1.000	0.000	1.000	1.000		
milk flow	1.000	0.000	1.000	1.000		
livestock health services	1.000	0.000	1.000	1.000		
livestock selling	1.000	0.000	1.000	1.000		
financial services	1.000	0.000	1.000	1.000		
feeding materials	1.000	0.000	1.000	1.000		
livestock lending	1.000	0.000	1.000	1.000		
training on livestock management	1.000	0.000	1.000	1.000		
government funding	1.000	0.000	1.000	1.000		
community watch out for thieves	1.000	0.000	1.000	1.000		

Diameter: 6
Average geodesic (distance): 2.3996
Density: 0.0682
Fragmentation: 52.992%
Cohesion: 47.008%
Degree Centralization: 99.194%
Closeness Centralization: 72.714%
Betweenness Centralization: 94.934%
* all measures for undirected graph
* multiple links between two nodes are counted as a single link.

Node attributes summary:

* numeric:	AVG	STD	MIN	MAX
* categorical:	Value	Count	Proportion	
Gender				
	Female	2	6.061%	
	Male	15	45.455%	
	both	16	48.485%	

Source: field data, 2015

The network properties for extensive livestock social network (for men)

The graph is connected.
The graph is directed.

Node types: actor
Total nodes: 34
Enabled nodes: 34
Isolates: 0
Dyads: 0
Components 3+: 1

Groups: 0

Relations: "Breeding services", "Fees and fines", "Financial services", "Government funding and services", "Livestock Health services", "Livestock lending", "livestock selling", "Livestock tending service (grazing and drinking)", "Milk flow", "Training on Livestock management"
Current relations: "livestock selling", "livestock lending", "breeding services", "livestock tending service (grazing and drinking)", "milk flow", "livestock health services", "financial services", "government funding and services", "fees and fines", "training on livestock management"
Total links: 40
Current links: 40
Current enabled links: 40

Link weight summary:

* link type:	AVG	STD	MIN	MAX
livestock selling	1.000	0.000	1.000	1.000
livestock lending	1.000	0.000	1.000	1.000
breeding services	1.000	0.000	1.000	1.000
livestock tending service (grazing and drinking)	1.000	0.000	1.000	1.000
milk flow	1.000	0.000	1.000	1.000
livestock health services	1.000	0.000	1.000	1.000
financial services	1.000	0.000	1.000	1.000
government funding and services	1.000	0.000	1.000	1.000
fees and fines	1.000	0.000	1.000	1.000
training on livestock management	1.000	0.000	1.000	1.000

Diameter: 5
Average geodesic (distance): 2.2781
Density: 0.0713
Fragmentation: 51.714%
Cohesion: 48.286%
Degree Centralization: 98.674%
Closeness Centralization: 77.879%
Betweenness Centralization: 94.232%
* all measures for undirected graph
* multiple links between two nodes are counted as a single link.

Node attributes summary:

* numeric:	AVG	STD	MIN	MAX
* categorical:	Value	Count	Proportion	
Gender				
	Male	17	50.000%	
	both	15	44.118%	
	Female	2	5.882%	

Source: field data, 2015.

The network properties for extensive livestock social network (for women)

The graph is connected.
The graph is directed.

Node types: actor
Total nodes: 28
Enabled nodes: 28
Isolates: 0
Dyads: 0
Components 3+: 1

Groups: 0

Relations: "Breeding services", "Financial services", "Livestock health services", "Livestock lending", "Livestock selling", "Livestock tending service (grazing and drinking)", "Milk flow", "Training on livestock management"
Current relations: "livestock lending", "livestock tending service (grazing and drinking)", "breeding services", "milk flow", "livestock health services", "financial services", "livestock selling", "training on livestock management"
Total links: 30
Current links: 30
Current enabled links: 30

Link weight summary:

* link type:	AVG	STD	MIN	MAX				
livestock lending	1.000	0.000	1.000	1.000				
livestock tending service (grazing and drinking)					1.000	0.000	1.000	1.000
breeding services	1.000	0.000	1.000	1.000				
milk flow	1.571	1.400	1.000	5.000				
livestock health services		1.000	0.000	1.000	1.000			
financial services	1.000	0.000	1.000	1.000				
livestock selling	2.333	2.981	1.000	9.000				
training on livestock management			1.000	0.000	1.000	1.000		

Diameter: 4
Average geodesic (distance): 2.1693
Density: 0.0794
Fragmentation: 50.088%
Cohesion: 49.912%
Degree Centralization: 99.145%
Closeness Centralization: 83.897%
Betweenness Centralization: 96.184%
* all measures for undirected graph
* multiple links between two nodes are counted as a single link.

Node attributes summary:

* numeric:	AVG	STD	MIN	MAX
* categorical:	Value	Count	Proportion	
Gender				
	Female	3	10.714%	
	Both	10	35.714%	
	Male	15	53.571%	

Source: field data, 2015.

APPENDIX 2: LEVELS OF INFLUENCE

Actors identified by males (Intensive)	Level of influence (%)	Level of influence	Full Score
Traders(milk)	67	4	6
Town households	33	2	
District council employees	33	2	
Town shops	33	2	
Lushoto Dairy farmers cooperative - UWALU	33	2	
Town restaurants	17	1	
Private milk collection centres	67	4	
Viti Dairy farmers cooperative -UWATU	0	0	
Commercial Dairy processor - Tanga Fresh Ltd	83	5	
Local villagers	50	3	
Local restaurants	50	3	
Private veterinary doctor	100	6	
Sokoine University of Agriculture(SUA)	67	4	
PADEP -Ministry of Agriculture &Livestock	83	5	
Tick bath Committee	67	4	
Private Agro-inputs shops	50	3	
District veterinary doctor	83	5	
Ward veterinary doctor	50	3	
Ward Agricultural officer	0	0	
Village veterinary doctor	50	3	
Community livestock health workers	50	3	
Farmers-Feedstock sellers	67	4	
Community forestry officer	50	3	
Local livestock market -Auction1	67	4	
Money lenders(Town)	17	1	
Commercial banks	33	2	
Mixed Self-Help Groups	100	6	
Microfinance institutions	67	4	
Local livestock lenders	67	4	
Bull owners	100	6	
Artificial insemination staff(Korogwe)	17	1	
Artificial insemination staff(Lushoto)	17	1	
Kongwa National ranch	67	4	
Private ranch	50	3	
Livestock development board (Buhuri - Tanga)	33	2	
Livestock herders	83	5	
Community police	100	6	

Source: field data,2015

Actors identified by females (Intensive)	Level of influence (%)	Level of Influence	Full Score
Local villagers	50	3	6
District council employees	50	3	
Local restaurants	33	2	
Traders(Milk)	50	3	
Viti Dairy farmers cooperative - UWATU	0	0	
Private milk collection centre	50	3	
Lushoto Dairy farmers cooperative - UWALU	50	3	
Town households	83	5	
Commercial dairy processor -Tanga Fresh Ltd	83	5	
PADEP -Ministry of Agriculture and Livestock	0	0	
Tick bath Committee	67	4	
Village government	100	6	
Local livestock market -Auction	100	6	
Village veterinary doctor	100	6	
Ward veterinary doctor	83	5	
District veterinary doctor	50	3	
Private Agro-inputs shops	83	5	
Community livestock health workers	83	5	
Farmers -Feedstock sellers	50	3	
Commercial banks	17	1	
Microfinance institutions	67	4	
Money lenders	100	6	
Women Self-Help Groups	67	4	
Mixed Self-Help Groups	100	6	
Soya beans project	50	3	
Local livestock lenders	83	5	
Kongwa National Ranch	0	0	
Livestock development board(Buhuri-Tanga)	33	2	
Government artificial insemination staffs	17	1	
Bull owners	100	6	
Community police	83	5	
Livestock herders	83	5	

Source: field data,2015

Actors identified by males (Extensive)	Level of influence (%)	Level of influence	Full Score
Local villagers	50	3	6
Local milk processors	83	5	
Local restaurants	50	3	

Traders(milk)	50	3	
Town shops	67	4	
Town households	50	3	
Town restaurants	50	3	
Commercial dairy processor -ASAS Dairies	33	2	
Hawkers(inputs)	50	3	
Tick bath committee	50	3	
District veterinary doctor	33	2	
Municipal veterinary doctor	33	2	
Ward veterinary doctor	33	2	
Community livestock health workers	83	5	
Private Agro-inputs shops	67	4	
Microfinance Institution - BRAC&VICOBA	83	5	
Commercial banks	0	0	
Local money lenders	67	4	
Maziwa Zaidi “more milk" staffs	17	1	
Women Self-Help Groups	50	3	
Village government	50	3	
Livestock traders	33	2	
Local livestock market -Auction2	17	1	
Local livestock market -Auction1	100	6	
District Council	67	4	
Municipal Council	83	5	
Butcher shops	50	3	
Kongwa National Ranch	50	3	
Ruvu National Ranch	33	2	
Artificial insemination staff(ward)	50	3	
Government Cattle Lending Programme	100	6	
Artificial insemination staff(municipal)	50	3	
Livestock lenders	100	6	
Bull owners	100	6	
Livestock herders	100	6	

Source: field data,2015

Actors identified by females (Extensive)	**Level of influence (%)**	**Level of influence**	**Full Score**
Traders(Milk)	83	5	6
Commercial dairy processor	67	4	
Town households	83	5	
Local villagers	67	4	
Local milk processors	100	6	
Local restaurants	67	4	

Sokoine University of Agriculture(SUA)	0	0	
Municipal Council (vaccination service)	33	2	
Tick bath Committee	100	6	
Ward veterinary doctor	100	6	
Municipal veterinary doctor	83	5	
Community livestock health workers	67	4	
Private agri-inputs shops	67	4	
Money lenders	67	4	
Microfinance institution -BRAC, VICOBA&CARE	83	5	
Commercial banks -NMB&CRDB	0	0	
Women Self-Help Groups	83	5	
Village government	83	5	
Local livestock market -Auction1	83	5	
Local livestock market -Auction2	17	1	
Livestock lenders	83	5	
Livestock traders	17	1	
Livestock herders	100	6	
Bull owners	83	5	
Artificial insemination staffs(Ward)	67	4	
Artificial insemination staffs(Municipal)	67	4	
Maziwa Zaidi "more milk" staffs	83	5	

