Gender roles, local knowledge, food security and biodiversity in different livestock production systems in Tanzania

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1 INTRODUCTION

Tanzania has a large livestock population of about 13 million cattle; 3.7 million sheep; 6.4 million goats; 275,00 pigs and over 22 million chickens (1984 Census). The ruminant population is mainly concentrated in Northern zone (Arusha), Central Zone (Dodoma and Singida); Western zone (Shinyanga and Tabora) and Lake zone (Mwanza and Mara). This distribution has an important implication in terms of production, marketing and resource use pattern (particularly land resource). Livestock production in Tanzania is organised under two main sectors; the commercial and the traditional sectors. The commercial sector was once dominated by a few para-statal dairy farms and beef ranches which have recently been privatised. This sector also include a thriving urban and peri-urban private commercial poultry and small-scale dairy farms and accounts for about 15% of the total livestock population in the country. The traditional sector accounts for about 99% of the country's cattle herd and 85% of the chicken. Under this sector animals kept are mainly indigenous breeds like Tanzania shorthorn zebu (TSZ) (98%) while pure beef and dairy breeds constitute 0.8% and 1% respectively (Shayo and Mlay 1986).

The livestock industry is part of the agricultural systems of Tanzania where agriculture is the backbone of its economy and plays an important role in food security of its people. Its importance is great and multipurpose. This industry provides men and women not only with food (milk, meat, blood) but also draught power, employment and fertilisers for their crops (Lamosai & Crees 1992). In some situations they serve as a means of capital accumulation (banking system & insurance) apart from supplying manure, providing hides, skins, wool hair and numerous other products (Shayo and Turuka, 1987).

The traditional sector of this industry is divided into several indistinct production systems. (Mtenga et al. 1992). These production systems have arisen from the socio-cultural importance given to livestock in the society, the ecological zone of the area, the ethnic groups, animal ecotypes and the farming systems practised by the community. The three main livestock production systems identified are pastoralism, agro-pastoralism and small-scale intensive specialised system.

Pastoralism is a form of livestock production system which is migratory and does not involve permanent settlement. The pastoral societies derive most of their sustenance and livelihood directly from livestock and thus livestock plays an important role in the economy, food security, social and cultural lives of these societies. In Tanzania, these pastoral groups operate with mixed herd owning about 20% of all the cattle, sheep and goats in the country. The chief management objective in this system is to avoid risk of any kind, both to the subsistence and to the ruminant capital. Their cultural and social heritage is bound in livestock with utmost importance attached to ownership; large numbers attesting to wealth and a high social standing. The tendency of the pastoralists in building up numbers during favourable seasons to ensure the survival of their herds during drought or disease outbreaks has often led to overgrazing, environmental degradation and lack of commercial inclination (Mtenga et. al., 1992).

Agro-pastoralism is a farming system where crop and animal production is combined. It is the most common mixed farming system in Tanzania. This can be extensive or intensive depending on the land availability. The agro-pastoralists keep about 50% of the cattle, sheep and goats in this country and some poultry. They grow maize, sorghum and millet as food crops and coffee and cotton as cash crops. This system is predominantly found in Shinyanga, Rukwa, Mwanza, Tabora, Dodoma, Mbeya, Mara, Iringa and some areas of Kagera. In this system subsistence and food security is gained from crops. Livestock are maintained as a mobile reserve of wealth providing insurance against crop failure and as a source cash when needed. The stock consumes crop residues and fertilises the fallow fields. Some agropastoralists use these animals for power- as draught animals for ploughing and transport. Livestock off take tends to slump due to the disease outbreaks and drought risks. to minimise risks, some farmers keep their animals in different places and also have a tendency of keeping large numbers which often leads to environmental hazards (Mtenda et. al. 1992).

The Small-scale intensive and specialised production system is mainly a crop based production system in which animal component plays a complementary and essential role. In the densely populated areas cattle and goats are kept by small holders mainly for milk and supply of manure for the crops. These animals are prevented from damaging crops by stall feeding. There is a recent trend of specialisation in dairy production in which the farmers have been encouraged to form co-operatives, which collect and market their milk. The system is mainly practised in some areas of Kilimanjaro, Arusha (Arumeru) and Mbeya regions.

Although the traditional livestock sector accounts for about 99% of cattle sheep, goats and poultry, the economic potential contribution has not been fully exploited due to a number of constraints, which account for the current sector's poor performance. Problems hampering this sector of livestock range from nutritional, health, breed, markets, policies, gender blindness and capital resource shortage (Mackenzie, 1973). For example, although there seems to be some promising achievements in some disease control (such as rinderpest), frequent disease outbreaks

and the ever prevalence of tick-borne and tsetse-borne diseases, the development of vector-chemical resistance and the resurgent of CBPP in many parts of the country are still major threats to the livestock sector.

