Beyond fetching water for livestock: A gendered sustainable livelihood framework to assess livestock-water productivity

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Abstract

Livestock water productivity is defined as the amount of water depleted or diverted to produce livestock and livestock products and services (Sonder *et al*, in prep). However, different livestock species and their products vary in terms of their values and contributions for men and women in reaching livelihood objectives. Similarly, various livestock production systems generate different costs for men and women, resulting from gendered control and access.

In this paper we propose a Gendered Sustainable Livelihood Framework (GSLF), focussing on poor livestock keepers. The framework gives guidance on how to better include gender perspective in holistic assessments and subsequent use of livestock water productivity information and interventions. We use the five assets of the Sustainable Livelihood Framework (SLF) to allow an asset based assessment, taking into account access and control mechanisms which are important aspects of gender studies. The GSLF is best applied using participatory discussion tools in order to ensure a common understanding of the issues.

1. Introduction

Water, and particularly good quality water is becoming a scarce resource, especially in many developing countries. Current debates on management shortages and quality of water focus on optimal use in terms of productivity, poverty alleviation and environmental functions. They often have a bias towards crop production, industrial and domestic use. The contributions that water makes to livelihoods based on livestock rearing are either not valued or undervalued.

ILRI believes that livestock can be a pathway out of poverty by e.g. securing current and future assets and sustainable improvement of the productivity of agricultural systems (ILRI, 2002). However, the livestock production system is a complex system where men and women have specific roles and responsibilities and benefit differently. Livestock production systems also vary between countries, cultures, and ecosystems. To evaluate this diversity and to understand the role of livestock in livelihood strategies of men and women we will use a Gendered Sustainable Livelihood Framework (GSLF) focussing on poor livestock keepers.

The GSLF presented in this paper, was developed through literature review and tested in case studies in three Nile basin countries: Ethiopia, Uganda and Sudan. These countries were selected as they share the same water source, present a wide range of different livestock production systems and most important, experience (sometimes extreme) water shortage.

We therefore look specifically into the optimal use of water for livestock production, here referred to as; livestock-water productivity (LWP). Sonder *et al* (in prep) define livestock-water productivity as “the amount of water depleted or diverted to produce livestock and livestock products and services”. They assume that the productivity of a specific animal is high when it produces a maximum of outputs (in kilo’s, litres, joules) while consuming and polluting minimal amounts of water.

But how does this equation relate to poverty reduction? Can we just assume that a 'high' livestock-water productivity value automatically leads to reduced poverty and increased food security? The following definition of "productivity" by Kijne *et al* (2003)[1] provides two insights:

> *the ratio of valuable output to input i.e., the efficiency and effectiveness with which resources, personnel, machines, materials, facilities, capital, time are utilized to produce a valuable output*

First, it emphasizes that the output should be **valuable** to a certain person or group. To reduce poverty in a gender equitable way, the output should, first of all, be of value to poor men and specially poor women since women constitute 70% of the poor (UNDP, 1995).

Secondly, the livestock-water productivity definition considers only the water input. But livestock production needs other inputs as well. A specific animal can have a high livestock-water productivity ratio and produce very valuable outputs but if it needs a lot of other inputs (medication, special feed, shelter, labour) it might be risky or impossible for poor men and women to raise. Besides, the persons delivering the inputs and obtaining the outputs are not automatically the same, which is often the case in hierarchical gender and class relations. It is therefore important to take into account all inputs that livestock production requires, how accessible they are and who makes the effort in labour, cash and kind.

Also, there is a range of governing institutions varying from written laws to cultural practices that dictate men's and especially women's roles and influences their livelihood strategies. This can be illustrated with a simple example; a specific animal can have an optimal livestock-water productivity ratio but if people are not allowed to eat it for religious reasons, its impact on food security or poverty reduction could be minimal. The implication here is that in the cultural context the output is not valuable and thus doesn't contribute to LWP.

This implies that a holistic understanding of LWP and particularly its contribution to poor people well-being requires a gendered assessment of all livestock utilizations, distribution of inputs and outputs and governing structures. As other studies have mainly focussed on the efficient water use for animal production (e.g. Sonder *et al*, in prep) we will focus here more on the livelihood dimensions of 'livestock productivity' valuing water as just one of the inputs. We therefore use the SLF as basis for our GSLF since it is asset based and puts emphasis on access and control over productive assets which forms an important component of gender analysis. By using examples from pastoral systems in Sudan, urban systems in Uganda and crop-livestock systems in Ethiopia we will explain how to use the GSLF as an assessment tool to obtain a more holistic understanding of LWP.

