
Gendered Perspectives on Smallholder Cattle Production and Health Management in Three Sites in Tanzania

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Abstract

Dairy farming offers opportunities to address poverty and food security among small-scale livestock keepers in Tanzania, particularly rural women. Animal health problems greatly hinder dairy farming in the country, making animal health interventions critical for achieving food security. Limited gender research has been undertaken on animal health and in relation to food security in rural households. Based on six focus group discussions, twelve individual interviews and a literature review, this study provides a gender analysis of animal health in small-scale dairy farming and the food security implications in three villages of Tanzania. The findings show that both women and men respondents were involved in animal health management and had similar knowledge of diseases. They also show how animal diseases impact the food security of women in particular. Yet, women were found to face more constraints than men in accessing vet services, information on diseases, and animal medicines. The article concludes by suggesting possible ways of minimizing gender disparities in animal health management.

Keywords: Animal health, Tanzania, gender, food security, dairy, livestock

Introduction

An estimated 30 percent of livestock production in developing countries is lost because of disease (Upton 2004). As reductions in milk yields are often the first clinical signs of disease, food security is regularly compromised. The impact of this loss can be especially dramatic for poorest households and women in particular (Njuki et al. 2016). Women constitute two thirds of poor livestock keepers. They are substantially involved in livestock management and depend on it for their food security and that of their households (FAO 2011b). Yet, women livestock keepers in East Africa are less able than men to address animal diseases because gender norms often constrain women's access to veterinary services, animal medicines and information (World Bank et al. 2009). Also, women are more vulnerable to animal losses than their male counterparts because they are less resilient to shocks: women own fewer resources to invest, have fewer alternative options to earn a living, and have less access to compensation programs (World Bank et al. 2009). Therefore, improving animal health management in small-scale dairy production in a gender-responsive manner, offers an opportunity to enhance the livelihoods and food security of smallholder households and women in particular. Finally, gender-responsive animal health interventions can offer opportunities to empower women given that milk -as compared to e.g. land, livestock and machinery- is often one of the few resources that women in livestock communities can control and use to feed their families particularly in East Africa (Swai et al.

2014; Njombe et al. 2012).

In Tanzania, the dairy sector provides livelihood support to approximately 1.3 million men and women (Ulicky et al. 2013). Between 80 and 95 percent of milk consumed in the country is produced by smallholders in extensive systems with local breeds (Phiri et al. 2011). Dairy farming generates the essential food to meet the household nutrition needs of these small producers, as well as provides them with a regular source of income throughout the year, thus making a key contribution to their food security (Kawonga et al. 2012). One of the causes of low milk productivity in Tanzania is poor animal health management at household level (Chang'a et al. 2010). Annual livestock mortality rates in smallholder households across a number of regions in Tanzania stand at 12–14 percent (Alonso et al. 2016). Focusing on the animal health challenges facing small-scale farmers is, therefore, of the utmost importance in increasing milk productivity sustainably and lifting small-scale farmers out of food insecurity. Understanding how the food security of women and men small livestock keepers in Tanzania is differently affected by animal diseases, and appreciating how gender dynamics affect their ability to cope with animal health issues can help better prioritize and target animal health interventions.

This article provides an overview and discussion of gender perspectives in dairy farming and animal health, and their implications for food security in three selected dairy smallholder households in Tanzania. It addresses the overall research question: 'How is the food security of women and men from the selected households affected by animal disease, and how?' This article describes gendered roles and control in dairy and animal health management in selected households. It shows how women and men are affected differently by animal diseases and the differential consequences on their food security. It discusses how to design gender-responsive animal health interventions to benefit women in particular. The article also suggests areas where gender norms and dynamics can be addressed by animal health interventions to enhance gender equity in dairy farming. Because it is based on a small-N (Mahoney & Goertz 2006; Flyvbjerg 2006) study this article aims to: a) tease out the salient issues in gender and animal health that could be examined subsequently in larger-scale or in-depth follow up research; and b) provide recommendations for animal health interventions that could be applied in broadly similar contexts.

Literature review

Livestock are essential assets for rural women and men in East Africa (Njuki & Sanginga 2013). They are regarded as safety nets for poor households because in case of shocks or need they can be easily converted into cash (FAO 2009). Livestock generally form a larger proportion of women's total assets—although women frequently control fewer and smaller animals than men (Flintan 2008; FAO 2011a). Also, women tend to own local breeds while men are more likely to own the more productive exotic or hybrid breeds (Njuki & Sanginga 2013). General livestock labor trends in sub-Saharan Africa indicate that women play a large role in the care of animals through activities such as cleaning barns, milking cows, making butter and ghee, watering, looking after calves and sick animals, cutting grass and supervising feeding. Men, on the other hand, are more involved in feeding oxen, livestock marketing and, together with women, managing livestock diseases (Yisehak 2008). In Tanzania, evidence on who in the household is involved in animal farming is scant and contradictory. Kawonga et al. (2012) show in their study on dairy farming in one district of Tanzania a high prevalence of male livestock owners with

limited details on labor allocation. Chang'a et al. (2010) reported that smallholder dairy farming was mainly controlled by men but often provides self-employment opportunities for women. A number of authors (World Bank et al. 2009; Njuki et al. 2016) report that intra-household allocation of labor in East Africa is affected by the level of intensification and commercialization of dairy farming with women taking on more work in intensive systems while losing control over the benefits accrued from milk.

In terms of gender roles in animal health management no specific studies were found in Tanzania. Evidence from East Africa shows that in more sedentary agro-pastoral African communities, women are expected to observe animals returning from pastures in the evening to identify health-related problems, such as poor appetite, nasal discharge or lethargy (GALVmed (Global Alliance for Livestock Veterinary Medicines) 2011). Men, on the other hand, are responsible for purchasing tick dips and dewormers and for taking the animals for scheduled vaccinations (GALVmed (Global Alliance for Livestock Veterinary Medicines) 2011). Both women and men purchase medicines or consult traditional healers (Okumba 2010).