Despite the numerous technologies available and a good number of trained personnel with diploma or degree, their impact on the traditional livestock production systems seems to be negligible and gender blind. In this country, 51% of the human population is women and contribute about 75% of the labour force in agriculture with varying degree of involvement in livestock keeping; crop production and wage earners on top of their other roles as mothers and unpaid household managers. ILO estimates that about 98% of rural women classified as economically active are engaged in agriculture at commercial and subsistence levels including livestock and fishing, as casual labourers and unpaid family workers (FAO facts sheet, 1994). Although, the nature of these activities varies from culture to culture, the reproductive and productive roles are common and central to women's identify and often their main source of status within the family and community. The workload for women in general in all rural areas is higher than that of men.

Modern technologies have been introduced over a number of years in trying to increase the output from the farm animals with minimal success. The probable cause for such outcomes might be due to the techniques used which in most cases disregard the farmers' experiences and local knowledge. Odhiambo (1990) stated that the knowledge, skills and survival strategies of farmers operating with low inputs have been ignored and eroded by outsiders promoting modern technology which are often costly or require a lot of inputs. Traditional livestock keepers have means of handling adverse situations and managing resources at their disposal efficiently. They minimise risks and seldom take chances that may lead to hunger, or starvation or loss of crops or their livestock. But we researchers and policymakers have not made enough effort to record or understand the variability in their cultures according to gender, age, class or occupational role. Identification and modification of the existing knowledge, which has persisted for several years in the society, can assist in the adoption of innovations. Dickman (1994) noted that innovation was accepted by farmers when its development involved step by step integration with existing farming system and local knowledge.

Several studies have been conducted by the authors aiming at analysing the gender roles and local knowledge, skills, practices and beliefs pertaining to animal health and production techniques in different livestock production systems. Data gathered from the studies is crucial and useful for increasing beneficial exchange among local community, animal health care providers, the formal animal health and production practitioners and the national policy makers and international agencies active in this field. It will be useful also for the authorities involved in the country's food security.

2 RESEARCH METHODOLOGY

2.1 The Study Area The studies were conducted in seven regions namely Kilimanjaro, Mara, Mwanza, Morogoro, Iringa, Tanga and Mbeya. These regions were selected because of their contrasting livestock keeping systems. In Kilimanjaro, the intensive livestock keeping system is dominant whereas in Mwanza and Mara, livestock are largely kept under extensive agro-pastoral system, while in Tanga and Morogoro there are seminomadic pastoral production system and in Mbeya and Iringa, the intensive agro-pastoral system. In some of the regions both crop and livestock production are practised while for the pastoralists of Handeni and Morogoro crop farming is minimal.

2.2 Data Collection The main methods of data collection used included:

a) Group interviews b) Individual or face to face interviews c) Observations d) Intensive discussion e) Collection and identification of local herbs used for medicinal purposes.

Group interviews were conducted in order to get an overview and opinion of the communities in general. Aspects such as gender division of labour in the household, indigenous knowledge in livestock pests and diseases, control and treatment of livestock diseases were covered during interviews. Checklist was used to guide discussions during the interviews. Based on the results of the preliminary survey individual interviews were designed for the purpose of quantifying and clarifying important aspects in the respective systems. Data was collected from fact to face interviews using a structured questionnaire. The unit of investigation in this research was the household. Throughout the study, physical observations, the identification of local herbs used by farmers for various purposes in livestock production was done. Samples of identified herbs were collected and dried for further taxonomy using experts in the Department of Forest Biology. The observations and discussions were also recorded through photography, video and flip charts.

2.3 Sampling Procedure The selection of villages in identified regions was based on the representativeness of the dominant livestock keeping system in the area. The choice was based on preliminary findings. A sample of key informants was selected from each village to participate in group interviews. Two groups, one of women only and the other for both men and women of 5-10 people were interviewed in each village. The farmers were selected based on their experience and knowledge in livestock keeping. For the individual or face to face interviews, a random sample of 30 households was selected with the assistance of the extension officers and village leaders in that particular village. In selecting the households, purposive sampling was used to select the households that kept livestock.

3 RESULTS AND DISCUSSION

3.1 Study Areas and Demographic Information The study locations differ greatly in terms of topography, traditional groups, land tenure, rainfall pattern, minimum and maximum temperatures, vegetation and soils. These factors have contributed to the evolvement of different

production systems. Tribes found in these areas also differ and include the Maasai, Hehe, Kurya, Luo, Songo, Malila and Sukuma. For these, pastoral system and agro-pastoral systems dominate, while the Chagga, found in Kilimanjaro, use the intensive production system. Different tribes in Tanzania have different cultures and customs. This is usually reflected mainly by the type of staple food, farming practices, livestock production system and roles performed by men and women.

The majority of the respondents in Iringa, Mwanza, Kilimanjaro and Mara have had primary education and are therefore able to read and write, unlike pastoralists in Morogoro and Tanga, where about 83% did not have any formal education. Most men are married and polygamy is a common feature, particularly among the pastoralists and the agro-pastoralists in Iringa. A large number of children (about 8/family) are also a common feature to all the pastoral and agro-pastoral systems. In the intensive systems where monogamy is common, there are about four members per family.