In section 2, the basic principles of the GSLF as it relates to the SLF are explained. The ownership of livestock and livestock products and the five livelihood assets are used to consider the different inputs which livestock production requires and the outputs it generates taking into account the governing institutions that influence the inter- and intra-household distribution in section 3. Finally, suggestions are made how the framework can be related to

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other livestock-water productivity frameworks and recommendations are given on how it can be applied in the field.

2. Analytical framework; Gender and assets in the SLF

Gender roles are the "social definition" of women and men, and vary among different societies and cultures, classes and ages, and during different periods in history. They are often conditioned by household structure, access to resources, specific impacts of the global economy, politics and other locally relevant factors such as ecological conditions (FAO, 1997).

The Sustainable Livelihood Framework (SLF)[2] enables us to get a better understanding of livelihood dynamics in general and the role of livestock within those dynamics in particular. Livelihoods are shaped by a multitude of economic, political and social forces and factors, and they vary between economic necessity/survival (responding to shocks, vulnerability and poverty) on the one hand and choices (as a way to further investment, savings and accumulation) on the other (Kabeer and Ang, 2000; Dolan, 2002; Ellis 1998; Smith et al 2001; Bebbington, 1999). However, while livelihood options are mediated by a number of external factors, they are also conditioned by the composition and internal dynamics of the households (Upton, 2004).

The gender dynamics in livestock productivity are a matter of roles and responsibilities that women and men have within their specific livelihoods strategies both at the household and the community level. For example, livelihood strategies can be conditioned by gender differences in reproductive responsibilities[3] and access to productive assets (e.g. land, capital, labour, livestock) as well as gender bias in marketing systems and infrastructure (Baden, 1998). Hence, gender relations include legal rights, ownership and wages that secure the access to and control over essential assets ensure sustainable livelihoods for both men and women (Fernando and Starkey, 2004). The role of gender or other intra-household differentiation and the role of intra-community differentiation in enabling and disabling livelihood choices are not made explicit in the SLF. Often the unit of analysis is the average household in a rural community – or the average household of any identified grouping. Yet, gender dynamics can become visible by acknowledging that households consist of individual members and applying the SLF framework for women and men separately. Such 'gendered' SLF highlights the number of gender related constraints that define the extent to which members in the households are willing, or able, to optimise their livelihood strategies[4]. The GSLF combines the SLF and the gender analysis framework developed by Feldstein and Poats (1989), which focuses on three core questions: 1) labour; *who does what?*, 2) incentives and benefits; *who benefits?*, and 3) governing arrangements; *who has access to and control over resources?*

[2] www.livelihoods.org gives an extensive overview of the sustainable livelihood framework.

[3] Gender analysis divides the roles and responsibilities of women and men into three categories. Child bearing and rearing responsibilities and domestic tasks relating to the maintenance of the household are referred to as reproductive roles (mostly allocated to women). Women, as well as men, also carry out productive roles, producing food or cash crops and/ or working in the formal or informal sector. Community-related roles differ from the management of collective community resources (mostly women) to the participation in formal community politics (mostly men) (Fernando and Starkey, 2004).

[4] A livelihood is defined as comprising 'the capabilities, assets and activities required for a means of living'. A sustainable livelihood is achieved when a livelihood 'can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base' (Carney, 1998).

Livestock are seen as productive assets and the roles and responsibilities related to livestock keeping are mostly valued as productive. Apart from labour men and women make use of different livelihood assets like; water, land, money and veterinary care. In the GSLF we refer to the efforts made to use certain assets for livestock keeping as *'livelihood costs'*. On the other hand livestock provide outputs that are of great value for men and women and their dependants in fulfilling their different tasks within their livelihood strategies. In the GSLF we refer to these as *'livelihood benefits'*. Household members also have varying degrees of, entitlement and mobility along gender lines, often dictated by institutions like marriage, inheritance and parenthood, which largely influence the dynamics of women's and men's incentives and allocation of efforts and the benefits derived. In the GSLF we refer to these governing arrangements as *'structures and processes'*. As other papers explain the *vulnerable context* (trends, seasonality and shocks) of livestock keeping in dry areas in detail we will not discuss it here (refer to Sonder *et al.* for an overview). But is should be noted that a thorough understanding of the (locally perceived) vulnerable context is essential to picture the threats of livelihood strategies and envisage future scenarios.

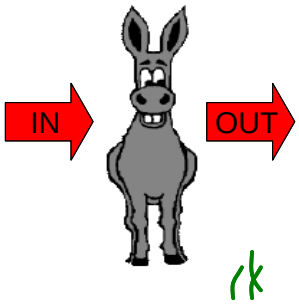
So far the discussion has been focussed on valuable outputs of livestock production for men and women. However, LWP also focuses on water as a scarce resource. How does water relate to the GSLF? The most straight forward connection is the investment of time and labour of men and women to collect water and maintain the water sources or infrastructure. In the GSLF this is valued as human capital. In some cases men and women have to pay for water (financial capital) or are looking after water sources collectively (social capital).