Women poor livestock keepers are found to be less able than men to access animal medicines, services and information. Women are less able to deal financially with livestock diseases because generally women have fewer assets than men to purchase drugs (FAO 2011b). A study in Kenya found that men farmers are able to pay higher prices than women for vaccines because of their ownership of more assets (Muindi et al. 2015). Women's limited control over financial resources also entails that women are less capable of assigning financial resources to treat livestock under their control (Paudel et al. 2009). In Tanzania women are less able to deal with animal diseases also because women have limited access to animal health training, information and extension services (Kimaro et al. 2014; Sarris et al. 2006; Jafry & Sulaiman 2013). Part of the problem is attributed to the low presence of women as service providers given that women may be discouraged from interacting with men livestock keepers by seclusion norms (Swai et al. 2014). Similarly, restrictions on mobility reduce access to animal services and information particularly for women living in remote areas who have less access to communication technologies and transport than men (Waithanji et al. 2015). According to a study on access to animal health information in Tanzania (GALVmed (Global Alliance for Livestock Veterinary Medicines) 2011), information on scheduled animal vaccination dates may not reach women as it is normally shared during dip meetings or on market days, locations to which women rarely have access to. In Kenya, restrictions on mobility—due to discriminatory social norms, time constraints facing women due to heavy work burdens and high rates of female illiteracy—have left women relying on their husbands for information (Kimani and Ngethe 2007).

Participation in women's groups in Kenya reportedly helps improve control of livestock diseases by providing women with more opportunities to participate in training, workshops and seminars related to dairy farming enterprises (Kimani & Ngethe 2007; Kimaro et al. 2014). The Southern Africa Newcastle Disease Programme—which organized women in groups and engaged them as community poultry vaccinators—resulted in more women poultry farmers reached, new incomes for vaccinators, and successful village poultry enterprises developed by the women's groups (AusVet 2006). Similar successful experiences enrolling women as community vaccinators have been reported in East Africa (Msoffe et al. 2010).

Due to these common challenges specific to animal health care provision, farmers (both men and women) in most low-income countries depend on indigenous knowledge—in the form of herbal

and traditional medicines—in managing animal health-related issues. Gender differences exist in ethnoveterinary knowledge as shown in studies carried out in India where researchers found that women mentioned different plants (compared with men) that they used in their ethnoveterinary applications, based on their distinct roles in animal health (World Bank et al., 2009). Similarly, a study in Kenya found that women and men held comparable knowledge about animal diseases. Yet, extension activities mostly targeted men when addressing animal health management (Curry et al. 1996). Integrating gender approaches into assessments of local knowledge of ethnoveterinary remedies in Tanzania is therefore considered instrumental in understanding how this knowledge could be better utilized or supported in addressing animal health problems (World Bank et al. 2009). Ensuring that both women and men livestock keepers are reached by extension services is equally important.

Occupational health risks vary according to the role one performs on the farm (McCoy et al. 2002). Working with livestock may lead to exposure to zoonotic diseases, such as brucellosis, avian influenza and anthrax (World Health Organization (WHO) 2009). Zoonotic diseases are transmitted to humans through direct contact with the infected animals and indirectly via the consumption and handling of infected animal products (McDermott & Arimi 2002). In Tanzania, vector and vector-borne livestock diseases, such as the East Coast fever (ECF), anaplasmosis, babesiosis, ornillo (a particular form of cerebral theileriosis) and trypanosomosis are ranked as most common (Swai et al. 2014). Dealing with these diseases involves engaging in a number of labor intensive activities such as fetching water and spraying animals with insecticide to control the vector-ticks and tsetse flies (vector of trypanosomosis), especially when cattle dips are unavailable. Although limited, evidence from Tanzania shows that women are responsible for preparing food for family, and looking after sick animals and family members (Covarrubias et al. 2009). Consequently, disease outbreaks increase women's work burdens and their exposure to disease, with particular risks for their reproductive health (Fenton et al. 2010). While there are opportunities to curb the spread of these zoonotic diseases, women's limited access to support systems renders them more susceptible (Ragasa et al. 2013). Some zoonoses, such as brucellosis, and tuberculosis (TB), are also transmitted to humans through food. Women's role in food preparation, therefore, also makes them key risk managers for the household (Kristjanson et al. 2010; Bagnol et al. 2015; Grace et al. 2015). This is particularly true in dairy farming: as milk pasteurization prevents the transmission of zoonotic agents (FAO 2013).

A number of publications have underlined the lack of gender approaches in national policies and strategies designed to address food security threats (World Bank et al. 2009; Brody 2009). Compensation mechanisms, microfinance, safety nets and insurance, for example, are all risk-avoidance and resilience-building measures that bear strong gender components. Male household heads are often the only recipients of these measures which often fail to reach the most vulnerable household members. In the event that these diseases occur and livestock die, women have been found to have less access than men to compensation or restocking programs. Unless policies are developed taking gender considerations into account, their effectiveness is likely to be limited and biased (World Bank et al. 2009).

Animal health research has also been found to rarely integrate gender considerations into the establishment of research priorities (e.g., which species or diseases to focus research on) or assessment of impact of research outputs on the ground (e.g., who can access or afford a new

vaccine) (CGIAR Consortium 2011). For instance, most animal health research has prioritized studies on commercial, higher-value or larger animals of most interest to men, and has overlooked small animals women have more control over. This entails that men are the primary beneficiaries of animal health technologies and innovations. Similarly, gender considerations have rarely been taken into account in assessing the impact of animal health research on the ground (Muindi et al. 2015).

Methodology

The study started by undertaking a literature review of the main animal health issues in Tanzania and East Africa (above). The review was undertaken through online search engines and included the following keywords: ‘gender’, ‘women’, ‘dairy’, ‘livestock’, ‘animal disease’, ‘animal health’, ‘East Africa’, and ‘Tanzania’. Thirty-one relevant documents including published and grey literature were identified and form the sources of the ‘literature review’ section. A set of guiding questions was developed based on these findings and on the advice of gender and animal health experts at ILRI and FAO. These questions were used to guide discussions during focus groups (FGDs) and individual interviews. FGDs were adopted to tease out the main gender issues in animal health through group brainstorming and discussions. These were followed by Individual interviews which allowed more in depth exploration of the issues raised during the FGDs and particularly the more sensitive questions about intra-household decision-making and control over revenues. In line with the main points emerging from the literature this study focused on: intra-household division of labor in management of livestock and animal disease; access to and control over livestock resources; key animal diseases and related knowledge (including zoonotic diseases); constraints in disease management (particularly access to animal medicine, services and information). The policy and research prioritization components were mostly explored in terms of interventions the respondents considered useful to address the constraints they faced. The analysis was undertaken in the framework of animal health and food security.