Residence period in the area for the respondents is variable. The agro-pastoralists of Mwanza, Mbeya, Iringa, and Mara have stayed in the area for more than 30 years that is 35.25±21.3 and 37.75±20.0 years respectively while the pastoral groups in Morogoro and Tanga have only lived in the areas for 10.3±10.6 years.

3.2 Livestock Species, Breed and Numbers Cattle are the dominant and most important livestock species in all production systems studies. Cattle are acquired through purchase, inheritance, present and dowry. The main reasons for keeping cattle are prestige or sign of wealth, income, social security, dowry, draught power, milk, meat and manure. However, there is a variation in animal numbers, large herds of cattle up to 200 are found in the pastoral system while only an average of about 7 - 15 in the agro-pastoral system in Iringa, Mara and Mwanza and an average of 4 dairy cows in the intensive system. This is in agreement with the general feature of pastoralists whereby large numbers of cattle are kept. The breeds kept by the pastoralists are the local indigenous dual purpose cattle mainly Tanzania short horn zebu (TSZ). During the present study, the respondents have revealed that there is a progressive decline in the number of calves resulting from tickborne diseases probably due to a halt in vector control. Other species kept apart from cattle are sheep, goats, poultry, pigs, donkeys, cats and dogs.

In the intensive system the economy is based on the cash crop coffee, while animals play the important role of supplying manure and milk. Animals kept are a few (2-4) improved dairy breeds, milk goats and few chickens. Currently due to a fall in the coffee production, milk is increasingly becoming an important source of household income.

3.3 Livestock Health, Husbandry and Management 3.3.1 Local Knowledge The management techniques and practices have been developed traditionally and passed on from generation to generation. Livestock are kept extensively in the pastoral and agro-pastoral systems studied. The pastoralists have a migratory type of husbandry because they stay in the semi-arid areas where

rainfall is unreliable, although it can reach 400-600 mm. These people have very good knowledge of the various vegetation types where they graze their animals - i.e. all fodder plants are known in local names. They have also an efficient flow of information about new areas for the grazing. They are capable and skilful in tending their animals. Pastoralists operate with mixed herd (cattle, sheep and goats) making intensive used of these animals and taking advantage of their different reproduction rates and feeding habits. Thus production of the animal protein per hectare is twice as high as the ranches. In addition, pastoralists interact with wetter areas where they can purchase grain to supplement their milk diet; where the crop residues after harvesting are used for grazing their animals; where they can find water for their animals and family use, and where they can find employment for cash payment during lean years so that they can rebuild their herds and sustain their families. Despite some few squabbles many places have seen a symbiotic relationship develop between the arable farmers and the pastoralists. No sensible pastoralists destroy grazing resources, so rarely do they start fires to burn pastures.

During the study, it was apparent that the majority of the respondents had substantial knowledge of diseases and health problems of their animals. Ill-health as a result of diseases transmitted by ticks, tsetse-flies and worms was high in all the areas studied. Diseases seemed to be the main constraint in livestock industry due to lack of drugs, increasing prices of veterinary drugs and services, nonfunctioning dips and lack of adequate extension services. They study revealed that pastoralists, agropastoralists and intensive farmers use all options they have including local herbs and modern veterinary drugs to tackle health problems that confront their livestock. However, where the animal is valuable the farmer sought veterinary help immediately. A list of local herbs used has been compiled (Table 1). We hope, in the near future, funds permitting, these herbs will be analysed chemically.

Table 1. Maasai Herbs, Scientific Names and their Uses VERNACULAR NAME SCIENTIFIC NAME USES 1. Ol sugukututi Cissus quadrangularis Kukohoa 2. Lbukoi Monordica spinosa Kuharisha tumbo 3. Olsuki Faraga chalybea Vidonda kusafishia kibuyu (Magome) mkaa wake kuhifadhi maziwa. 4. ol girigiri Acacia pennata Worms, 5. eluai Acacia brevispica babesiosis 6. ol mukutan Acacia drepanolobiu bark-mastitis, diarhoea, worms 7. ol suguroi Albizia anthelmintica retained placenta, wounds 8. ol beresonjugi Aloe volkensii non-infectious diseases 9. ol sagarami Andropogan ischaemum eye 10. ol amuriake Bauhimia thonningii worms, 11. ol senetoi Carissa edulis leaf, constipation, diarrhoe 12. ol matasia Clausena anisata leaf-worms 13. ekirikiri Erythrina abyssinica flower-eye infection 14. ol pongoni Euphorbia candelabrum Wounds, sores, ulces 15. olo engerianthus Galium aparinoides fruit-thoat cancer 16. ol orien P;ea afrocama leaf-eye, babesiosis 17. ol dule, ol onyonyong'I Ricinus communis mites mange, diarhoea, retained placenta 18. ol ojongalami Serbania aegypriaca diarrhoea 19. ndulele Solanum incanum fruit-constipation root-worms 20. ganyamda Balenites eagyptiaca mites, mange, worms, 21. ol ama Ximenia americana root-diarrhoea, wounds 22. ol kiperelekina retained placenta 23. igumu Tephrosia vogelii minyoo, mites, mange, ticks 24. ole kyasa malaria 25. ol kolobobiti ECF-UTOMVU 26. olkunonoi otitis