The accessibility, quality and quantity of water itself is valued as physical and natural capital and different governing arrangement determine who has access to these water resources and controls them.

3. The gendered costs and benefits of livestock related livelihood assets.

The SLF recognises five livelihood assets (see table 2) that comprise the basic productive and reproductive factors. Following this classification, the GSLF also considers five livestock related livelihood assets. These are factors required to keep livestock, to improve livestock production systems and ensure that men and women actually derive livestock related benefits. The first column of table 2 contains some examples of livelihood assets. The second column notes what costs are involved to access or utilize these assets. By making use of these assets, livelihood benefits are produced which may include the reproduction of livestock assets itself (third column).

Table 2: Examples of livelihood assets, costs and benefits of livestock production in Ethiopia, Uganda and Sudan as elaborated in this paper.

Livelihood Assets	Costs to access assets	Access/ control	Livestock as an asset	Benefits	Access/ control
N -water -land -feed		♀		-fertility -biodiversity -op. water use	♀
H -labour -knowledge -skills	XX			- nutrition	
P -water infr. -services				-traction -transport -energy	
F -cash	X			-income -insurance -coping	
S -resource sharing groups -gifts, bride price -cultural festivals	X			-status -social security	

All assets are required, but it is apparent that the relative importance of the livelihood assets differs among agricultural production systems, animal species, cultures, gender and poverty levels. One should realise that differences between assets are not rigid. Most are interrelated, overlap and convertible.

3.1 Livestock as an asset; gendered ownership of livestock in the household

Gender is one of the central organizing principles and governs the processes of production and reproduction, consumption and distribution (FAO, 1997). As a result, the potential to use a particular asset is governed by two processes; 1) the social meanings attached to particular tasks (e.g. men herd, women milk) and forms of income generation (e.g. men sell larger animals, women sell eggs), and 2) the individual choices men and women make.

In all societies 'the social perception of *men* and *women* is institutionalized, both formally and informally, which includes issues such as the division of labor, ownership, inheritance, markets, education, health care and marriage. Most gender papers discuss land tenure, water rights, access to credit and control over labour. Less has been published about the gendered ownership of livestock and livestock products.

Box 1: Changes in gendered ownership rules

Most formal and informal regulations related to agricultural production assume a stable situation with a majority of married women that are part of male-headed households and a few widows. The reality in countries like Ethiopia, Uganda and Sudan is that a lot of poor households are disrupted because of war, AIDS and drought. Many women are left in the rural areas to look after the farms while their husbands have left to fight, died or migrated to look for work.

For example, within the Nuer society in south Sudan, widows used to remarry one of their husband's relatives. As the number of men decreased because of the war, women could

no longer remarry and have to look after themselves. This is very hard as most productive assets are governed by men (Amuguni, 2000). Rahmato and Kidanu (1999) describe several cases of divorce in Ethiopia, were women are often left with nothing. Widows are better of as they can participate in the peasant association. We discovered in central Uganda that lately some men and women sign a contract when getting married. This contract explains what percentage of the land, but sometimes also livestock, will be left for the woman when she becomes a widow. In case this is not done, most of the livestock are taken by older children or by other close relatives, leaving women with only a few small ruminants (Kakwanzi-Kezaabu, 2001).

Livestock ownership implies a socially respected set of property rights, such as the right to use, manage, derive income, exclude other potential users, be paid compensation for use or damage and to dispose the animal. Associated responsibilities include care taking of the animals and compensation for damage that might be caused to others. The assignment of property rights affects the bargaining powers of members of society and therefore the distribution of income and wealth (Beerling, 1986).

Given this definition of ownership women generally own little or no livestock, except for chicken. But women often have user rights (access) to specific services or products of livestock such as milk, manure and transport and often have responsibilities such as looking after small ruminants or sick animals.

In some cultures women already own some sheep or goats before they get married and bring them to their new home. Also women in Dire Dawa (Ethiopia) mentioned that they invested their earning from selling milk and eggs in goats (Van Hoeve, 2004). In addition NGO's in Uganda and Ethiopia often target women in their 'give a goat/cow' projects. The question is what this ownership entails and to what extend women have actual control over these animals.