Source: field data,2015

APPENDIX 3: ACCESS AND CONTROL OF FACTORS AND BENEFITS OF PARTICIPATION

Intensive livestock system

	Access			
	Males	Females	Male-Headed households	Female-Headed households
Norms and practices	**3**	**4**	**6**	**1**
Decision on Livestock health	**22**	**16**	**21**	**17**
Decision on livestock selling or buying	**47**	**51**	**48**	**50**
Decision on milk sale	**32**	**30**	**34**	**28**
Education	**27**	**27**	**26**	**28**
Market channel knowledge	**24**	**23**	**23**	**24**
Knowledge on livestock	**30**	**34**	**36**	**28**
Land	**24**	**25**	**25**	**24**
Livestock ownership	**5**	**8**	**8**	**5**
Memberships in farmer groups	**25**	**24**	**25**	**24**
Mode of payment	**25**	**23**	**24**	**24**
Physical infrastructure	**0**	**0**	**0**	**0**
Price of livestock	**0**	**0**	**0**	**0**
Price of milk	**26**	**25**	**25**	**26**
Relation with the market actor	**24**	**25**	**25**	**24**
livestock management	**34**	**29**	**28**	**35**
Social capital	**37**	**32**	**38**	**31**

Source: field data,2015

Extensive livestock system

	Access			
	Males	Females	Male-Headed households	Female-Headed households
Norms and practices	**5**	**8**	**8**	**5**
Decision on Livestock health	**7**	7	**6**	8
Decision on livestock selling or buying	**28**	30	**30**	28
Decision on milk sale	**24**	24	**24**	24
Education	**24**	24	**24**	24
Market channel knowledge	**25**	24	**24**	25
Knowledge on livestock	**24**	24	**24**	24
Land	**27**	26	**28**	25
Livestock ownership	**7**	5	**7**	5
Memberships in farmer groups	**24**	23	**24**	23
Mode of payment	**23**	24	**24**	23
Physical infrastructure	**0**	10	**5**	5
Price of livestock	**13**	0	**7**	6
Price of milk	**13**	24	**17**	20
Relation with the market actor	**23**	20	**22**	21

livestock management	**24**	24	**24**	24
Social capital	**26**	24	**24**	26

Control-Intensive system

	Males	Females	Male-Headed households	Female-Headed households
Norms and practices	**9**	**0**	**6**	**3**
Decision on Livestock health	**40**	**4**	**22**	**22**
Decision on livestock selling or buying	**16**	**5**	**12**	**9**
Decision on milk sale	**13**	**18**	**14**	**17**
Education	**23**	**13**	**19**	**17**
Market channel knowledge	**17**	**4**	**9**	**12**
Knowledge on livestock	**17**	**7**	**12**	**12**
Land	**22**	**6**	**13**	**15**
Livestock ownership	**9**	**6**	**11**	**4**
Memberships in farmer groups	**6**	**7**	**5**	**8**
Mode of payment	**1**	**2**	**3**	**0**
Physical infrastructure	**0**	**0**	**0**	**0**
Price of livestock	**0**	**0**	**0**	**0**
Price of milk	**0**	**0**	**0**	**0**
Relation with the market actor	**17**	**19**	**22**	**14**
livestock management	**23**	**21**	**22**	**22**
Social capital	**22**	**21**	**22**	**21**

Source: field data,2015

Control – Extensive system

	Males	Females	Male-Headed households	Female-Headed households
Norms and practices	**12**	**1**	**7**	**6**
Decision on Livestock health	**32**	3	**17**	18
Decision on livestock selling or buying	**12**	0	**4**	8
Decision on milk sale	**3**	30	**16**	17
Education	**18**	3	**11**	10
Market channel knowledge	**17**	0	**8**	9
Knowledge on livestock	**22**	10	**15**	17
Land	**21**	4	**12**	13
Livestock ownership	**9**	0	**6**	3
Memberships in farmer groups	**4**	1	**4**	1
Mode of payment	**7**	0	**5**	2
Physical infrastructure	**0**	0	**0**	0
Price of livestock	**0**	0	**0**	0
Price of milk	**0**	0	**0**	0
Relation with the market actor	**17**	9	**10**	16
livestock management	**18**	7	**11**	14
Social capital	**22**	15	**17**	20

Intensive livestock system

Access

	Polygamous households	Non-polygamous households	1 wife households	2 Wives households	3 Wives households	4+ Wives households
Norms and practices	**3**	**4**	**4**	**3**	**0**	**0**
Decision on Livestock health	**17**	**21**	**21**	14	1	2
Decision on livestock selling or buying	**42**	**56**	**56**	29	9	4
Decision on milk sale	**25**	**37**	**37**	19	4	2
Education	**24**	**30**	**30**	18	5	1
Market channel knowledge	**21**	**26**	**26**	15	4	2
Knowledge on livestock	**25**	**39**	**39**	19	4	2
Land	**22**	**27**	**27**	15	4	3
Livestock ownership	**3**	**10**	**10**	1	2	0
Memberships in farmer groups	**21**	**28**	**28**	14	5	2
Mode of payment	**21**	**27**	**27**	15	4	2
Physical infrastructure	**0**	**0**	**0**	0	0	0
Price of livestock	**0**	**0**	**0**	0	0	0
Price of milk	**22**	**29**	**29**	16	4	2
Relation with the market actor	**21**	**28**	**28**	15	4	2
livestock management	**21**	**42**	**42**	14	5	2
Social capital	**30**	**39**	**39**	22	6	2

Control

	Polygamous households	Non-polygamous households	1 wife households	2 Wives households	3 Wives households	4+ Wives households
Norms and practices	**3**	**6**	**6**	**3**	**0**	**0**
Decision on Livestock health	**17**	**27**	**27**	13	3	1
Decision on livestock selling or buying	**10**	**11**	**11**	7	2	1
Decision on milk sale	**14**	**17**	**17**	11	2	1
Education	**15**	**21**	**21**	11	3	1
Market channel knowledge	**10**	**11**	**11**	8	2	0
Knowledge on livestock	**12**	**12**	**12**	7	4	1
Land	**13**	**15**	**15**	9	3	1
Livestock ownership	**8**	**7**	**7**	6	1	1
Memberships in farmer groups	**7**	**6**	**6**	4	2	1

Mode of payment	**2**	**1**	**1**	2	0	0
Physical infrastructure	**0**	**0**	**0**	0	0	0
Price of livestock	**0**	**0**	**0**	0	0	0
Price of milk	**0**	**0**	**0**	0	0	0
Relation with the market actor	**17**	**19**	**19**	12	4	1
livestock management	**19**	**25**	**25**	13	4	2
Social capital	**18**	**25**	**25**	13	4	1

Source: field data,2015

Extensive Livestock system

Access

	Polygamous households	Non-polygamous households	1 wife households	2 Wives households	3 Wives households	4+ Wives households
Norms and practices	**8**	**5**	**5**	**3**	**3**	**2**
Decision on Livestock health	**8**	6	**6**	4	4	0
Decision on livestock selling or buying	**36**	22	**22**	16	12	8
Decision on milk sale	**28**	20	**20**	12	8	8
Education	**28**	20	**20**	12	8	8
Market channel knowledge	**28**	21	**21**	12	8	8
Knowledge on livestock	**28**	20	**20**	12	8	8
Land	**32**	21	**21**	14	9	9
Livestock ownership	**8**	4	**4**	4	2	2
Memberships in farmer groups	**27**	20	**20**	11	8	8
Mode of payment	**27**	20	**20**	11	8	8
Physical infrastructure	**7**	3	**3**	2	1	4
Price of livestock	**8**	5	**5**	3	2	3
Price of milk	**21**	16	**16**	10	6	5
Relation with the market actor	**26**	17	**17**	10	8	8
livestock management	**28**	20	**20**	12	8	8
Social capital	**28**	22	**22**	12	8	8

Control

	Polygamous households	Non-polygamous households	1 wife households	2 Wives households	3 Wives households	4+ Wives households
Norms and practices	**7**	**6**	**6**	**3**	**2**	**2**
Decision on Livestock health	**20**	15	**15**	8	7	5
Decision on livestock selling or buying	**7**	5	**5**	3	2	2
Decision on milk sale	**20**	13	**13**	8	8	4
Education	**14**	7	**7**	6	5	3
Market channel knowledge	**10**	7	**7**	3	4	3
Knowledge on livestock	**19**	13	**13**	6	6	7
Land	**15**	10	**10**	7	5	3
Livestock ownership	**2**	7	**7**	2	0	0
Memberships in farmer groups	**3**	2	**2**	2	1	0
Mode of payment	**3**	4	**4**	1	1	1
Physical infrastructure	**0**	0	**0**	0	0	0
Price of livestock	**0**	0	**0**	0	0	0
Price of milk	**0**	0	**0**	0	0	0
Relation with the market actor	**16**	10	**10**	6	6	4
livestock management	**17**	8	**8**	10	4	3
Social capital	**22**	15	**15**	11	5	6

Source: field data,2015

Intensive livestock system

Access

	Males	Females	Male-Headed households	Female-Headed households
Asset accumulation	**9**	**7**	**11**	**5**
Dowry	**0**	0	**0**	0
Jobs	**0**	0	**0**	0
Farm expenses	**2**	4	**3**	3
Food(Milk)	**2**	0	**2**	0
Manure	**13**	15	**9**	19
Income	**20**	20	**19**	21

Insurance	**3**	0	**1**	2
Livestock expenses	**0**	1	**1**	0
Traditional medicine	**0**	0	**0**	0
Household expenses	**19**	22	**20**	21
Medical bills	**14**	15	**12**	17
School expenses	**12**	14	**13**	13
Prestige	**0**	0	**0**	0
Transport	**0**	**0**	**0**	0

Control

	Males	Females	Male-Headed households	Female-Headed households
Asset accumulation	**15**	**5**	**11**	**9**
Dowry	**0**	0	**0**	0
Jobs	**0**	0	**0**	0
Farm expenses	**2**	4	**3**	3
Food(Milk)	**2**	0	**2**	0
Manure	**12**	15	**9**	18
Income	**19**	14	**16**	17
Insurance	**3**	0	**1**	2
Livestock expenses	**0**	1	**1**	0
Traditional medicine	**0**	0	**0**	0
Household expenses	**15**	15	**14**	16
Medical bills	**14**	8	**8**	14
School expenses	**14**	7	**11**	10
Prestige	**0**	0	**0**	0
Transport	**0**	**0**	**0**	0

Source: field data,2015

Extensive livestock system

Access

	Males	Females	Male-Headed households	Female-Headed households
Asset accumulation	**19**	**7**	**12**	**14**
Dowry	**6**	0	**2**	4
Jobs	**1**	0	**1**	0
Farm expenses	**0**	0	**0**	0
Food(Milk)	**0**	8	**7**	1
Manure	**0**	3	**2**	1
Income	**20**	21	**21**	20
Insurance	**1**	1	**1**	1
Livestock expenses	**4**	0	**4**	0

Traditional medicine	**5**	2	**6**	1
Household expenses	**21**	21	**20**	22
Medical bills	**7**	4	**4**	7
School expenses	**16**	15	**17**	14
Prestige	**1**	0	**1**	0
Transport	**6**	0	**5**	1