Study area

The study was conducted in three sites in Tanzania where dairy development is important: one nomadic system (Twatwatwa village); one intensive system (Shume village); and one tsetse-infested site (Chalinze village), see Figure 1. This choice was made based on evidence that gender roles in livestock management change between intensive and extensive systems (Njuki & Sanginga 2013). In the former men are mostly in charge of taking large herds of local breeds to the bush in search of pasture in the dry season. They leave a few animals behind for the women to look after and to rely on to feed the family (Galiè & Lukuyu 2016). Milk production, which is controlled by women, is low and prevalently for home consumption. Livestock are important mostly for financial security and status. Intensive systems are characterized by fewer livestock (more hybrid and exotic breeds that are kept around the household) and greater incidence of disease. Milk production is higher and oriented to the market as well as home consumption. Market orientation has been shown to often exclude women from controlling the benefits from livestock (Baltenweck 2017). The tsetse-infested site was chosen to explore gender dynamics in a context with high incidence of animal disease.

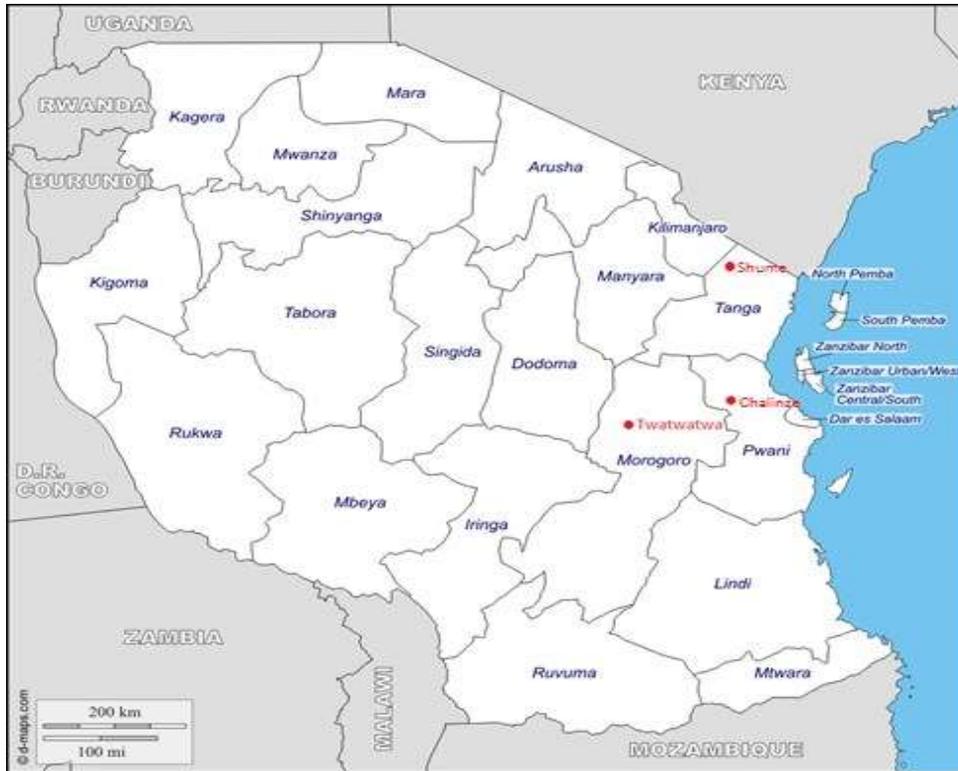


Figure 1: Shume, Chalinze and Twatwatwa, the three villages of this study

Twatwatwa village is in Kilosa district, Morogoro region. The community belongs to the Maasai ethnic group. Dairy farming is extensive here and non-commercial, and each household owns on average two to three local cattle.

Shume village is in Lushoto district, Tanga region. The Pare and Sambia ethnic groups live in the village. The district is predominantly characterized by zero-grazing, intensive and commercially-oriented dairy production system in which farmers rear from one to five dairy animals on average, both exotic and hybrid breeds. Milk production for both market and household consumption amounts on average to 3–5 liters of milk per cow/day, and up to a maximum yield of 8–10 liters per cow/day.

Chalinze village in Bagamoyo district, Pwani region, is a tsetse-infested site where dairy farming is intensive and commercial. The ethnic groups living in the village are Maasai, Chagga, Kwere, Gogo, Kurya, Makonde, Meru, Kerewe and Sambia. The average cattle size for sedentary smallholders here is from four to five per household and includes local, exotic and hybrid breeds. Table 1 details the main social markers characterizing the respondents in each village.

Data collection and analysis

Community facilitators from the three sites were contacted to identify and arrange meetings with individual informants and FGD participants from each community. The inclusion criteria for the FGDs were: a) women and men who conduct the majority dairy (particularly disease-related) work in the household; b) women and men heads of households (to assess whether female-headed households face specific constraints and opportunities); c) young unmarried women and

men who are involved in dairy farming.

Six single-sex FGDs were undertaken, two in each of the three villages. With the exception of the FGD held with men in Chalinze, where only 6 people participated, 10 to 12 respondents were involved in all the others. Of the 35 women and 28 men interviewed, most had primary education and belonged to the Maasai ethnic group. The women from Shume belonged to the Sambia and Pare ethnic groups. The respondents from Chalinze belonged to between four and seven ethnic groups. Table 1 below provides an overview of the marital status, education attainment and ethnic origin of the respondents.

Table 1: Number of respondents by village, gender, marital status, education level, ethnic group, and average age (years)

Social markers		Twatwatwa		Chalinze		Shume	
		Women	Men	Women	Men	Women	Men
Marital status	Married	9	10	6	6	9	10
	Widow/er	3	0	5	0	3	0
	Single	0	2	0	0	0	0
Education	None	8	7	1	0	1	1
	Primary	3	5	7	4	10	8
	Secondary	1	0	3	0	1	1
	Post-secondary	0	0	0	2	0	0
Age	Average	38	40	48	48	40	47
Ethnic group	Maasai	12	12	2	2	0	0
	Gogo			1	0	0	0
	Chagga			3	0	0	0
	Makonde			1	0	0	0
	Kwere			2	2	0	0
	Kurya			1	0	0	0
	Meru			1			
	Kerewe				1		
	Sambia				1	10	7
	Pare					2	3

Source: FGDs undertaken in this study

During the FGDs, and after consultation with community facilitators, one to three people from the FGDs—who provided the most interesting information—were selected to participate in individual interviews. Animal health providers from the villages were also selected to participate in Individual interviews. Twelve Individual interviews in total were undertaken. Five Individual interviews were undertaken in Twatwatwa—with a male and a female livestock keeper, an

animal medicine trader, a village extension officer and a ward extension officer. Four individual interviews were undertaken in Chalinze: with a woman and a man livestock keeper, a village extension officer and a veterinary shop owner. The other three individual interviews took place in Shume with a ward extension officer, a man and a woman livestock keeper.