3.3.2 Housing In the pastoral and agro-pastoral systems, the animals are housed during the night in enclosures which are not roofed. These enclosures are known as kraals or bomas built within the homestead from materials readily available from the locality such as thorny bushes or bamboo trees (Iringa). The young calves are normally kept in special houses constructed out of wooden poles and thatched with grasses or stay in the same house with family (Maasai). Sheep and goats in some areas are kept in small kraals or houses. The knowledge of how to build animal enclosures is learnt from the elders. In the intensive system, most of the farmers are elite having had an education or training on how to keep dairy animals and thus build modern houses of concrete and mortar, roofed with iron sheets. Small biogas units have also been built by some of these farmers using the animal dung.

3.3.3 Feeding and Nutrition Animals in the pastoral and agro-pastoral systems are grazed in open areas for 6-11 hours everyday. The grazing areas are selected depending on the availability of pasture and water, thus the distance from home to the field varies depending on the season. Supplementation is rarely done except after crop harvesting when the animals are left to feed on crop residues in the fields. Agro-pastoralists have shortest time (6 hours) coinciding with the peak of agricultural work when they have to work in the crop fields first before herding the animals. The pastoralists' pattern of herding a combination of the ruminant species with different foraging habits and reproductive rates indicates an overall optimisation of resources. Both systems of production have evolved several skills, which enable them to feed their livestock during the dry and wet season and also allows the animals to survive in the face of high challenge of diseases such as tick-borne diseases. Forage is plenty during the wet season and animals gain weight and milk-yield is high. However, during the dry season the grass is dry, scarce and of low nutritive value, thus the animals tend to be unproductive. Animals are watered in natural rivers or water holes or dams. No supplementation if the animal diet is given although some farmers give their animals minerals either naturally occurring or bought. In the intensive system, animals are stall-fed, whereby the owners have transport and collect hay from fields far from home. Some preserve crop residues such as maize straw or rice straw for dry season feeding. The farmers also grow fodder grasses such as elephant grass and siratro on the slopes and borders to use as feed. In addition, the animals are given supplements such as cereal bran, mineral licks and molasses.

3.3.4 Reproduction and Breeding The pastoralists have controlled breeding whereby they select the best bull, breed with the best cow for size, shape, colour and milk-yield. However, some of the agro-pastoralists mate their animal randomly with the aim of getting more bull calves so that they can use them for power. The growth rate being slow, the age of first mating vary between 3 to 5 years and calving interval is 1.5-2 years. The dairy farmers either use artificial insemination (AI) or borrow graded bulls from neighbours for breeding.

3.3.5 Milking and Milk Processing Milking is normally done in the mornings and in the evenings every day for all systems but only once a day (in the evenings) for the poor milkers. Instruments used for milking are gourds or wooden cups (nunda) or plastic containers. Milk is consumed fresh in most of the households and some made into yoghurt. Excess milk is sold

either fresh or as yoghurt. Ghee and butter is prepared locally and used for home consumption and excess is sold.

3.3.6 Slaughtering and Meat Processing Animals are rarely slaughtered unless they are too old and unproductive or there is a special occasion. Often the Islamic rites are observed during slaughter since the meat might be sold to both Christians and Muslims. In many cases, just small amount of meat is taken for the family and the rest is sold for cash or bartered for grains.

3.3.7 Other Animal Products Animals dung is used as manure for fertilising crops in the field. In some households it is dried for fuel or building. Few households in Iringa did not use the manure as fertiliser because they believed it dispersed weed seeds in the farms. Skins and hides are often sold to shoe factory or middle men who transport them to shoe factories. Urine is normally used for cleaning gourds and for treating FMD cases or treating hay to make it more nutritive and palatable for the animal. Some of the skins and hides is used for making skirts, water bags, sitting mats or donkey bags. Thus under the pastoral system there is nothing from the animal which is wasted.

3.3.8 Crops and Livestock Interaction A major link exists between crop and livestock production in the agro-pastoral and intensive production system. Crop residues and crop by-products are directly used as animal feeds while manure and draught power are used for crop cultivation. Cash from the sale of surplus crop or cash crops is saved by buying more livestock. This acts as a buffer to secure food supply in lean years or in case of crop failure.

3.4 Gender Analysis in the Livestock Production System Gender analysis was carried out to enable us to recognise the different issues and interests women, men, girls and boys have on the livestock production system. A variation in the interests, issues and roles for men, women, male children and female children within a household was observed between the systems.