Control

	Males	Females	Male-Headed households	Female-Headed households
Asset accumulation	**20**	**7**	**12**	**15**
Dowry	**6**	0	**2**	4
Jobs	**1**	0	**1**	0
Farm expenses	**0**	0	**0**	0
Food(Milk)	**0**	7	**6**	1
Manure	**0**	3	**2**	1
Income	**21**	15	**22**	14
Insurance	**2**	1	**2**	1
Livestock expenses	**4**	0	**4**	0
Traditional medicine	**5**	2	**6**	1
Household expenses	**16**	20	**20**	16
Medical bills	**7**	1	**3**	5
School expenses	**16**	3	**10**	9
Prestige	**1**	0	**1**	0
Transport	**6**	0	**5**	1

Source: field data,2015

Intensive livestock system

Access

	Polygamous households	Non-polygamous households	1 wife households	2 Wives households	3 Wives households	4+ Wives households
Asset accumulation	**8**	**8**	**8**	**8**	**0**	**0**
Dowry	**0**	0	**0**	0	0	0
Jobs	**0**	0	**0**	0	0	0
Farm expenses	**3**	3	**3**	2	0	1
Food(Milk)	**0**	2	**2**	0	0	0
Manure	**10**	18	**18**	8	0	2
Income	**18**	22	**22**	13	4	1
Insurance	**2**	1	**1**	0	2	0
Livestock expenses	**0**	1	**1**	0	0	0
Traditional medicine	**0**	0	**0**	0	0	0

Household expenses	**18**	23	**23**	13	4	1
Medical bills	**11**	18	**18**	9	2	0
School expenses	**11**	15	**15**	9	1	1
Prestige	**0**	0	**0**	0	0	0
Transport	**0**	0	**0**	0	0	0

	Polygamous households	Non-polygamous households	Control 1 wife households	2 Wives households	3 Wives households	4+ Wives households
Asset accumulation	**10**	**10**	**10**	**7**	**2**	**1**
Dowry	**0**	0	**0**	0	0	0
Jobs	**0**	0	**0**	0	0	0
Farm expenses	**3**	3	**3**	2	0	1
Food(Milk)	**0**	2	**2**	0	0	0
Manure	**9**	18	**18**	8	0	1
Income	**16**	17	**17**	12	3	1
Insurance	**2**	1	**1**	0	2	0
Livestock expenses	**0**	1	**1**	0	0	0
Traditional medicine	**0**	0	**0**	0	0	0
Household expenses	**12**	18	**18**	8	3	1
Medical bills	**11**	11	**11**	9	2	0
School expenses	**9**	12	**12**	7	1	1
Prestige	**0**	0	**0**	0	0	0
Transport	**0**	0	**0**	0	0	0

Source: field data,2015

			Extensive livestock system Access			
	Polygamous households	Non-polygamous households	1 wife households	2 Wives households	3 Wives households	4+ Wives households
Asset accumulation	**16**	**10**	**10**	**7**	**4**	**5**
Dowry	**5**	1	**1**	0	2	3
Jobs	**0**	1	**1**	0	0	0
Farm expenses	**0**	0	**0**	0	0	0
Food(Milk)	**5**	3	**3**	3	2	0

Manure	**1**	2	**2**	1	0	0
Income	**23**	18	**18**	9	7	7
Insurance	**1**	1	**1**	1	0	0
Livestock expenses	**4**	0	**0**	2	2	0
Traditional medicine	**4**	3	**3**	2	2	0
Household expenses	**25**	17	**17**	10	7	8
Medical bills	**7**	4	**4**	3	4	0
School expenses	**18**	13	**13**	5	7	6
Prestige	**1**	0	**0**	1	0	0
Transport	**5**	1	**1**	2	2	1

	Polygamous households	Non-polygamous households	Control 1 wife households	2 Wives households	3 Wives households	4+ Wives households
Asset accumulation	**15**	**12**	**12**	**7**	**5**	**3**
Dowry	**5**	1	**1**	0	2	3
Jobs	**0**	1	**1**	0	0	0
Farm expenses	**0**	0	**0**	0	0	0
Food(Milk)	**4**	3	**3**	2	2	0
Manure	**1**	2	**2**	1	0	0
Income	**20**	16	**16**	10	7	3
Insurance	**2**	1	**1**	1	1	0
Livestock expenses	**4**	0	**0**	2	2	0
Traditional medicine	**5**	2	**2**	3	2	0
Household expenses	**20**	16	**16**	8	6	6
Medical bills	**5**	3	**3**	2	3	0
School expenses	**11**	8	**8**	3	4	4
Prestige	**1**	0	**0**	1	0	0
Transport	**5**	1	**1**	2	2	1

Source: field data,2015

APPENDIX 4: GENDERED EFFECTS OF FACTORS OF PARTICIPATION

HOW INFLUENCING FACTORS AFFECT PARTICIPATION IN THE VALUE CHAIN	Extensive livestock system		Intensive livestock system	
	Men	Women	Men	Women
48 : **factor: community norms and practices**	5	8	3	4
49 : Effects on participation	39	45	36	39
50 : a family needs to have a son to get respect and or resources	0	1	1	1
51 : Bad for women to go to the tick bath	0	1	2	0
52 : Cowshed needs to constructed in a certain way to avoid bad luck	4	1	0	0
53 : Dowry payment during marriage	1	0	0	0
54 : Husbands are the ones to provide for the family	0	0	2	3
55 : Husbands or males are final decision makers in the household	3	3	9	10
56 : Inappropriate for a woman to call a man in the household	0	2	0	1
57 : Last born son will live together with his mother	3	1	0	0
58 : Livestock selling or buying is considered to be man's job	3	9	2	4
59 : Men are strong enough to handle cows	0	0	3	1
60 : Milk and milk business is considered women's' job	12	0	0	0
61 : No effect	12	4	15	11
62 : Not allowed to inherit from deceased or divorced spouse	2	10	1	3
63 : Not allowed to own assets(women)	0	11	1	3
64 : Some parts of meat are not allowed to be eaten by women	0	7	0	0
65 : Spouse inheritance	0	0	1	0
66 : Wives need to stay at home	1	4	1	2
68 : Women considered not have enough livestock knowledge	0	0	0	1
69 : women need to get married to be respected	0	2	0	1
70 : **factor: decision on livestock selling or buying**	7	7	22	16
71 : Effects on participation	7	7	21	16
72 : Can sell and or buy livestock	7	0	12	5
73 : Cannot sell or buy livestock	0	7	6	10
74 : Keeping money from livestock sale	6	0	2	0
75 : No effect	0	0	1	1
76 : **factor: decision on milk sale**	28	30	47	51
77 : Effects on participation	28	30	45	47
78 : Decide to sell or consume the milk	6	26	7	12
79 : doesn't decide to sell or consume milk	21	2	9	7
80 : Doesn't keep the milk money	15	2	16	11
81 : Doesn't sell the milk	1	0	4	0
82 : Keeping the milk money	4	23	18	28
83 : **factor: education**	24	24	32	30
84 : Effects on participation	24	24	27	27
85 : Able to attend trainings	2	1	5	3
86 : Becoming a leader in the community	1	0	1	0
87 : Cannot read or write	5	20	1	10
88 : Get employed to earn extra income	1	0	3	1
89 : Improve bargaining power	9	0	0	0
90 : No effect	1	2	0	2

91 : Read and understand instructions on inputs or service use	16	3	20	13
92 : Starting own dairy enterprise	1	0	3	1
93 : **factor: knowledge about livestock**	24	24	27	27
94 : Effects on participation	24	24	26	27
95 : Help with delivering livestock	0	0	0	1
96 : Identification and or treatment of different livestock diseases	21	4	10	5
97 : Identification only diseases	1	12	0	0
98 : Maintaining good quality of milk	0	0	1	0
99 : People trust you with their Livestock	0	0	0	1
100 : Unable to treat or identify different livestock diseases	3	8	16	20
101 : Washing livestock	0	1	0	0
102 : **factor: knowledge about market channel**	25	24	24	23
103 : Effects on participation	25	24	24	23
104 : Cannot bargain the prices	0	1	1	1
105 : Knowing Limited milk markets	7	21	11	23
106 : More knowledgeable about Livestock markets	17	1	6	0
107 : Selling milk daily	0	1	0	0
108 : Selling milk to households instead to processor	1	1	4	0
109 : Started a milk collection centre	0	0	1	0
110 : Working as herder	7	0	1	0
111 : **factor: land ownership**	24	24	30	34
112 : Effects on participation	24	24	29	32
113 : Building house and cowshed	11	1	0	0
114 : Cannot keep farm income	0	0	0	2
115 : Cannot use as Collateral	4	15	5	3
116 : Getting farm income to supplement livestock income	7	1	6	6
117 : Getting feedstock for the livestock	4	4	21	18
118 : Getting income to buy calves or cows	3	0	2	4
119 : Growing food crops for the family	8	9	13	16
120 : Husbands makes all final decisions on land	2	14	0	2
121 : No effect	5	1	1	2
122 : Paying for livestock inputs or services from farm income	2	1	5	3
123 : **livestock health services or inputs**	27	26	24	25
124 : Effects on participation	27	26	24	25
125 : Calling or paying for services or inputs	21	1	15	2
126 : Limited access to calling or paying for inputs or services	1	24	8	23
127 : Own treatment of Livestock diseases	14	2	1	0
128 : **factor: livestock ownership**	7	5	5	8
129 : Effects on participation	7	5	5	8
130 : Can sell or buy livestock	7	0	3	0
131 : Cannot sell or buy livestock	0	3	2	7
132 : Doesn’t receive any income from livestock	0	4	0	1
133 : Keeps all the money from livestock sale	5	1	2	0
134 : Makes all final decision concerning livestock	6	0	0	0
135 : **factor: membership in livestock keepers' groups**	24	23	25	24
136 : Effects on participation	24	23	24	24
137 : Cannot attend trainings	0	12	3	9
138 : No effect	21	9	15	6
139 : Trained on feeding, cleanliness and proper milking	3	2	6	8
140 : Training on dairy enterprise management	3	0	2	3