All the fieldwork involved one facilitator and one note-taker from Sokoine University who recorded the discussions on paper and later transcribed them digitally. The digital transcriptions of the interviews were entered in the software package Nvivo 2010 which was used to organize, code, aggregate and disaggregate the material. Coding was undertaken using both predetermined codes (based on the main issues the study set out to examine, such as ‘animal health constraints’ and ‘women’s access to veterinary services’) and new codes that emerged from the discussions (such as for example ‘local veterinarians’ and ‘foreign veterinarians’) (Campbell et al. 2013). The findings were analyzed descriptively and quantitatively. Consensus analysis (Caulkins & Hyatt 1999) was performed manually on statements to identify issues upon which the group agreed and dissenting views. Where relevant, these have been reported in the section below. The findings have been organized based on the principal gender and animal health issues identified by the authors during analysis. Differences in views related to village or ethnic belonging, livestock system, age, social status or gender have been highlighted when relevant and possible.

The study obtained ethical approval by ILRI’s Institutional Research Ethics Committee (IREC). Written consent was obtained from the respondents at the beginning of each discussion after the aims and process of the interviews were clarified in local language. The procedures to guarantee respondents anonymity were followed throughout the study as recommended by the IREC. Written consent was obtained from the respondents. The digital copies of all interviews were stored in the locked computer of the PI. Interviews and discussions were recorded to ensure completeness of information and then transcribed. The anonymity of all interviews was guaranteed to respondents by assigning a numerical value to each respondent.

Results

Division of labor

In the three villages, women, men and boys—and to a limited extent girls—are involved in livestock activities. Men were said to be involved in activities that include financial transactions and construction work, and dealing more with the public sphere (e.g., buying veterinary medicines; selling cattle; contacting veterinarians; building animal sheds and fixing fences). Men were also in charge of applying medicines and servicing livestock. Men in Shume also mentioned having to check on a daily basis whether household members had performed their assigned tasks.

Women are mostly involved in cleaning activities—of the house, animal sheds and milk containers—and household chores, such as cooking, and fetching water and firewood. They are also in charge of milk-related activities, such as milking, and making butter for household consumption and sale (except in Twatwatwa where milk is not sold but only used for household consumption). Women in Twatwatwa and Shume were also in charge of checking on the health of animals, an activity performed by both women and men in Chalinze. Both women and men in Twatwatwa and Shume looked after sick animals, while in Chalinze only women performed this activity. In Chalinze, women were also involved in calling the veterinarian and buying medicines. Boys were mostly involved in collecting water and forage and helping look after sick animals.

Generally, they supported both mother and father in their activities. Girls from Twatwatwa and Chalinze were less involved than boys in livestock activities. In all villages they supported their mother's activities only. Table 2 gives details on the gendered division of labor.

Overall, the activities in all the villages varied little between the dry and rainy seasons, and extensive and intensive sites. The fact that the roles of household members reported by women and men mostly coincided across sites demonstrates that there is a strong and clear gender division of labor. Chalinze, however, offered slightly different patterns in the division of labor, with women involved in activities performed only by men in the other two villages that might be explained by the high incidence of male alcoholism altering gender roles in household management.

Table 2: Most important livestock activities disaggregated by gender and sites

Village	Twatwatwa				Chalinze				Shume			
	Women	Men	Girls	Boys	Women	Men	Girls	Boys	Women	Men	Girls	Boys
Milking	x		x		x				x		x	
Washing cow's teats					x				x	x	x	x
Checking health of the cattle	x			x	x	x		x	x			
Treating sick cows		x		x		x		x		x		
Spraying for tsetse flies, ticks etc.	x			x					w*	x	w*	x
Giving vaccines										x		
Separating calves from mothers & cattle	x		x	x		x		x				
Helping the cow to deliver	x	x				x			w*	x		
Cleaning the cow shed	x				x	m*	x	x	x	x	w*	w*
Cleaning dishes and milk containers	x				x		x					
Making butter and ghee	x											
Filtering and measuring milk					x	x						
Slaughtering						x		x				
Buying the drugs for cows		x			x	m*				x		
Buying tools and equipment						x						
Calling/looking for vet		x			w*	x				x		
Selling cattle		x								x		
Selling milk					x				x			
Disposing of dead animals	x		x	x		x		x		x		x
Collecting grasses/forages		x		x	x	x			x	x	x	x
Fetching water				x		x		x	x		x	x
Removing thorns in legs/tongues		x		x								
Buying bran		x										
Looking after sick animals	x	x	x	x	x				x	x		

Looking for the lost cows	x	x							
Building and repairing fence or cowshed	x					x			
Looking after livestock at night							x		
Identifying when cow is on heat								x	x
Servicing cow									x
Grow crops				x	x				
Check that household members have done their work									x
Household chores (e.g. wash house, dishes and clothes; fetch firewood)	x			x					

X = means that both men and women agree on who performs the activity
w*= where the role is mentioned by women only
m*= where the role is mentioned by men only

Source: FGDs undertaken in this study

Empty rows indicate that the activity was not mentioned in the FGD as one the main livestock-related activities they performed

Control over livestock resources

The men and women respondents from Twatwatwa only owned indigenous cattle. Single men owned the smaller number of cattle (Table 3). Married men on average owned more cattle. Married women and widows owned a similar number of cattle. Married men from Chalinze owned most local cattle followed by married women. Widows had on average most cross-bred cattle and one widow owned one exotic cow that she had received through a development project. Women and men from Shume mostly owned hybrids and in similar numbers. The farmers who owned the most cattle across sites belonged to the Maasai ethnic group (Table 4).

Table 3: Respondents' number and breeds of cattle they own

Villages			Twatwatwa				Chalinze			Shume		
			Women		Men		Women		Men	Women		Men
Gender			M	W	M	S	M	W	M	M	W	M
Marital status			9	3	10	2	6	5	6	9	3	10
No. of respondents												
Total	Local	Min	3	5	2	3		25	50			
		Max	14	7	40	3		142	150			
		Ave	7	6	12	3		83	100			
by breed type	Hybrid	Min					1	1	2	1	2	1
		Max					10	3	4	4	2	6
		Ave					6	2	3	3	2	3
	Exotic	Min						2				
		Max						2				
		Ave						2				

Source: FGDs undertaken in this study

While in the case of FGDs with men, the number of cattle owned by each respondent was very clear, women respondents seemed less certain about the number of cattle they owned. The women explained that in their household, cattle were mostly considered their husband's property and, in some cases, the husband had distributed some of the livestock to his wives under different management arrangements. Determining who owned the cattle within the household was, therefore, difficult. This may mean that the number of cattle the women said they owned, referred in fact to the cattle owned by their households which they could 'access' i.e., provide work for and use milk, but not control. This would explain why women and men respondents seemed to own a similar number of cattle and of the same breeds, while the literature routinely reported that women only own local breeds and men also own hybrid and exotic breeds (Njuki & Sanginga 2013). The concept of livestock ownership is indeed complex, as there is no standard definition across locations or genders (Galiè et al. 2015).