In the pastoral system, the gender division of labour is rigid becoming more flexible in the agro-pastoral and intensive systems. The gender analysis is discussed in detail under each system.

3.4.1 Gender analysis in the Pastoral Production System Ownership and Control of Resources In this system of livestock production 98% of the respondents said the cattle belong to the men. Children and women mostly own the smaller stock such as poultry and rabbits. Analysis of gender issues in the pastoral societies studies indicate that ownership and control of cattle, sheep, goats is tightly vested in male heads of the household. Women have limited rights. They control the milk of certain cows allocated to her by the husband. The male heads of the pastoral society are so conservative that they even control the religious and traditional rituals of their women-folk. This is so because the ritual leader (laibon) and the age-set spokesman (laigwonak) must be a man. All the family resources and assets are controlled by the male head. Even children born to the women outside marriage belong to the husband.

Gender Division of Labour The pastoral groups of Morogoro and Tanga are irregularly transhuman moving the herd and part or all of their settlements to areas where the herds will be certain to survive during particularly extremely long dry seasons. The daily work of attending them is assigned to the uncircumcised boys (ilaiyoni) who eventually miss formal education. They are helped by ilmurran if the pastures are a long distance from the settlements or sending the animals to dips; or water points. Murrans are also given the tasks of buying and selling stocks at the auctions, medical treatment of the sick animals, the branding of animals as well as any service which the elders might demand of them from time to time (e.g. transmission of messages). They also build the kraals or bomas and palisades for small animals. Calves are tended by children both boys and girls.

The life of women and girls in the pastoral society is shaped by the livestock-economic system. With marriage, which is sanctioned by a transaction of 8-15 heads of cattle from husband to father of the bride, the wife is assigned a number of milk cows and small stock. Studies revealed that 81.7 and 95.0 percent of the women in the households are involved in milking and marketing of milk and milk products such as ghee and butter that they prepare.

In addition, women pound maize or take to the mills and prepare the daily food. This consists of stiff porridge eaten with fresh or sour milk; sometimes cassavas, sweet potatoes, red beans and rice. Meat is only eaten on ritual occasions or when sick animals have to be put down. Children and women also collect wild berries, fruits, nuts and honeycombs for the family. Women milk the cows twice a day and look after the young animals, which have to be brought to their mothers twice a day and separated from them again. Women are responsible for keeping food stores and for making butterfat from milk. The work of milking as well as the control of the distribution and consumption of milk and other food types such as maize are the undisputed responsibility of the individual women in a household.

Other duties are fetching water, firewood and daily cleaning and repair of the houses which normal they accommodate calves. Women and girls make milk calabashes, which they clean daily with water or cattle urine and fire. They brew mead and prepare snuff, go to the market and maize mill. They work the skin of slaughtered animals making leather skirts, cloaks, water bugs to be carried by the donkeys and bead jewellery work for decorating women, men and children of the household. The hardest and most time- consuming work is building houses and keeping them in good repair. A well-off man, however, will pay casual labourers mainly their Bantu neighbours to build a house for his wife. However, the current migration of young energetic male members of the household into towns to seek wage labour, which is on the increase has a detrimental effect on the fabric of the household. The advantage of this move is that the man gets cash to buy grains and restock. The major negative effect is that the women who are left behind have a heavier workload of managing the rest of the family and whatever animals that are left.

Older men do not normally carry out manual work unless he is poor and does not have grownup children. They are responsible for managing all matters of public interest i.e. settling legal disputes, marriages, bride-price, divorce and arrange ritual ceremonies. They also sanction any conflicts settled by women. The elders are responsible for the management of the herd, which includes the cattle of his children and wives. They also supervise the work of all members of the household and discipline the wrong doers. The gender-specific division of labour manifests its not only in the economy but also in the ritual and political spheres i.e. in rituals women play very small task of moving with the sons or group as a cook to a new settlement for a few years.

Decision-making in a Pastoral Society Despite their considerable labour input in the care and maintenance of the herd, women are excluded from major decision making. Cultural laws and traditions rationalise this exclusion, maintaining that conflict between men and women is inevitable because women give first priority to satisfying the milk needs of their children while men put the needs of the herd first. The discrimination in gender roles is also noted where there is labour shortage. In such cases women can and do perform male tasks such as herding and watering animals but men seldom perform female tasks except in those tasks which are associated with increasing control over assets which are gaining in value.