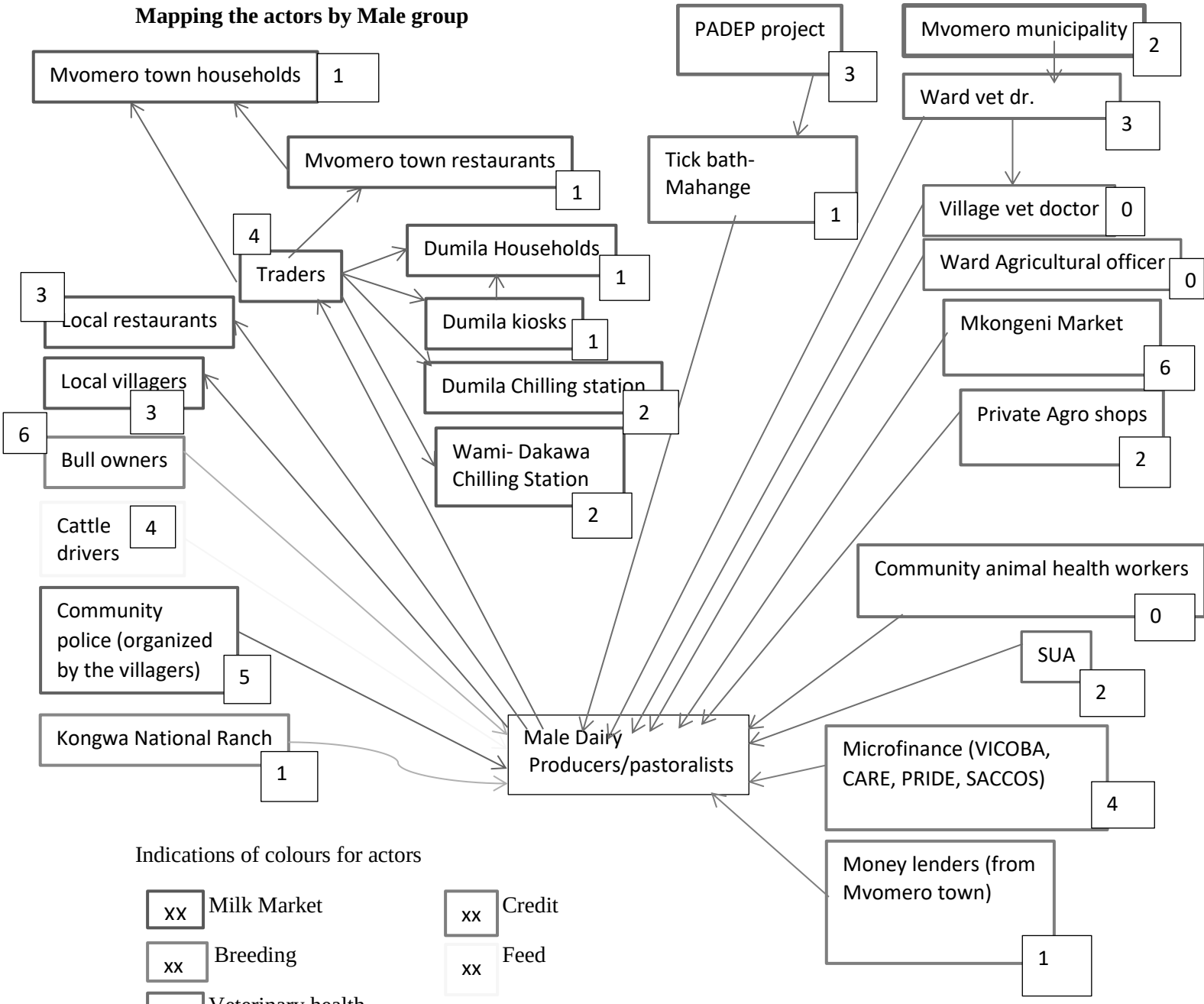
141 : **factor: mode of payment**	23	24	25	23
142 : Effects on participation	23	24	25	23
143 : Discouraged by late payments	1	8	5	4
144 : Getting regular income for inputs buying or paying for services	3	1	1	2
145 : Keeping money or income	2	4	8	14
146 : No effect	6	5	10	5
147 : Prefers to receive cash only	11	6	0	0
148 : Thinking about increasing supply	0	0	1	0
149 : **factor: physical infrastructure**	0	10	0	0
150 : Effects on participation	0	10	0	0
151 : Unable to deliver milk during the rainy season	0	10	0	0
152 : **factor: price of livestock**	13	0	0	0
153 : Effects on participation	13	0	0	0
154 : More active in livestock market than in milk market	13	0	0	0
155 : Selling cow and replace by buying a calf	1	0	0	0
156 : **factor: price of milk**	13	24	26	25
157 : Effects on participation	12	24	26	25
158 : Discouraged	3	15	8	8
159 : Doesn’t keep the milk money	0	0	1	0
160 : Getting income	1	4	3	8
161 : Going to sell milk less often	0	12	0	0
162 : No effect	7	1	12	7
163 : saving to buy livestock	1	0	1	0
164 : Selling to porridge vendor instead of trader	0	0	1	2
165 : **factor: relation with the market channel actor**	23	20	24	25
166 : Effects on participation	23	20	24	24
167 : Communicates with the commercial dairy processor	0	0	1	0
168 : Easier to sell or buy livestock	17	1	1	0
169 : Getting credit from the trader	0	1	7	3
170 : Getting reliable market	1	6	5	4
171 : No effect	3	1	1	1
172 : Not in good terms with trader due to low price	0	5	1	0
173 : Paid quickly most of the times	1	0	2	4
174 : Selling at higher price	0	1	2	2
175 : Selling milk directly to the cooperative	0	0	1	0
176 : Selling milk with walking distance	2	7	8	14
177 : **factor: responsible for livestock management**	24	24	34	29
178 : Effects on participation	24	24	34	29
179 : Breeding	1	0	1	0
180 : Cleaning the cowshed and Livestock	6	4	9	10
181 : counting	17	10	1	0
182 : Employing Livestock herder	0	0	1	0
183 : Grazing finding grasses and or drinking	24	8	20	18
184 : Milking	2	19	13	15
185 : **factor: social capital (relations with relatives, neighbours and friends)**	26	24	37	32
186 : Effects on participation	26	23	31	29
187 : able to trade in the Livestock market	1	0	1	0
188 : Borrowing or lending livestock	2	1	4	10
189 : Borrowing or Lending money in SHGs	1	2	2	6
190 : Getting employment	9	1	2	0
191 : Getting feedstock from others	0	0	12	5
192 : Getting help with livestock treatment	17	14	4	1

193 : Getting inheritance	0	1	2	0
194 : Getting reliable source of milk from villagers	0	0	1	1
195 : give security and looking for stolen livestock	2	0	0	2
196 : Helped in grazing and or drinking for livestock	11	9	3	3
197 : Learn about livestock keeping from others	2	1	2	0
198 : No effect	1	0	2	2
199 : Selected to attend trainings	2	0	3	0
200 : Solving dispute in case livestock eat other people crops	2	0	0	1

Source: field data, 2015; it was created by matrix coding query by Nvivo 10.

APPENDIX 5 : PROCESS-NET MAPS IN INTENSIVE LIVESTOCK SYSTEM
MAKUYU VILLAGE – MVOMERO

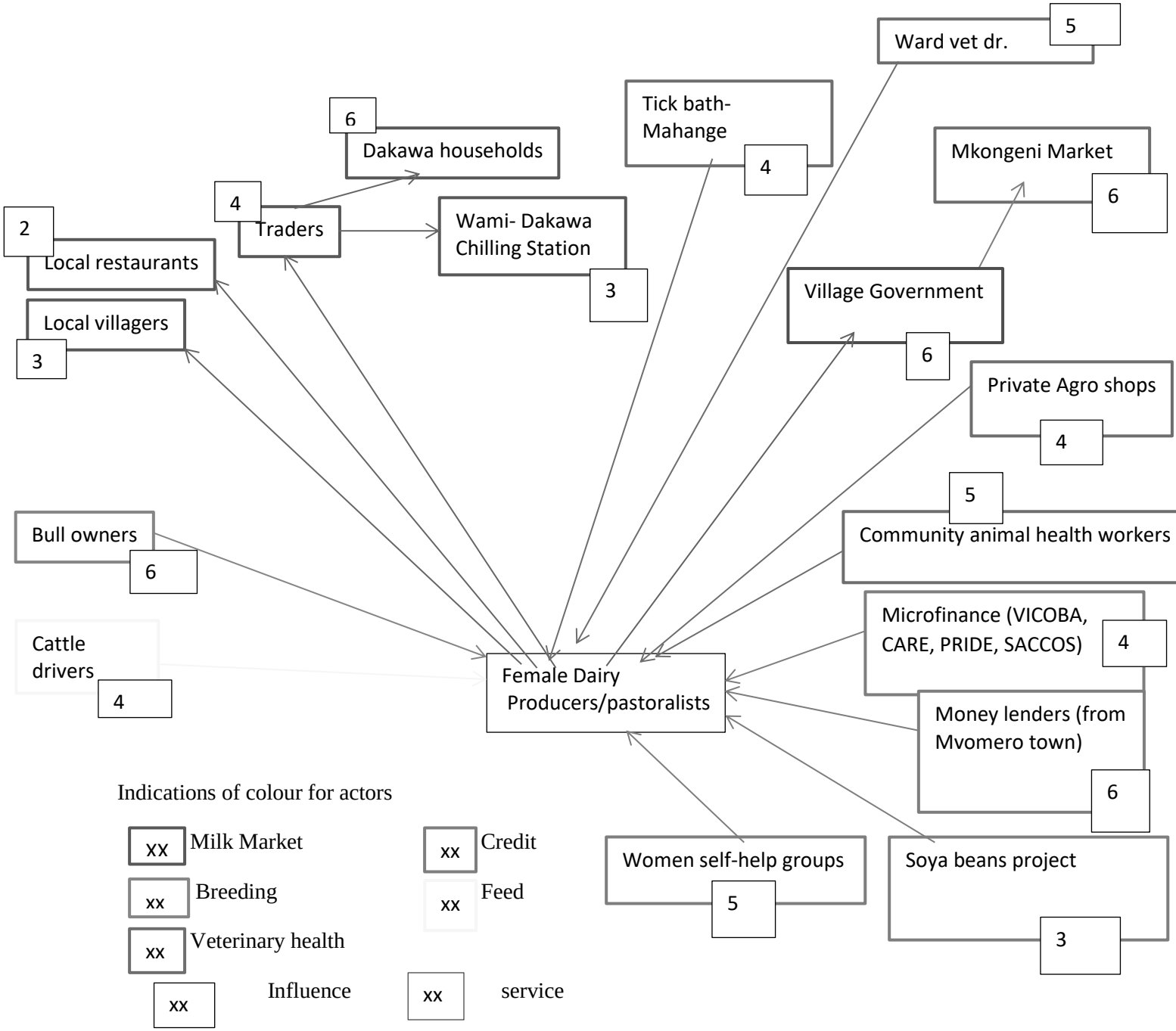
Mapping the actors by Male group



Indications of colours for actors

xx Milk Market
xx Credit
xx Breeding
xx Feed
xx Veterinary health
xx Influence
xx Service