Table 4: Average number of livestock owned by village, gender and ethnic group

Villages	Ethnic group	Women		Men	
		Married	Widow	Married	Single
Twatwatwa	Maasai	7	6	12	3
Chalinze	Maasai	0	84	125	
	Chagga	6	0		
	Kwere	0	1	27	
	Gogo	3	0		
	Kurya	5	0		
	Makonde	0	3		
	Meru	10	0		
	Kerewe			3	
	Sambaa			2	
	Shume	Pare	3	2	2
Sambaa		2	2	3	

Source: FGDs undertaken in this study

Generally, men seemed to exercise control regarding decisions over the use of livestock. A middle-aged Maasai woman from Twatwatwa said: "If a woman sells a cow without the permission of her husband, he will beat her for real [...] The village elders will meet to have a discussion about you...they will say that they'd never heard of a woman selling a cow ...you will be sent to your parents and asked to bring a cow back to your husband. The marriage may even fall apart". The men also mentioned that women face challenges in not having any decision-making power with regard to cattle. One Maasai man from the same village explained: "Women are 'weak tools'...they lack physical power...as a consequence they can't leave home to graze animals or look for lost cows for days, as men do; they get tired. Also, they can't tie up cows when we need to administer medicines. Women can't repair huts... they end up only with milking, bringing water or firewood and reporting to me that the house needs to be repaired. Hence I should give her money or find a person to repair it. For these reasons men have the power over the

cattle.”

Table 5: Access to and control over productive resources disaggregated by gender and site

Twatwatwa – women respondents					Twatwatwa – men respondents				
Resource	Access		Control		Resource	Access		Control	
	Women	Men	Women	Men		Women	Men	Women	Men
<i>Inputs to the enterprise</i>					<i>Inputs to the enterprise</i>				
Land	x	x		x	Human labour (shepherd)	x	x		x
Drugs for livestock	x	x		x	Drugs for livestock	x	x		x
Money		x		x	Money	x	x		x
Bran	x	x		x	Bran	x	x		x
					Water	x	x	x	x
Chalinze – women respondents					Chalinze – men respondents				
Resource	Access		Control		Resource	Access		Control	
	Women	Men	Women	Men		Women	Men	Women	Men
<i>Inputs to the enterprise</i>					<i>Inputs to the enterprise</i>				
Animal feeds	x	x	x	x	A good cowshed	x	x		x
Vaccines	x	x	x	x	Animal feeds and artificial nutrients	x	x	x	x
Land	x	x	x (when they purchase)	x	Land for keeping cattle	x	x		x
Money	x	x	x	x	Money	x	x		x
Drugs for livestock	x	x	x	x	Drugs for livestock	x	x		x
					Water	x	x	x	x
<i>Outputs from the enterprise</i>					<i>Outputs from the enterprise</i>				
Milk revenue	x	x	x		Milk revenue	x		x	
Shume – women respondents					Shume – men respondents				
Resource	Access		Control		Resource	Access		Control	
	Women	Men	Women	Men		Women	Men	Women	Men
<i>Inputs to the enterprise</i>					<i>Inputs to the enterprise</i>				
Feeds & minerals	x	x		x	Land for growing forages/grasses	x	x		x
Land	x	x		x	Water	x	x	x	x
Water	x	x	x	x	Tools (cart, hoe, harrow, spade, spraying pump, milk containers)	x	x		x
Vets/experts	x	x		x	A good seed/bull	x	x		x
Drugs for livestock	x	x		x	Vets	x	x		x
Money	x	x		x	Time	x	x	x	x
					Drugs for livestock		x		x
					A good cowshed	x	x		x

Source: FGDs undertaken in this study

The gap between accessing and controlling livestock was also evident when the respondents were asked to mention all the resources needed for dairy farming and animal health. Women and men

from the three villages mentioned land, medicines for livestock, money, bran and water. Men in Chalinze and Shume added a good cowshed, tools, a good bull and time (Table 5). According to women and men, women in Twatwatwa and Shume have access to the same resources as men. Only men, however, exercise control over them. This is in line with the common argument in the literature that women may have access, but often do not have control of productive resources (Valdivia 2001). It is interesting to notice that the few resources over which women were said to have control were mostly resource over which control is difficult to claim. In the three villages men mentioned 'water' as the resource over which women exercise control. Yet, water in this region is a public resource, over which nobody can claim control. Similarly, 'time' is the second resource that men in Shume believe women can control. The women from Chalinze reported that they had both access to and control over all resources, while their male counterparts believed women controlled only milk revenues, bran and water. This divergence in views may be due to the changing household arrangements in this village caused by men's alcoholism. The situation seems in fact to have pushed women to take on roles customarily considered men's such as being in control of the family's resources. Therefore, women may have referred to the actual daily reality of managing the household, while men referred to customary gender norms.

Key diseases and related knowledge

The respondents were asked to identify and rank the diseases that most seriously affect their livestock (Table 6).