3.4.2 Gender Analysis in Agro-Pastoral Production System Ownership and Control of Livestock and other Household Assets Livestock ownership particularly cattle is mainly confirmed to men being 66.7, 76.7 and 75 percent for Iringa, Mwanza and Mara, respectively. A wife can own some animals through inheritance or purchase with money obtained from the sale of surplus food crops or any other fund-generating activities. Children are also entitled to animals which they may be given as presents by a relative or which are inherited. In case of female headed households, women own the family livestock and make decision concerning their sale or slaughter or exchange. Women also do not own the land but have access to it through the husband or their families. Husbands allocate small plots to each wife and in these plots the woman will grow food crops for the family. The produce from this plot belongs to the women and she can always sell the excess but with the husband's permission. Thus it is common for women to command the food crops and poultry which are consumed by the family, whereas men are responsible for cash crops and livestock production, with the output being at their own disposal.

Gender Division of Labour The most time-consuming activity in livestock keeping is herding, which is done by boys who have left school or children on vocation. In some cases, the male head of the household will graze his animals or use hired labour. Watering the animals is usually done by men, while male children and other family members may help. During the dry season when water is in short supply the male head has to dig a well at the bottom of a river or ferry water from permanent wells using oxen carts. Construction of kraals is mostly a men's building of special houses for calves and small ruminants and chickens is the responsibility of the men.

Caring for the young stock is done mainly by children, but wife and husband can also help. By tradition milking is done by women, mostly girls. Processing of milk to ghee is a woman's job. Women also do marketing of fresh milk, skimmed milk and ghee. However, there is an exception in the Sukuma tradition, where milking is done by men but the milk is passed on to the wife for distribution as required.

Identification of livestock when on heat, pregnant, or sick is done by male head assisted by other members of the family especially those who have been herding the animals. Similarly, selection of the best animals and decisions regarding livestock are taken by the head of the household.

Other farming activities are distributed among the family members. These include cultivation of the land, sowing, transport of inputs and products, harvesting and processing and marketing of the produce. Domestic/household and agriculture/livestock production duties are closely integrated, so that there are conflicting demands for labour and other resources within a household.

Decision-making A wife cannot decide to sell or slaughter her animals without consulting the husband but she can decide to use her money from sale of surplus food crop to buy livestock. Even children cannot decide on their own. On the other hand, they can dispose of chicken without seeking permission.

3.4.3 Gender Analysis in Intensive Livestock Production System Ownership and Control of Resources In the intensive system, less than 50% of the respondents said the livestock is owned by men (cattle, 23.3%; goats 33.3% & sheep 22.3%). However, 40% of the respondents said the main ownership of the family assets including livestock is of the whole family. Land, belongs to men (or his clan) who has full control over it thus he can dispose it as he wishes. Chicken are mainly owned and controlled by women (33.3%) and children. In case of the man's death the elder son takes over the control of the land, livestock and other assets or the assets are divided up if the man had many sons. The wife can care for the assets on behalf of her sons if they are still young with deceased male relatives acting as advisors. Coffee, which is a cash crop, is controlled by men. Food crops such as bananas, maize and beans are controlled by women, but once they gain in commercial value the man takes over. Milk was formerly controlled by women, but nowadays it is controlled by both men and women because it now represents the main source of household income. Women have access to the income but do not have full control over it. Women are the ones collecting cash from the sales of milk, which is not the case with coffee.

Gender Division of Labour The activities are distributed among the family members by gender. These activities include domestic/household and crop /livestock production, which are closely integrated so that there are no conflicting demands for labour and resources within the household. Women concentrate more on the activities related to food crop production while men are responsible for the cash crops and taking the cow to a bull for mating (48.3%). Crop farming

activities, such as weeding of the coffee and banana farms, are undertaken by the whole family and labourers. Pruning of the coffee is mainly done by men, while picking and processing of the coffee is done by the whole family with the help of labourers. In most cases, men are more involved in the processing of coffee. Ferrying coffee to the market is done by women with the help of children. Collecting of cash from sales is men's activity. Men are engaged in clearing maize fields before they can start ploughing. Hand hoe or tractor is then used for ploughing, a job done by both men and women. Almost all the fields of maize and leguminous crops are sown by hand. This is mainly done by the whole family and casual labourers. Few farmers use tractors for planting, but if so the work is supervised by men.

Workload Women work for 15-17 hours a day (105-117 hours a week) during the peak season of activities such as sowing maize or beans, harvesting maize, and picking and processing coffee. Men in these rural areas work hard, between 40-75 hours per week, but only on non-domestic duties, and rarely do they contribute to housework and child-care.

Decision-making Women's access to money is dependent on their opportunities for earning money in the village and surrounding areas. Besides the opportunity for earning money, married women's access to money is dependent on the attitude of the husband and the resources available. In case of Wari Women, keeping dairy cattle has enabled women to have a limited control over it. Crop production is organised at the household level. The head of the household and his wife, or the female head of the household decides which crops to be grown and how the produce should be used. Slaughtering of cattle, goat and sheep is rarely done nowadays. It is done only when a special need arises in which case the head of the household, who in most cases is the husband, makes a decision on slaughtering in consultation with the wife. Slaughtering of chickens and ducks is decided upon by the wife without seeking permission from the husband. Sometimes children are consulted as they own some of them. Decision on the addition of livestock is made by both the husband and wife, money for adding livestock is mainly from the sale of milk.