Mapping the actors by female group



UBIRI VILLAGE - LUSHOTO

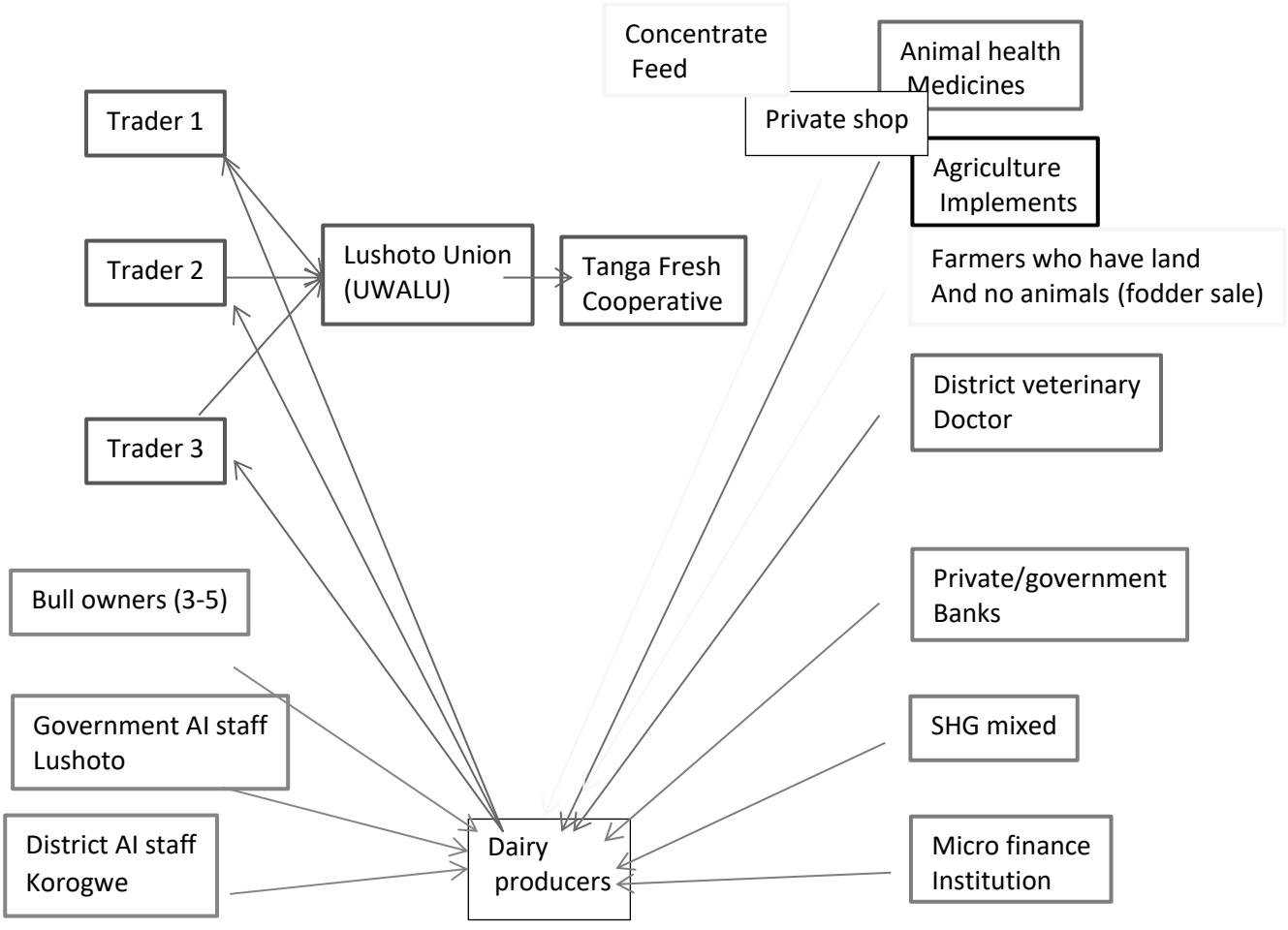
Gendered Net-Map in UBIRI village in Tanzania (Tanga fresh market institution model)

Basic details of the village

- No of households: 432
- Population: 1973; men:903, women: 1070
- Households without cattle:90- 100
- Cattle; Dairy cow: 500, Breeding bull:5, draught cattle: 50
- All cow are crossbreed, average production/ cow- 5 litres

- Female headed households: 120-130 (divorced, widow)
- Male headed households: 300
- Groups: Farmer cooperative group for sale of milk: 1 and farmer group: 1 for general purpose farming related
- Some of the farmers who are not group members but they sell milk directly to traders
- Milk Sale: trader 1: 500 litres; trader 2: 150 litres; trader 3: <100 litres all are giving same price for milk 500 TSh price set by Tanga fresh: but UWALU give 630 TSh for traders and Tanga fresh gives 800 TSh to UWALU
- Members attended for FGD: 5 women and 5 men- meeting started with women group for half hour when the men joined the meeting, women didn't express their views. Future need to have the meeting with women first and include me

Step 1: Mapping the actors



Indications of color for actors

xx	Milk Market	xx	Credit
xx	Breeding	xx	Feed
xx	Veterinary health		

Influence Ranking

How these actors influence them for dairy development?

1st rank: Tanga Fresh and Micro finance institutions (Framers gave 90-100% marks)

- Tanga Fresh
    - Only way to sell their milk
    - They earn income whole season because of this actor
    - Who sets the price for milk
    - Men women both can sell milk
    - Payment given to men and women also

  But they feel the payment system is late after 40 days, monopoly of actor so less price for their milk
- Microfinance institution
    - They can access for micro credit anytime
    - Women benefits more
    - No formalities or procedures
    - No collateral
    - Helps in time of emergency for cropping and livestock purchase

2nd rank: District vet doctor and bull owner (75% marks)

- Bull owner
    - Easily accessible
    - Timely service
    - They can pay later- credit
    - Sometime free service
    - Conception good and repeat service available
    - No difference for rich, poor and women and men
- District vet doctor
    - Who saves animal in emergency
    - Saves their livelihood
    - Farmers can't save the animal without this actor

3rd rank: private shop (60%)

- Private shop
    - Easily accessible
    - Emergency medicines
    - Helpful for cropping implements

4th ranks: AI staff Lushoto, district AI staff- 3-5% marks

- Both are not accessible
- And high price

4. Process of market institution

Apart from the above mapping farmers not aware of the flow of milk till consumers, because of lack of communication with union or cooperative head office

Note: End of meeting, framers expressed that immediate need for them is training for any local educated person for AI and treatment knowledge which can improve their production and save their animals

Farmers feel there is no direct access Tanga fresh or communication which needs strengthening so they receive very less price, some women who earns less than one dollar from her cow but labour is high.

Some cases

Labour division

Women: cleaning, collecting grass, watering, milking

Men: taking cow for natural service

Case 1:

Women headed household

Lady 1, 50 years, member for cooperative group-feeding committee member, whose husband got married to other women and left her before 20 years back. Her husband didn't left any land or livestock for her. She borrowed one cow and acquired the land from her husband family by somehow (purchased). She built 2 houses her own from agro and dairy income. She borrowed cattle from other women and gave first calf to the woman who gave the cattle and second calf belongs to her and third goes to other woman. The second calf become matured and gives milk now. So she gave back the cow brought first because it's difficult to handle the two cows with available resources. She is running some SHGs for credit service and act as secretary for these groups

What are influencing factors for her development: group membership and position in group? ownership of borrowed cow and its milk, and second calf grown and gave milk, support of husband relatives, acquired land from husband relatives, her relatives of husband are well off with modern houses located just beside her house. She was running SHGs

She also got land from the village who distributed a land which was belongs to white man who left the village; villagers distributed that land among themselves. Somehow in flouncing people got this piece of land

Found this lady being influential; this lady expressed that they can't get loan from formal bank because these land titles were not given to them, family of her husband just allowed her to use the and informally but she says its belongs to her. We understand that there is some bureaucratic procedures for women to acquire the land legally. The land titles are not in her name.

Case 2

One women who we met before meeting, Mama Irene her husband died 2000, she inherited land of husband, her son looked for her cattle which has been borrowed from other village (borrowing the cow which is explained down).She sells milk directly to trader 2 and collect money herself, also have goats but maintain the herd and she don't want to sell the sheep and goats and she want

to multiply them. She looks after her grandchildren, their son and daughter are in city she is taking care of kids