Table 6: Ranking of diseases by women and men respondents in the three sites

Disease	Twatwatwa		Chalinze		Shume	
	women	men	women	men	women	men
East Coast Fever	7	2	3	1	-	-
Contagious Bovine Pleuropneumonia (CBPP)	1	1	1	2	-	-
Foot and Mouth Disease (FMD)	2	3	2	3	-	-
Lump Skin Disease (LSD)	3	5	6	4	-	2
Trypanosomosis	4	4	-	6	-	-
Babesiosis	6	6	5	-	-	-
Paralysis of legs	-	-	4	-	-	-
Blindness	-	-	7	-	-	-
Anaplasmosis	-	-	-	5	2	1
Swelling and Rapturing of Sores Disease	-	-	-	-	1	-
Mastitis	-	-	-	-	3	4
Shaking of legs and failure to stand up	-	-	-	-	4	-
Worms	-	-	-	-	-	3
Gangraena emphysematosa	5	1				

Source: FGDs undertaken in this study. Number '1' indicates the most important disease, '2': 2nd most important disease, etc

A total of 14 different diseases were mentioned across the three villages. Generally, Twatwatwa and Chalinze mentioned similar diseases, while respondents from Shume mentioned fewer and different diseases. Across villages, men and women from the same village were aware of a similar number of diseases (four in Shume, between six and seven in Twatwatwa and Chalinze). In Twatwatwa women and men mentioned the same diseases but ranked them differently (three diseases out of seven are ranked the same). In Chalinze men and women mentioned four of the same diseases out of nine that were mentioned in total. In Shume two out of the four diseases that were mentioned were common between women and men. Although similar rankings of diseases by women across villages could have been expected due to the effect of gendered patterns in the division of labor or control over dairy resources, location seemed to affect the ranking of diseases more than gender. Location also seemed to affect the importance of diseases more than ownership of exotic or hybrid cattle.

Men and women from the same village mostly agreed on the ranking of the top diseases. Contagious bovine pleuropneumonia (CBPP) was amongst the top two diseases that most affected livestock according to women and men in Twatwatwa and Chalinze (together with Gangraena according to the men from Twatwatwa), followed by East Coast Fever (ECF) for men from the two villages (ranked last by the women from Twatwatwa) and Food and Mouth Disease (FMD) for the women. Men and women from Shume village mentioned Anaplasmosis as one of the top two diseases affecting their livestock. Swelling and rupturing of sores (respondents did not know the official name of the disease which is likely to be FMD or mucosal disease) was only mentioned by Shume women and ranked first as the one that most affected their cattle (Table 6). The men from Twatwatwa mentioned that women suffered from tsetse flies and other insects because of their milking work: “The woman is the one who is mostly affected by tsetse flies and other insects because these are many out at night, particularly in the rainy season, and they attack women when milking...the man is also affected because he will have to find a way of killing those insects”, said a middle-aged Maasai man. Generally, the findings are in line with the study by Curry et al (1996) who found that men and women in Kenya hold similar knowledge about animal diseases.

The respondents disagreed as to whether animal diseases could be passed on to humans. Some reported symptoms (possibly of anthrax) experienced by humans after being in contact with infected animals. Others mentioned the risks of eating contaminated milk, eggs or meat. In Shume, respondents argued that cases of animal-to-human infection had ceased years ago due to restrictions on livestock movement caused by the decreased availability of grazing land. Other respondents believed it was not possible for humans to be infected by animals. Men and women who believed zoonoses exist, agreed that women were most exposed to these diseases given their roles in milking, food preparation and taking care of sick animals.

All respondents generally believed that men were more knowledgeable than women about cattle diseases, and about disease identification in particular, although the findings from this study show otherwise. This was justified on grounds of beliefs about ethnicity, gendered space, gender roles, family tradition or gender biases. In Twatwatwa, both women and men respondents agreed that men in general were more knowledgeable about livestock diseases. An older Maasai widow from Chalinze said: “Women notice when the cow is sick but can’t identify the disease it is

suffering from because women generally can't differentiate between diseases". The Sambaa and Pare women from Shume complained that their knowledge of diseases was undervalued because of prejudiced beliefs suggesting that 'women don't know if the cow has a problem'. However, when asked who in the household was knowledgeable in identifying cattle diseases, the women agreed it was the men. This seems to show that when asked the general question about who is knowledgeable about livestock, women relied on customary norms suggesting men were the knowledgeable ones. When asked more specific questions such as 'who knows about diseases in your household?', women displayed their knowledge and also expressed irritation at how this knowledge was overlooked. A man from Shume used a metaphor indicative of how the management of cattle by women was perceived in his village; he argued that the cattle of a widow were like 'orphans' because they lacked the good supervision that could only be provided by a man.

Men from Twatwatwa argued that men generally had more knowledge than women about all diseases because they were regularly looking after the animals and, therefore, were able to spot the early signs of sickness in cattle. Furthermore, they argued that because there were no veterinary or extension officers in their area, men had to apply their experience and knowledge about diseases. A Maasai man from the same village referred to both 'women's general lack of knowledge' and 'their restricted movement' when discussing the role of men in contacting the veterinarian. He said: "A woman can't call the vet because she doesn't know where the vet is or how to get him; also she doesn't know which kind of disease the cow has...we men are the ones who know the kind of disease the cow has, that's why we take the responsibility for buying medicine or calling a vet to tell him clearly what the problem is". A Chagga woman from Chalinze held a different opinion. She said: 'the woman is the one in charge of animal health because she is closer to the cow as she takes care of them every day. A man can even spend a whole month without going to the cowshed...he wakes up, gets dressed and leaves the house'.

All respondents argued that in Maasai culture it is the men who are in charge of livestock and therefore, they are the only ones in the family to be knowledgeable about livestock. Respondent men and women from all villages believed men were generally more involved than women with livestock from childhood, in line with local traditions, and were, therefore, more knowledgeable. Respondent men from Shume argued that, in general, men were the ones who identified diseases. One older man respondent explained: "In our households, both women and men have experience in keeping cattle. However, it can happen that I was born in a family with cows, therefore, I know how to identify diseases more easily...the wife might have not been involved with cattle as a child but only as an adult. As a consequence, it is not easy for her to understand cows as well as I do. It's possible that she doesn't notice some of the signs and symptoms even during milking, even though they are there". Gender biases in 'who holds knowledge' are reported in the literature about both crops and livestock (Galiè et al. 2013; World Bank et al. 2009). The World Bank et al. (2009) argues that such biases are reflected in extension activities which are geared to men only, thereby reducing diagnostic and management capabilities on farm.

Gendered constraints in addressing animal health problems

During the FGDs, respondents were asked about the constraints they encountered in addressing animal health problems. Men respondents mentioned that an inability to identify diseases was a main constraint. A man from Twatwatwa stated: "For example this year a strange disease erupted. We couldn't identify it. We went to call a vet and he came to examine the animals, but

up to this moment he hasn't come back to us with the answers. About 70 percent or 80 percent of the cows died". The men from Chalinze complained that the veterinarians were not always competent and did not have the appropriate tools to intervene when needed. Women did not mention this constraint.