3.5 Food Security and Livestock Production Systems Food security is achieved when people have access to sufficient staple foods to enable them to lead healthy working lives and participate in the growth and development of the societies in which they live. Staple food varies widely among individuals, environments and conditions. Access to food means having adequate supply of food to meet perceived needs and is acquired either by growing it or/and buying it. Lusaka Accord, (1980) established that improved food security was an essential objective in the drive towards economic liberation in any nation. Currently, the general trends of attaining food security is through food production whose levels are declining while population growth rate is soaring, level of malnutrition and infant mortality are increasing and life-expectancy is low. Let us look at the different livestock production systems, deduce their food security and discuss their limiting factors.

3.5.1 Pastoral System Although data on milk yields, household grain production, marketing of livestock and diet were not specifically included in the structured interviews, the following information on food provision for the household can be deduced from the PRA. Many of the

respondents said that milk and meat produced from their herds was inadequate to feed and sustain their families as it used to be. The livestock holding size has decreased tremendously due mainly to diseases. The principle strategy of the households therefore is to cope with declining herds by cultivating maize. The source of income is the sale of livestock. Livestock are sold in the primary livestock markets (mnada) to middlemen by bargaining process then transported to terminal markets in the district or municipal for slaughter. Cattle owners are reluctant to use the weigh-bridges because animals offered for sale are weak bulls, steers, old and unproductive cows or animals not immune to diseases. Cattle prices are not controlled and vary seasonally and according to supply and demand. Marketing of milk is done through informal sector whereby the pastoralists sell directly to consumers or milk vendors who collect and sell it in urban centres. Hides and skins are normally used for household the extra ones are sold to traders by the women.

Men and women of the same family have been forced to take up other economic activities such as crop farming, poultry keeping, petty business in towns and wage labour in the cities. The move to cultivation of maize is not to secure grain but to safeguard their livestock as many responded by saying they do not want to sell their livestock for food. They are sentimental about using their animals for ploughing, thus they can only plant small plots using hand hoes. The produce from plots can only sustain the household for a short period therefore funds collected from other activities is used to buy more grain and for restocking. This has also resulted into changes in eating habits from the meat and milk to grain foods for survival. The quality and quantity of the food eaten depends on the season. The basic diet is milk and stiff porridge or ugali, some beans and tea. Adults eat twice a day but children trice a day. The taboo of not eating chicken or fish has resulted in many children being malnourished. Although many keep poultry, they do not feed their children eggs unless the doctor prescribes. This trend obviously will have a negative impact on the nutrition of pastoral families. One detrimental cultural habit is that of fasting during pregnancy so that the women may have easy delivery. Although its effect was not assessed the consequences are obvious.

3.5.2 Agro-pastoral System The agro-pastoralists are subsistence farmers whose main aim is to produce enough food to sustain the family throughout the year. They till the land where rainfall is often unreliable leading to crop failure. They keep livestock primarily as a banking system to insure survival during drought. These people try as much as possible to reduce the risks of crop failure. For example, in Mwanza region farmers inter-crop about 5-6 different crops in the same field. Similarly, in Mara they plant drought resistant crops such as cassava, sorghum and sweet potatoes. Cassava and sweet potatoes are used for the roots and leaves. During this period they normally sell their animals starting with poultry, sheep, goats and then cattle to buy grains, thus livestock play a big role to ensure that household food needs are met. Likewise livestock exchange as dowry help to assure access to food in times of shortage for families with daughters.

Productivity of their livestock is low thus tendency to keep large numbers as sign of wealth and more ability to withstand drought. Similar, livestock are sold in primary markets at a varying price depending on the season, the supply and demand. Milk is also sold informally to consumers or milk vendors who send it to the urban centres.

In the agro-pastoral system in Iringa and Mbeya, livestock contribute directly to food production by providing manure as fertiliser, power, milk and meat. Also the livestock can be sold for cash when it is needed. Land scarcity contribute to insufficient food supply to some families in the villages thus there is a great need to intensify agricultural activities or create alternative employment opportunities.

3.5.3 Intensive Livestock Production Essentially these people are crop farmers with perennial and annual crops. The perennial crops require manure thus livestock is first bought in order to supply manure for the coffee and banana plantations. However, as population increased land for grazing decreased thus these farmers were forced to stall - feed their animals. The government encouraged and helped them to acquire more productive animals (improved dairy cattle and milk goats). Farmers were encouraged to invest into good housing, improved breeds and were taught how to grow fodder and supply better animal feeds. Cash is normally received from the sales of coffee and livestock. Milk is sold directly to consumers. In some villages residents have formed co-operatives which collect milk and send it to milk factory in Arusha. Some farmers make cheese when they do not get a market for their milk. Food security in this system is good because they have bananas, maize and beans as food crops and coffee for cash. Infrastructure is reasonable thus food distribution and marketing can easily be done.