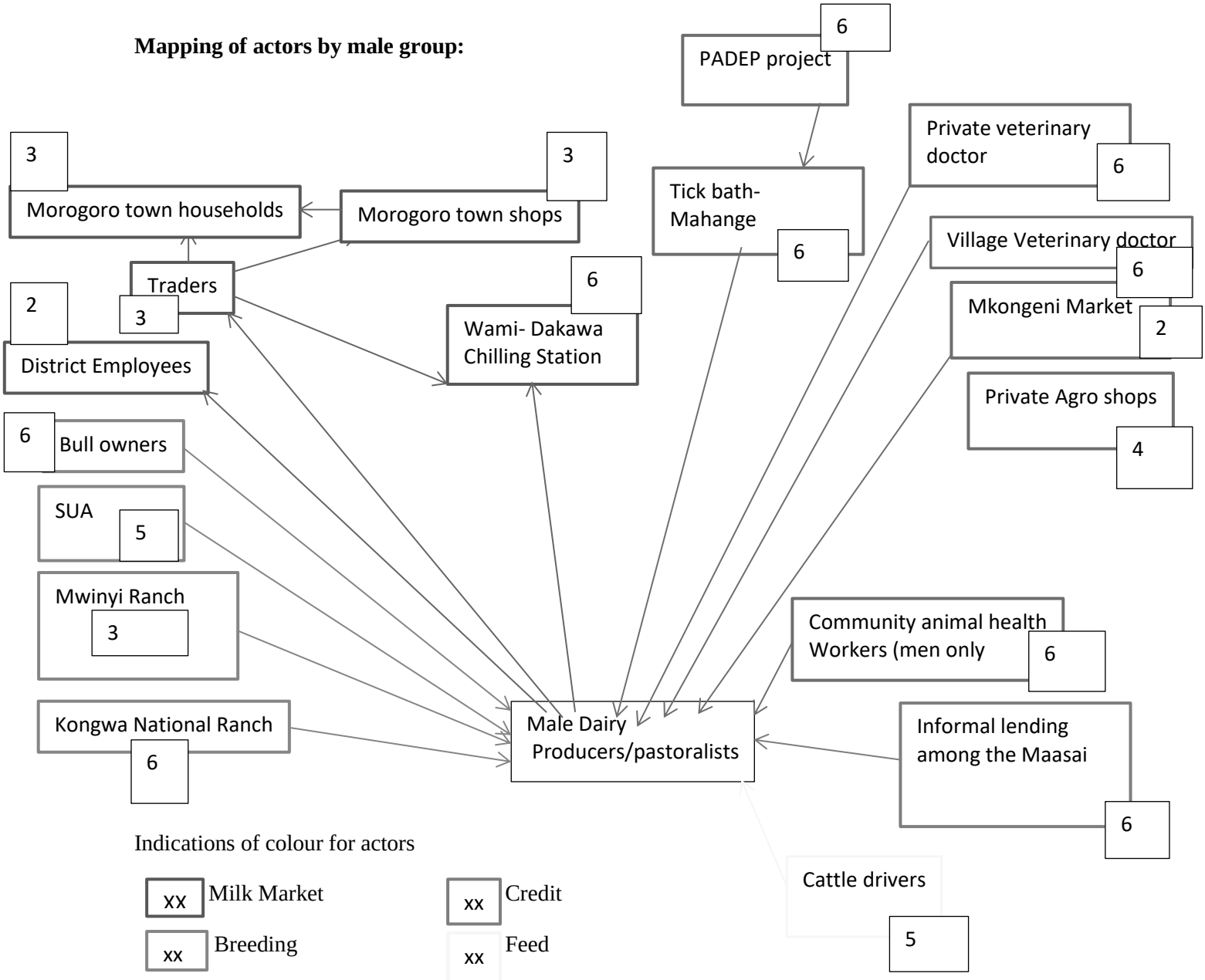
Case 3

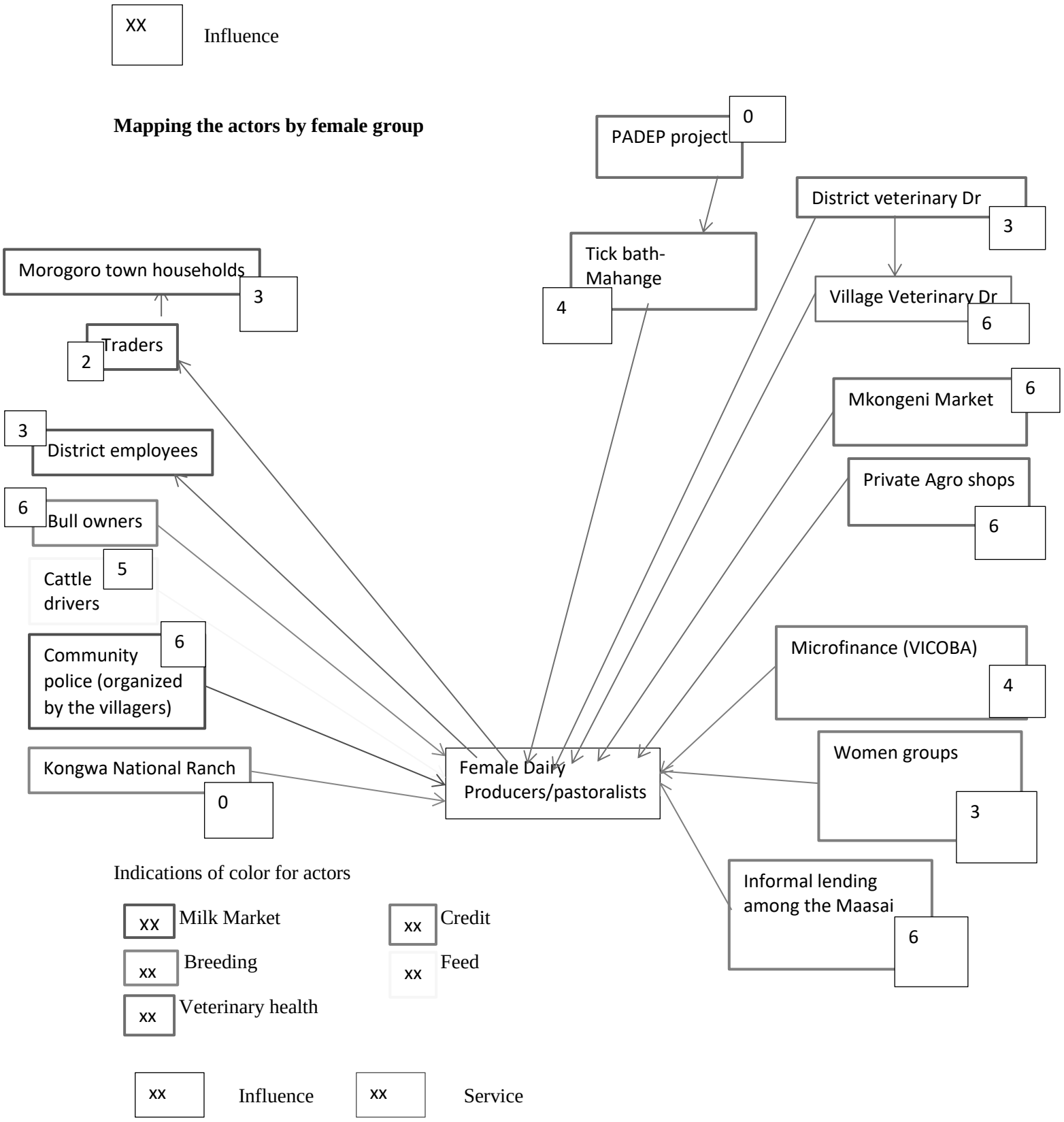
One guy who have 4 cows and 3 sheep and selling milk 20 litres per day and earning about 300000/month which he feels that he is earning more than the educated and employed persons; he felt confidence of dairy livelihood. He come this level through borrowing one cow long back. He has built a house with concrete roof; he uses the land which belongs to his family sharing with brothers. He feels that he can marry other women because he is earning more to give dowry to another beautiful woman? This norm exists that men with wealth leave wife and marry another.

WAMI-SOKOINE –MVOMERO

WAMI-SOKOINE VILLAGE

Mapping of actors by male group:



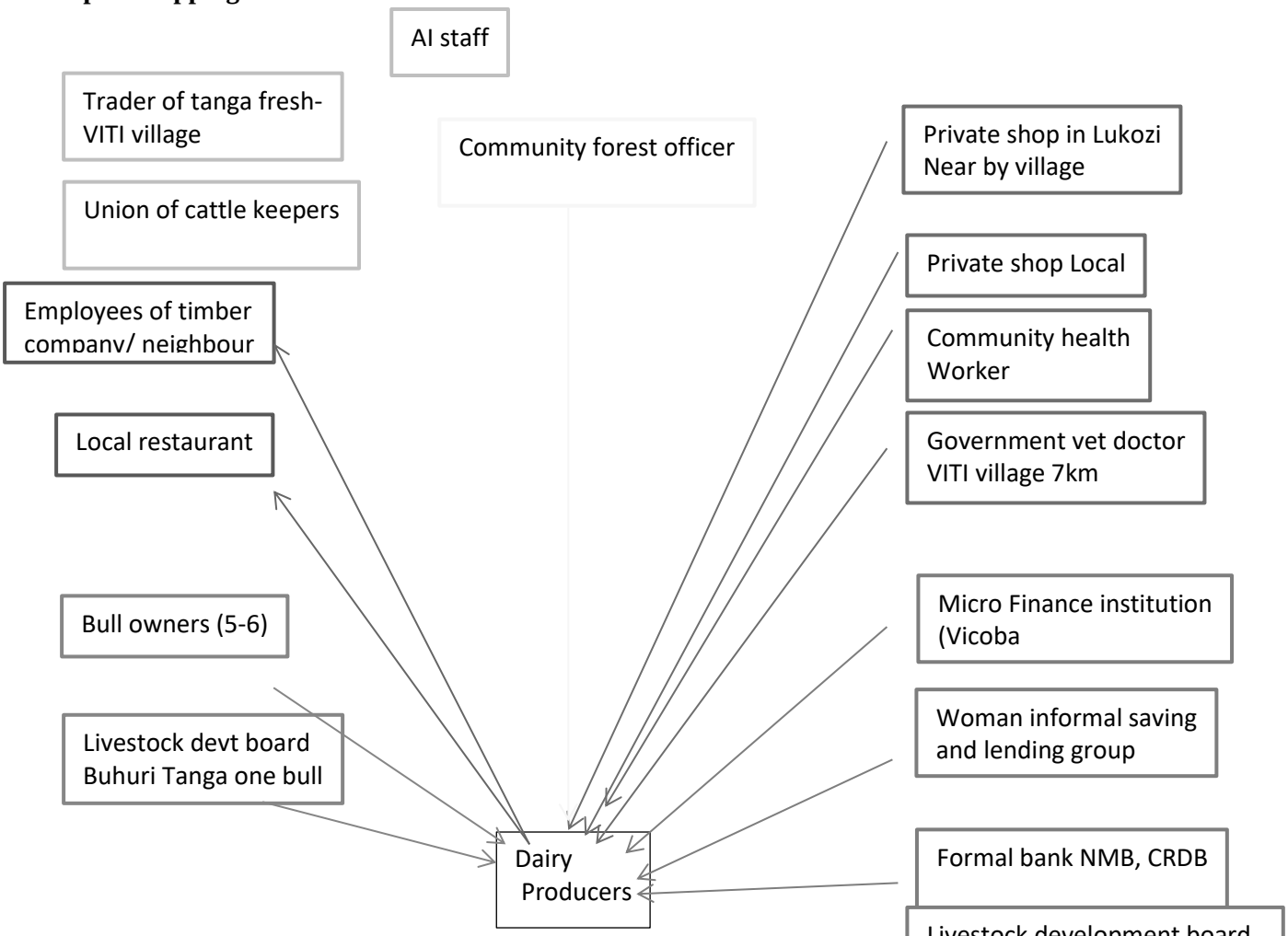

XX
Influence
Mapping the actors by female group
PADEP project
0
District veterinary Dr
3
Tick bath-Mahange
4
Morogoro town households
3
Village Veterinary Dr
6
Traders
2
Mkongeni Market
6
3
District employees
Private Agro shops
6
6
Bull owners
5
Cattle drivers
Microfinance (VICOBA)
4
6
Community police (organized by the villagers)
Women groups
3
Kongwa National Ranch
0
Female Dairy Producers/pastoralists
Informal lending among the Maasai
6
Indications of color for actors
xx Milk Market
xx Credit
xx Breeding
xx Feed
xx Veterinary health
xx Influence
xx Service

Gendered Net-Map in Gologolo village in Lushoto Tanzania (Informal market institution model)

Basic details of the village

- No of households: 400
- Families : 800;
- Households without cattle: 25%(100)
- Cattle; Dairy cow: 300, Breeding bull:6, draught cattle:
- All cow sare crossbreed, average production/ cow- 3 litres (Five back there was one bull given by Tanga livestock board for breeding purposes whose offpsrings are now available for breeding). There are some research done and reported that the breeds available in the village are not suitable for the local conditions.
- Female headed households: 100 (divorced, widow)
- Male headed households: 300
- Employed families : 100(timber company within the village)
- Price: 600 TSh. per liter both for the neighbors and the local restaurants
- Milk Sale: 90% to neighbors and 10% to local restaurants.
- Members attended for FGD: 3 women and 5 men- meetings initiated by contacting the village chairman who is also a primary school head teacher who introduced us to one farmer who keeps one cow and also working in the timber company. This farmer called other farmers for the meeting. No widow in the meeting and no woman from a female headed household.
- **Most members that attended are employed, need further exploration of the households headed by the women who sell milk informally.**