Male and female respondents mentioned their constraints in accessing appropriate medicines which were said to be expensive, of low quality, and difficult to transport and preserve. In Twatwatwa, women said that they failed to cure East Coast fever because the medicine was only available in town, was expensive and needed to be stored in a cold place (and they did not have access to a fridge during transportation or in the household). All three characteristics made the medicine inaccessible to them. The men from Twatwatwa mentioned their inability to cure foot and mouth disease because the medicines available were not effective, they argued. A lack of money to buy good medicines was considered a major problem for men across sites—because the purchase of drugs was their responsibility. They could only afford low quality medicines that were not effective, they argued.

Both women and men respondents mentioned that agro-vet shops selling veterinary medicines were too far away, as were veterinarian and extension offices. Women, in particular, found it difficult to reach animal health services given the restrictions on movement imposed on them. Widows faced higher levels of discrimination as it was not considered culturally appropriate for them to go out and look for a veterinarian; they needed to wait for a man from the village to do this for them. This usually delayed the process of getting medication for their livestock and raised the possibility of the animal dying. A widow who contacted the veterinarian alone would probably not receive appropriate and timely support, the women argued, unless the veterinarian had been contacted by a man beforehand. One middle aged woman from Chalinze added, "the vet could not lie to a man by saying he would assist and then not doing it". The women from Shume indicated that the veterinarians discriminated against them: "Most of the time the vets think that women don't know if the cow has a problem or can't pay for the services. Therefore, some women are forced to lie and say that they have been sent by their men so the vet can go to provide the service on time" stated an older Pare woman. She added: "Most native vets discriminate against widows, but the vets who are not from here are helpful".

The women from Chalinze and Shume complained that the lack of control over revenues made them dependent on men when dealing with issues related to cattle diseases. When the men did not support them, the women were forced to rely on traditional herbal medicines. In general, the women did not have any money of their own, and the men often used all the household savings on other expenses without consulting them. A man from the same village explained: "A woman can also use the money to buy medicine and other necessities, but she must explain to the man how she has used it". It was frequently argued by both women and men that giving women control over cattle or money would be interpreted in the village as disrespectful towards men which brings social shame on all concerned. This evidence is in line with the literature on the importance of traditional medicine for animal health management in East Africa (World Bank et al. 2009). It contributes an understanding of the gender dynamics increasing women's reliance on traditional medicine.

Dairy farming, animal health and food security

Across the three selected sites, all respondents agreed that livestock farming provided essential

income and food security for their households through a number of different pathways. It provides milk for home consumption and sale; meat for sale; byproducts, i.e., manure for the vegetable garden and traction power for crops; and social status. In all respondent households livestock were said to be the sole source of income. Women from the three villages mentioned milk as the biggest benefit they received through cattle farming. Milk is used to feed the family, particularly children. Revenues from the sale of excess milk are used by women to purchase food and make investments, such as the purchase of sheep. One Maasai widow from Chalinze stated: “Milk has empowered women a lot because in the past when a woman needed money to buy a match box or salt she was forced to ask her husband. That is not the case when she gets milk revenues.”

Women and men respondents from all villages agreed that their children benefited from milk for their nutrition mostly, which also improved their health. Revenues from livestock farming were also used to support children’s education. They were particularly important for boys who could also use them to pay a dowry and get married. A man from Twatwatwa asserted: “Children get education because I can sell a cow and get money to pay for school fees, exercise books, uniforms, shoes, and medicines for treating animals, treating my children or even myself and also buying food. We don’t have anything else we depend on other than animals. If they die or get sick we are lost”.

When asked how women and men within households were affected by animal diseases *vis-à-vis* food security, most women and men respondents across the three sites stated that men were affected most because they were the ones who had to find the money to buy medicines. If they had no money, they would have to sell their cattle, sick and/or healthy, frequently at a loss. This financial loss can make the situation of the family, including their food security, more unstable. If the animals died, for men this would represent not only a financial loss but also a loss of social status. In their communities, respondents explained, the larger the herd, the higher the social status a man enjoys. Large herds could also be used as collateral to obtain loans from other community members. Livestock revenues were used by men to satisfy their roles as food providers, and to enjoy free time with friends at the market. After livestock died, the women argued, some men left the family to avoid social shame, and women would then have to feed the children without the support of the men and without any livestock.

After further probing the women became more explicit about the impact of animal diseases on them both within female- as well as male-headed households. This was mostly due to their responsibility for feeding the family, and their reliance on milk, the availability of which was reduced by animal diseases. In male-headed households, when the men spent the money inappropriately—e.g., on alcohol—women would have to find money both for veterinary medicines, as well as for food to substitute for the milk not produced by the sick animal. During the dry season, when their husbands brought the herd into the bush to look for pasture, only the sick animals were left at home. The women would have to look for money to buy food because the sick animals did not produce enough milk to feed the family. Taking care of sick animals also placed an additional burden on them. Women from female-headed households always faced these constraints as they had no men to rely on. An extension officer from Shume stated that when milk producing cows get sick or die, the food security of the whole family is affected.

Discussion

This study shows how respondents saw dairy farming as essential for their households and how

the latter was threatened by animal diseases. For all respondents the purchase of animal medicines constituted a heavy financial burden. The death of livestock meant a loss of social status for the men who may have to leave the community. Women's ability to secure household food provision was highly dependent on milk and its revenues. When discussing possible ways of addressing this problem, together with technical interventions, the women talked about enhancing women's access to and control over resources and services, and to address gender norms regarding authority over, and knowledge and management of, livestock. In fact, they believed that women's low social and economic status in their households and communities was the root cause of their inability to secure food for the household. Examples of such interventions are discussed below.

Across sites, and regardless of the dairy system adopted by the household, women were in charge of checking the health of the animals and looking after sick ones. Yet, women had to rely on men to access veterinary services, information and medicines. Widows in particular seemed to face systemic discrimination based on gender and marital status and had to rely on unrelated men to access animal health services and required dairy farming inputs. These findings are in line with the literature (Kimaro et al. 2014; Sarris et al. 2006; Kimani & Ngethe 2007). This study recommends that livestock interventions focus on guaranteeing gender-responsive access to veterinary services and technologies. Delivery mechanisms for animal drugs need to consider how access, affordability and usability for different women and men can be guaranteed - for example by producing medicines that do not need refrigeration or are easily available in the most remote areas. Similarly, adopting simple and gender-responsive technologies to deal with challenges such as tsetse flies may help address some of the constraints mentioned in the interviews. Finally, animal health research needs to take into consideration who in the household and community is mostly affected by disease and potentially at risk of exposure to zoonoses when prioritizing what vaccines and species to focus on in order for the outcomes of animal health research to benefit all.