3.6 Factors Limiting the Contribution of the Livestock Industry to Food Security It has been documented that agriculture contributes over 40% of GDP and 70% of export earnings of which 30% is from livestock (beef 40%; diary 30% and other livestock 30%). Despite its current important role in the national economy, the potential contribution has not been fully exploited. This is due to a number of constraints such as nutrition, health, breeds markets and capital resources. Pasture availability usually follows the rainfall pattern and this is often inadequate both in quality and quantity during the dry season. Animal health is still affected by disease such as tick borne diseases, trypanosomiasis and CBPP. Attempt to raise productivity of the indigenous breeds is hampered by lack of capital resources.

Women participation in the livestock sector is limited by several factors that contribute directly to food insecurity. Women have no right to own land in many traditions and cultures and as such she has no collateral to get a loan or credit. Similarly ownership of livestock is vested in the heads of the households whose majority are men. In addition, lack of social pointers such as education, health programmes, child care facilities, water and fuel facilities and appropriate farming technology geared to minimising the work load of women and optimising on their productive activities.

Many factors affect food security in Tanzania and these can be grouped as economic, social, institutional, structural and environmental factors. At the household level, key factors are: a) Weather – dependence on unreliable rainfall for crop and livestock production. b) Declining of

land for cultivation and grazing c) Productivity of the farms and animals is low d) Family consumption requirements has increased due rise in human population (3%) e) Household storage capacity not available f) Cash requirements for other activities are increasing such as school fees, medical fees, clothing, etc. g) No effective use of advanced technologies h) Education levels low.

At the national level, the following factors prevail: a) Price and marketing factors, insufficient attention to market forces. In some cases, the prices do not provide incentives to the farmers to produce more. b) Availability of consumer's foods locally is limited c) Availability of credit and agricultural inputs is also limited d) Infrastructure serving production centres is inadequate. e) Food distribution and marketing - (livestock markets, tracking routes, livestock products processing industry) is poor f) National policies are poor or lacking tooth for biting.

4 CONCLUSIONS

From this study there are pointers showing that the animals serve several diverse purposes in the economy and food security of each system, but primarily to satisfy the basic needs of the family rather than to meet the demands of the market. During the present study it has been found that, first, subsistence farmers dominated the rural areas regardless of the livestock production system, and they all keep a variety of different species of livestock.

Second, rural women work hard in all production systems with a workload of 14-17 hours a day compared to that of men of 6-8 hours. However, women do both productive and reproductive work while men to only the productive work. This means that women are not only bearing children, housekeeping and child care, but are also earning income, growing food crops and ensuring the family food security. In addition, the migration of the young and energetic members of the households to cities to seek wage labour is putting the fabrics of the families at stake and increasing the workload of the pastoral and agropastoral women.

Third, in the pastoral system, there is no interaction between crop farming and livestock and that cultural attitudes and taboos are more ingrained and often have a negative impact. Although there is no concrete data on household consumption or nutritional status from these studies, it is clear that livestock holdings and milk yields have dropped to a level which is unable to sustain the majority of the households. In the absence of an alternative source of income to supplement the livestock economy and re-invest in livestock, poverty is increasing in the livestock based economies. This implies that local knowledge or traditional production no longer suffices the food needs of the household. There is a need for new interventions.

However, in the agro-pastoral and intensive systems, there is a strong interdependence between crops and livestock. In periods of drought, livestock provide a buffer against low crop yields or crop failure, but over the long term neither sub-sector is abandoned in favour of the other. An

increasing dependence on grain is pushing households into crop cultivation to reduce the need to sell livestock in order to purchase grain, but in the end reducing grazing land. Moreover, the productivity of most of the stock is still very low and most farmers have a lot of uncertainties.

In all systems of production, men and women have developed different expertise and knowledge regarding the local environment, plants, animal species, their products and uses. The gender differentiated local knowledge is highly sophisticated, traditionally shared and plays an important role in the conservation, management and improvement of genetic resources for livestock and crops. For example, women and men's knowledge of wild plants has been used to identify plants to be used as food in times of needs, as medicines, and as sources of income. Furthermore, through experience, innovation and experimentation, sustainable practices have evolved to protect soil, water, and natural vegetation.

Thus as women hold half the universe/sky (Chinese Proverb) and sustain more than half the agriculture, if progress in empowerment of rural women and if their increase in their participation in development is to be sustained and advanced, then major changes in attitudes must come from the people who hold up the other half of the sky, the men. 'It takes two to tango'.

More research is needed to find out the impact of the changes taking place in the household of the study areas and how it affects food security. The studies should be carried out over a specified period for conclusive data to be collected. In summary, this paper has tried to point out that livestock plays an important role in the life of many rural women and men. Therefore, livestock productive ventures should ensure that the potential and needs of both women and men are taken into account e.g. the questions of ownership and rights to resources, distribution of work load and their management and use of biological resources.

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