Step 1: Mapping the actors



Indications of color for actors

xx Milk Market

xx Breeding

xx Veterinary health

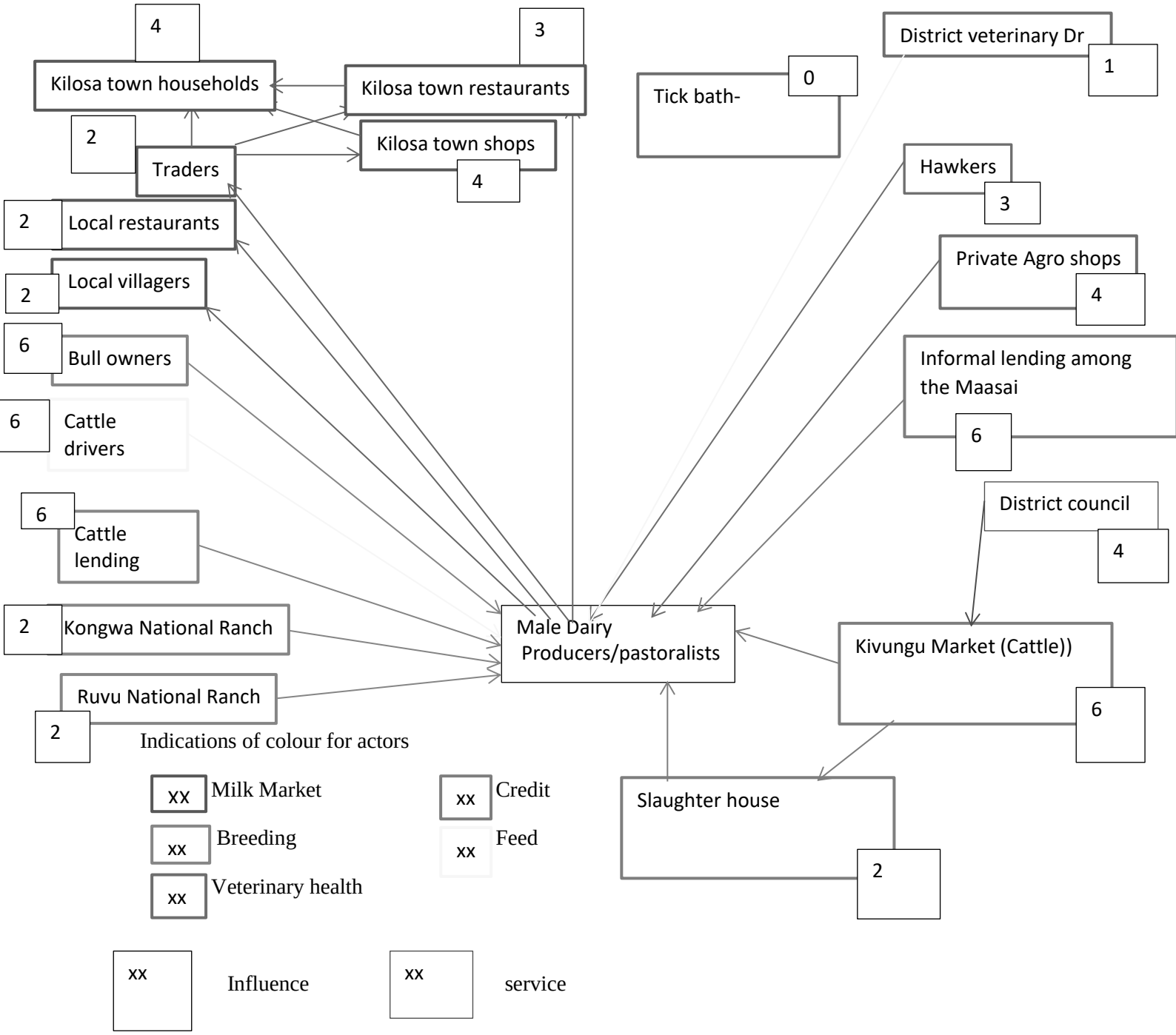
xx Credit

xx Feed

APPENDIX 6 : PROCESS-NET MAPS IN EXTENSIVE LIVESTOCK SYSTEM

KIVUNGU VILLAGE

Mapping the actors by Male group



Mapping the actors by female gro

Indications of colour for actors

xx Milk Market

xx Breeding

xx Veterinary health

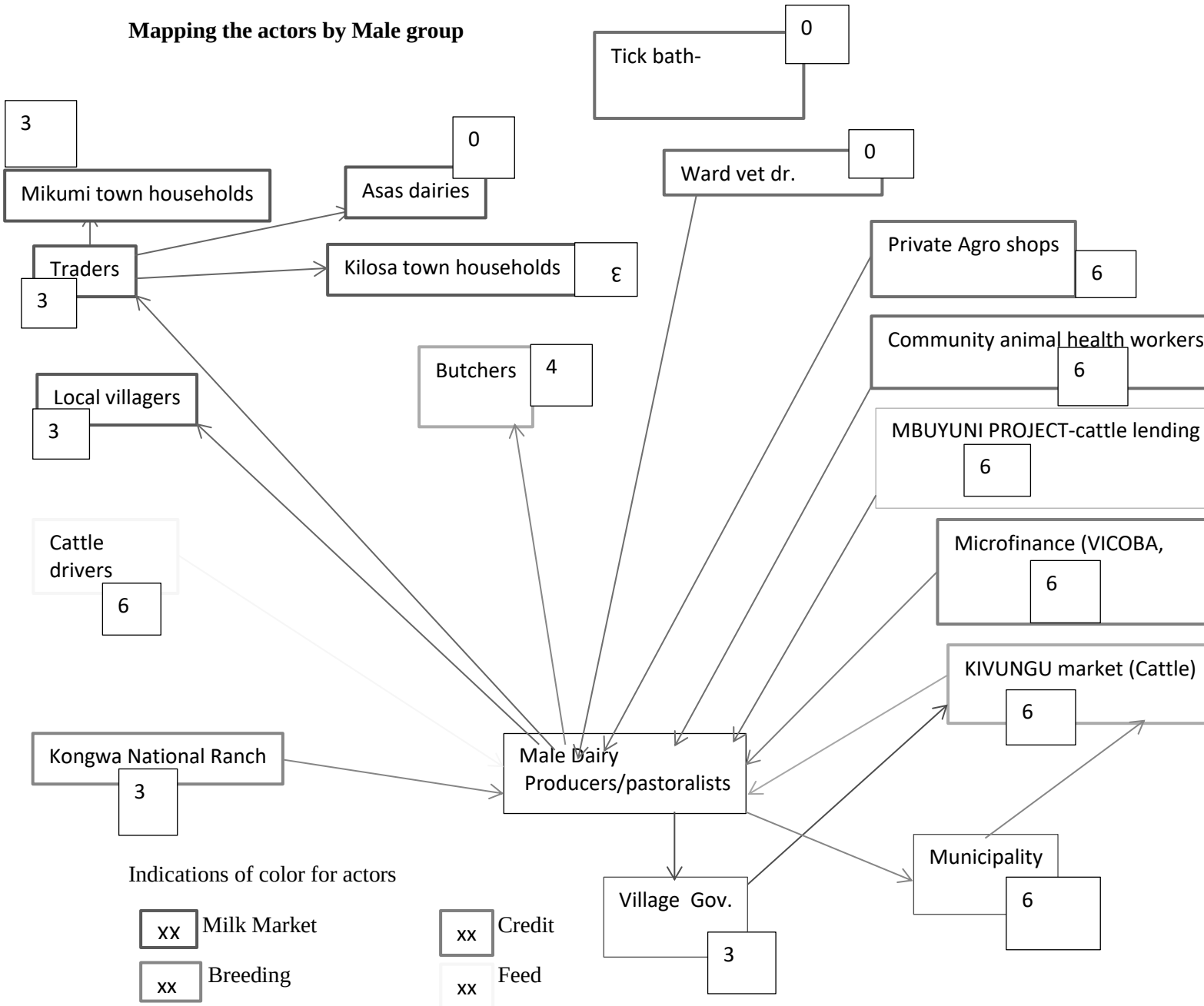
xx Influence

xx Credit

xx Feed

ULAYA-KIBAONI VILLAGE

Mapping the actors by Male group



NB: women we

KWANDIAMBE VILLAGE –HANDENI

FGD Gendered net-map Kwadiambe- Handeni)