To address gender discrimination in the provision of services, women respondents expressed the wish that development organizations would train more non-local veterinarians who were considered more receptive to women's needs and knowledge, and more supportive of widows, as opposed to the current practice which favors local veterinarians. Developing the capacities of service providers—the government departments, such as veterinary department, and community and other non-governmental organizations—on integrating gender into their activities and services would help reduce gender discrimination in service provision. In addition to providing information on diseases, strategies to increase the visibility of women's existing knowledge of animal health—e.g., gender-responsive social media campaigns; public events involving women as speakers or model livestock keepers, etc.—may also help address the gender-based prejudice that 'only men are knowledgeable about livestock'. This prejudice was found to reduce veterinarians' responsiveness to women. Finally, the women from Twatwatwa suggested that education could improve their access to vet services by facilitating their access to information.

Women respondents indicated that joining groups or associations would help address the challenges associated with shortage of information and obstacles to accessing services, particularly for women. Professional associations—for instance of women para-veterinarians—were shown in the literature to be effective in enhancing women's access to income-generating opportunities (AusVet 2006; Msoffe et al. 2010). Groups, such as village community banks, were mentioned by all respondents as a way for women to save money and invest in small businesses that would support the food security of their households. Such groups could also help enhance

women's access to market, increase their bargaining power when selling livestock, allowing them to benefit from economies of scale. Women's groups could also offer opportunities for the investment of income and purchase of livestock, overcoming women's limited control of livestock activities imposed by existing gender norms.

Women were found to have access to resources but limited control over them. This was particularly problematic in cases when women were undertaking activities traditionally considered the responsibility of men. It was particularly urgent in the two commercially-oriented sites where the women who owned improved breeds complained that their lack of control over revenues reduced their ability to cope with animal diseases. Similar evidence on the lack of control over resources limiting women's ability to cope with animal diseases emerged from the literature (FAO 2011a). The women and men respondents pointed to the potential benefits of increasing community outreach which highlighted the advantages of joint decision making on access to, and control over, the use of income from livestock. This could, it was suggested, help address the deep-rooted perception that increasing the decision making role of women entails disrespecting men and reducing their authority. This outreach could focus on highlighting the benefits of shared decision-making as a way of giving women more space to control livestock farming and reducing the pressure on men customarily seen as the main guarantors of food security. The women respondents from Chalinze, for example, maintained that interventions addressing men's education would make a difference by increasing men's appreciation of livestock as a family enterprise rather than a women's affair. This would result, they believed, in household members sharing the workload more equitably leading to a consequent increase in overall revenues and food security.

In the case of milk, however, the women from all sites controlled milk, and in the two commercially oriented sites, they also sold it and controlled its revenues. Milk was considered by them a key resource that had empowered them and helped secure food. Disease, more frequent in intensive systems with improved breeds, strongly affected the benefits the women enjoyed from milk. This paper argues that development initiatives supporting a switch to intensive and commercial systems need to engage with gender analysis of dynamics affecting intra-household ability to address animal health challenges in order to ensure women do not bear the heaviest burden of such a switch.

This paper further proposes that beyond adopting an approach that avoids harming women livestock interventions have the potential to address unequal gender norms and enhance transformation towards gender equity. Transformation of gender norms has been shown in the literature to be initiated by dairy commercialization which often increases the range of activities women are involved in while decreasing their control over the derived benefits (World Bank et al. 2009). Similarly, alcoholism in Chalinze was found to be a stronger determinant of gender roles: due to men's alcoholism, women had to take on men's tasks. The fact that the women respondents discussed these new roles openly in the FGDs, may indicate that in problematic contexts, when men's status is lower (due to drug use or alcoholism) women may speak openly about their actual daily reality, without fear that contradicting customary norms (e.g. of men as the sole bread-winners) would reduce their social status or that of their menfolk. This shows that gender roles do change and may even contradict gender norms when new circumstances and needs emerge. When supporting dairy commercialization, livestock interventions can provide positive (e.g. as compared to alcoholism) opportunities to support ongoing changes in gender roles. This article

has suggested possible interventions that can enhance social transformation towards more equitable social arrangements.

Finally, knowledge displayed by respondents about zoonotic diseases was limited, both in terms of the identification of these diseases, and their understanding of contamination and transmission pathways. Yet, zoonotic diseases have an impact on household food security and health. There is, thus, an urgent need to increase awareness of zoonotic diseases. Such awareness campaigns should specifically target women since they were found to be particularly exposed to zoonotic diseases because of the livestock and food preparation activities they performed. Additional research is needed to identify and quantify the occupational health and safety risks in livestock keeping in order to identify best practices to minimize such risks.

Conclusions

The findings show that the women and men respondents performed a similar number of mostly complementary activities in dairy farming and animal health. They also held similar knowledge of diseases. Yet, most respondents considered men to be more knowledgeable in animal health than women. All respondents complained about the lack of good animal health support services, of good and affordable animal medicines and of appropriate information on animal diseases. Women faced more constraints than men in accessing information, veterinary services and animal medicines because of restrictive norms on both their movement and their interaction with unrelated men, because of biases about their reliability in identifying diseases and paying for services, and because they had limited control over the household resources. All respondents argued that animal diseases impact on overall household food security by: increasing expenditures for animal medicines; decreasing milk production which increased expenditure on food—less milk for household consumption and less milk revenues; increasing the time needed to look after sick animals which reduced the time available for revenue-generating activities; reducing income from animal sales; reducing manure and traction power that reduced crop production; and reducing the status of men, thereby, affecting both their human and social capital. The death of animals causes women severe distress because of their total dependence on livestock and milk to provide food for the household. Men are affected because their status in the community diminishes when animals die.

This paper suggests ways to enhance women social and economic status in the communities, which, together with gender discriminating norms, seemed to be the root cause of many constraints they faced. Supporting women's groups is suggested as a way of enhancing women's control over livestock and revenues, and access to animal health information and income-generating opportunities. The paper recommends enhancing the capacity of service providers in gender-responsive approaches, and of organizing community outreach activity that highlight the benefits of intra-household shared decision making. It recommends that research institutes include gender considerations when identifying priority species and diseases for research on animal medicines, and also assess what format (e.g. size or temperature sensitivity) increases the accessibility of animal medicines at local level.

Finally, the paper argues that interventions on animal health have the potential to provide opportunities to address inequitable gender norms by for example, increasing the visibility of women's roles and knowledge in animal health, and by supporting women in undertaking professional activities such as para-veterinarians.

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