Total HHs: 206

Female headed HHs: 55

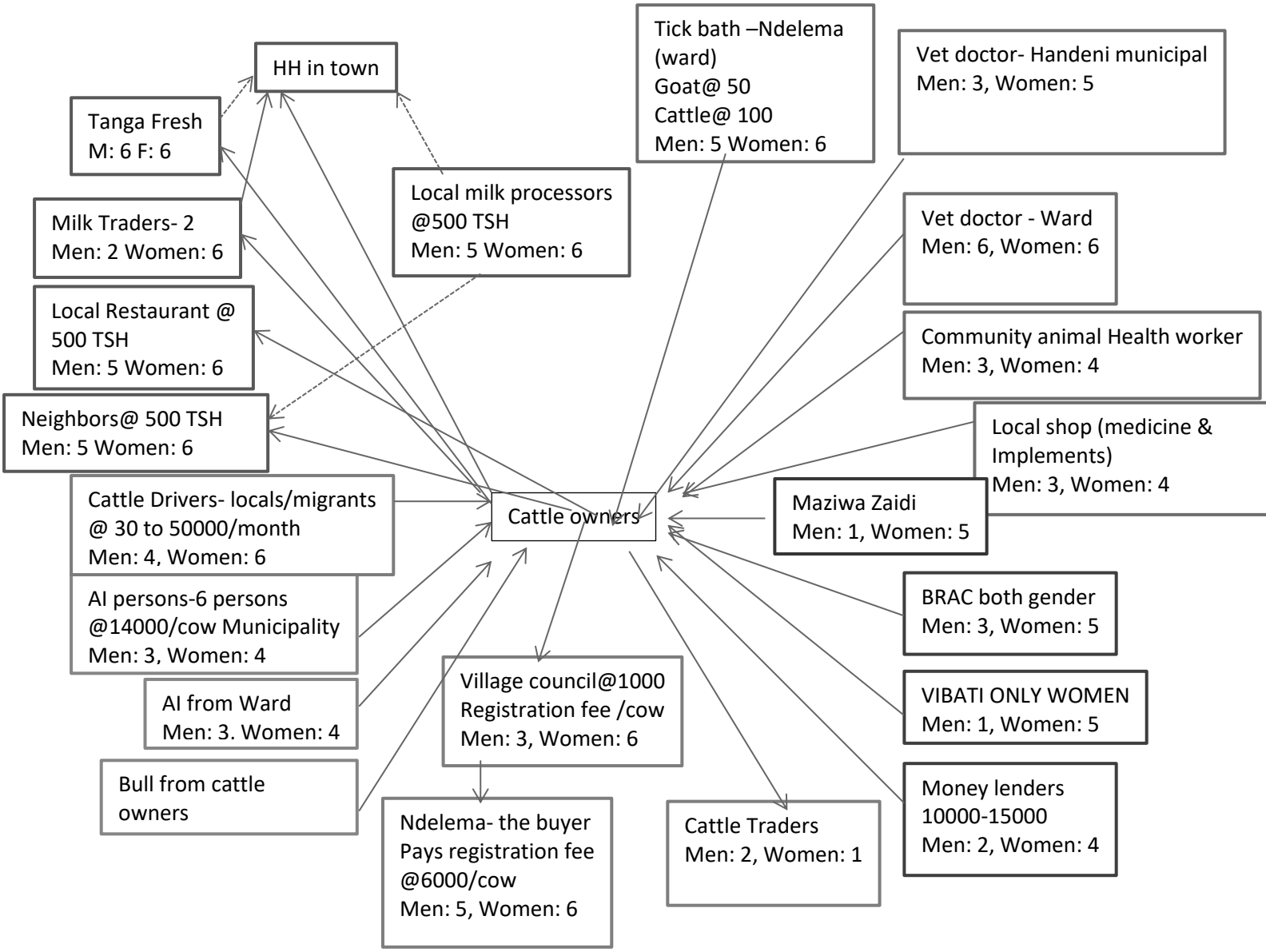
Cattle population: 1025

Households own cattle: 24

Distance from Handeni: 8 km

Note

- Households have been allotted with pieces of land in Valley region for the Agriculture farming- mostly for the consumption purpose, they plant maize, vegetables.
- Scarcity of land for the grass production
- Area is very dry, only one time rain- one time cropping
- Pastoralists have big herds move for grazing when summer leaving few cows in home for the wife to milk and sell the milk, the income used for household expenses
- Crop production is done by women, she leaves home in the morning after sending kids to school and comes back evening 4pm
- Men goes grazing 10am and back 8pm when there is enough grass around the homesteads



KWENJUGO VILLAGE – HANDENI

Kwenjugo village

Total HHs: 500

Female headed HHs: 100

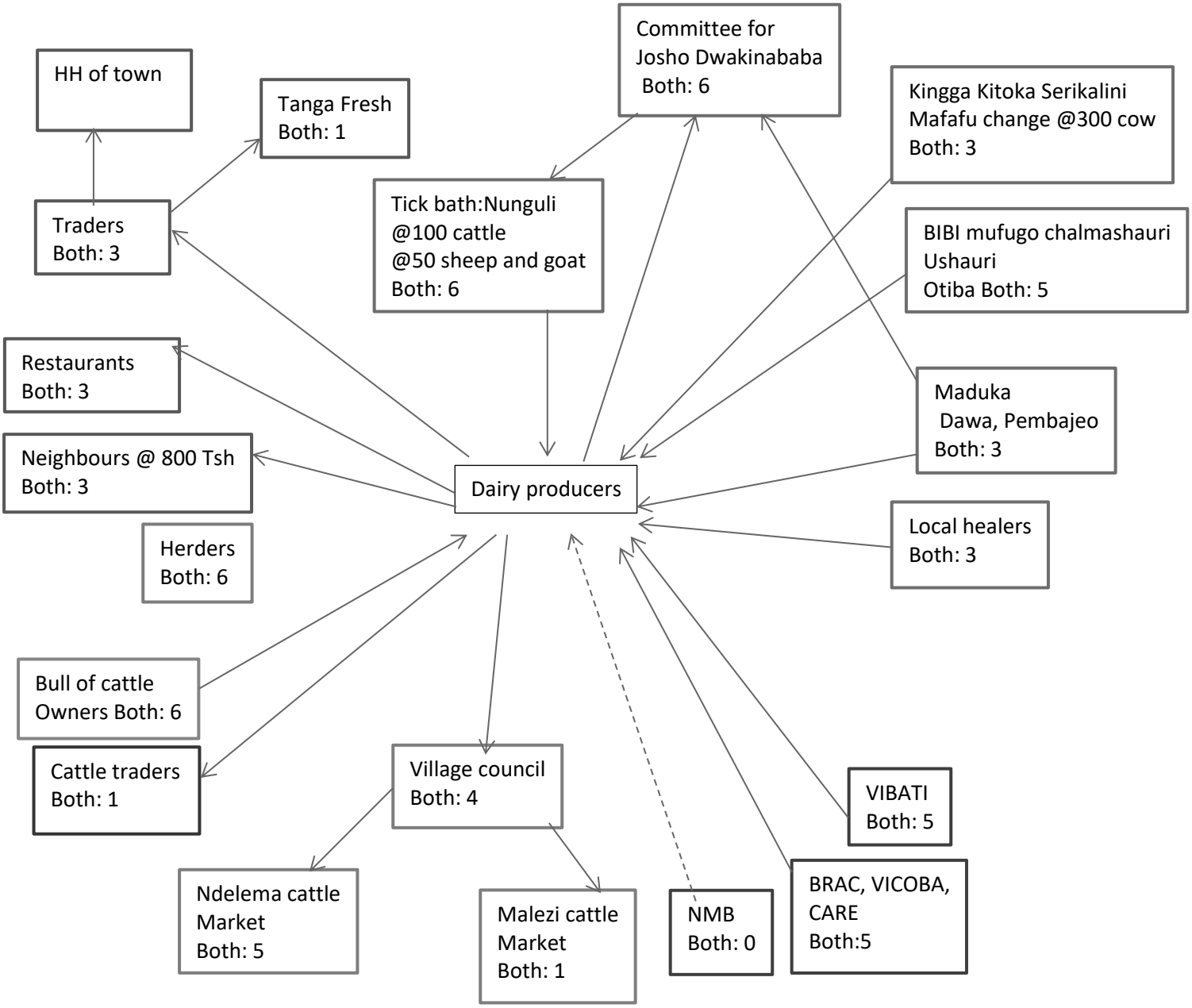
Cattle population: 2000

Households own cattle: 100

Distance from Handeni: 6 km

<u>Challenges</u>

- Water shortage
- Drugs problem and poverty
- Drought and feed shortage
- Women- feel problem between farmers and pastoralists
- Fee /registration in markets is high even though you do not sell your cows
- Price fluctuation for the value of animal



APPENDIX 7 : SOME PICTURES FROM THE FIELD

Grazing in communal rangelands Source: field, 2015

After discussion with village chairman family

Source: field, 2015

Cowshed in Intensive system with cross-bred cows

Source: field, 2015

Cowshed in extensive system with Zebu cattle

Source: field, 2015

13 years old girl who would be married soon

Source: field, 2015

Milk collection tank owned by commercial processor

Source: field, 2015

Focus Group Discussion with women Source: field, 2015

Milk collection centre in Handeni –Tanga Source: field, 2015

Men directing cattle into the tick bath Source: field, 2015

Cattle after going through the tick bath Source: field, 2015

Evening discussion with a woman during village stay Source: field, 2015

Weak and dead livestock due to drought Source: field, 2015

Water drinking trough; no longer in use Source: field, 2015

Old unused and unmaintained tick bath Source: field, 2015


Woman milking in the morning

Source: field, 2015


Woman bottle feeding the calves

Men helping a cow deliver Source: field, 2015

Preparing for going grazing Source: field, 2015

Women fetching water for livestock to drink Source: field, 2015

Drinking trough for livestock “traditionally made out of tree log” Source: field, 2015

Livestock drinking water Source: field, 2015

Women from richer households buying water from the village well for households use and livestock drinking and the man in a blue shirt was receiving the money Source: field, 2015.

Discussion with a family in a female headed household Source: field, 2015

Local milk processor vending her traditionally made yoghurt; only women did this Source: field, 2015.

Discussion with widow in a female-headed household Source: field, 2015

Discussing while having breakfast with a woman during village stay; the researcher stayed with this family during village stay in Lushoto Source: field, 2015

Livestock market or auction where only men could enter or trade Source: field, 2015

APPENDIX 8: QUESTIONS EXLPORED DURING FGDs AND VILLAGE STAYS

What are the expected outputs from the FGD-Gendered net map tool?

- We didn't see any village with both informal and formal marketing system- any village is dominated by informal or formal (traders-Tanga Fresh). So there is no difference in marketing of milk by women and men- mostly all farmers follow the same channel whichever available to them and giving more incentive to participate. (This is different in India- we see many models in same village so can be compared)
- Who are the actors/ stakeholders providing the services and inputs for dairy production?
- What are the factors or determinants for participation of men and women in the particular actor-services r inputs? (land and livestock ownership, human capital, norms and practices)
- What are the gender issues or constraints for the participation of women or men to access the services or input? (for gender analysis excel table)
- Which actor is more influential and why? How the market institution plays role for the dairy value chain improvement or increasing the production and gender inclusive? From influencing factors and ranking

What information needed to address the research questions through Ethnographic Study?

1. Ownership, control and decision making of livestock at household level- cooperative or non-cooperative model in male headed households- Rather than the number of livestock owned, find out the value of ownership- like women sells milk and receives money (Pastoralists- women handles the money from milk sale but she is not owner of the cow- so insight knowledge of the perception of ownership how women and men perceives?)- What happens in the female headed household for the ownership, decision making and control?
2. Same for land ownership- How owning land- small, medium and large farmers are different in the participation with market? Is it different between men and women what are the constraints for women in land title especially female headed households?
3. In-depth information on the norms and practices which is helping and preventing women to participate- explore some case studies where this is changed? What factors can change the existing norms to change for better participation.
4. What impact and effect of the participation in market- who controls the income within household and what are the dynamics?
5. How different in the food security, income, and expenditure pattern between female headed and male headed households and difference between the market institution models.
6. What are the gender constraints for availing the inputs and services (feed, breed improvement, health services, and credit and information) specific issues by women and men perceived and discussed.
7. Communication pathways for men and women for different information and technologies spread
8. Decision in the labour allocation- who does what, and who allocates? Go for activity clock observation for 2-3 type of household categories- Men headed, Women headed, (pastoralists, intensive, semi-intensive)- Take some pictures for activity mapping between men and women

Ideas for detail exploration in Ethnography study

1. *Data collection- village stay 2 weeks*

First- HH categories/ member sampling households for detail observation and interview

- Men headed households- separate interviews with
    - Men
    - Women
    - Observed with 80% of hhs are men headed, Take 5-7% hhs (15-20 hhs)
- Women headed households

    - Women
    - Men
    - Take divorced and widowed equally, take young (recently widow or divorced) and old women
    - Take 20% of the households (6-7 hhs)
- In both the above categories take households of rich and poor (this includes in the above samples)
    - Identify the household wealth by house construction- concrete, nos, no of cattle, land size (least considerable in pastoralists, applicable IN Lushoto)
- In Kilosa- take hhs from Sukuma, maasai and local tribes