Access and control over land is governed by both formal and informal regulations and often restricted to the household head; a man (Beerling, 1986; Bravo-Baumann, 2000; Upton, 2004). Governing structures concerning livestock seem to be directed by more informal processes like marriage arrangements and inter-household bargaining. This means that access and control arrangements vary between cultures, communities and even between households. Tangka *et al* (2000) tried to identify gendered roles, responsibilities and ownership within different livestock production systems. But is seems difficult or impossible to make these generalisations. The next paragraphs give therefore examples of governing arrangements to illustrate the type of ownership men and women can have with regard to livestock in Sudan, Ethiopia and Uganda.

In transhumant societies, property rights for land are often not well defined. In contrast, livestock are a main source of household income and have a defined ownership (Bravo-Baumann, 2000). For example within the Nuer culture in south Sudan, the husband is the authority in a home and the decision-maker in major issues such as livestock sales, to use animals for dowry (men can have up to eight wives) and migration. Women are perceived as men's property and do not control the outcome of their labour themselves. For example, women are fully responsible for small stock management but they cannot decide on their sale. Also, when an animal has calved, the husband decides which of his wives will benefit from the milk. This means that women usually control income derived from chicken rearing only. Men control money raised from the sale of all other animals (Amuguni, 2002; Bravo-Baumann, 2000).

In Ethiopia, traditionally men gain access to land through inheritance, except for female heads of households with young children. Women also have a minimal roles in decisions related to land distribution and agricultural production (SIDA 2002). Only widows participate in the peasant association which is in charge of land allocation and redistribution. Women can not make use of oxen directly, but can use donkeys for transportation of e.g. water. In most areas women own sheep, goats and chicken. They also control milk products even when the men milk and look after the animal, as is the case with camels.

Table 1 gives an example of; the access to, and control over resources within a male headed household in a village in the Ethiopian highlands. Please note that it presents the perception of women in those households. It shows that husbands control oxen, are the only ones having access and control over credit, and farm inputs, and are mostly targeted by extension. Here also, wives have full access and control over chicken, are more in charge of spring water and have more access to milk products but less control over the cows. The river, sheep and goats, crops, labour and cash are more or less equally shared.

Table 1: Perception of middle income women in North Wollo of their resource profile compared to their husband's, indicated in percentages of total access and control (Percy, 1997)

	Perceived access to…		***Perceived control over…***		
Resources	Husband	Wife	Husband	Wife	***Benefits***
Spring water	25	75	25	75	Dinking and preparation of food
River	50	50	50	50	Washing and irrigation
Land	70	30	70	30	Crops, trees, building, burial
Livestock:					
Cow	30	70	70	30	Milk, butter, cheese
Oxen	70	30	100	0	Ploughing, meat
Sheep & goat	50	50	60	40	Meat, income
Chicken	0	100	0	100	Meat, eggs, income
Grazing land	100	0	100	0	Animal feed
Horticulture	55	45	55	45	Food and income
Extension	80	20	100	0	To plant in rows, vegetable prod.
Crop produce	60	40	40	60	Food, income
Trees	50	50	60	40	Fuel wood, shade, construction, income
Credit	100	0	100	0	To buy oxen and seed
Labour	35	65	50	50	To increase yield
Team work	65	35	100	0	To facilitate work
Farm inputs	100	0	100	0	To increase production
Cash	55	45	50	50	Food, health, clothes, education and to buy livestock

In Uganda female headed households may own fewer livestock (Dolan, 2002, Madanda, 2000) than their male counterparts, but women in female headed households generally experience fewer restraints securing access to, and control over livestock and livestock products than women do in male headed households. For example, none of the female heads interviewed in Dolan's study were limited by restrictions as to which animals they could maintain and/or sell. In contrast, the potential of women within male-headed households to exercise claims to livestock was contingent upon marital negotiations and the

leverage that they could exert within their households. While there was substantial intra-district variation, women in male-headed households mostly reported that they did not control the disposal or sale of the animals they tend, and had to consult their husband before selling an animal. Similarly women may control some, livestock products such as meat, milk and manure, but they did not have the right to sell/use animal skins and wool (Madanda, 2000; Dolan, 2002). However box 2 shows that control over livestock products can shift from women to men when the production is being commercialized (Kabirizi, 2003; Kakwanzi-Kezaabu, 2001)

Box: 2 milk commercialisation in Uganda

Women's decisions over livestock and milk management have been overshadowed by the commercialisation of milk. Women would earn the right of access to milk, the primary means of subsistence upon the fulfilment of their obligations as mothers, wives and as accomplished managers in the household. Milk and *ghee* produced by women were shared among a wide range of relatives and friends, ensuring social capital.
But today milk has become a male domain in distribution for public consumption and income generation. This trend has affected women's position as managers and mothers. Women have less bargaining power to decide what is good for their families. Men tend to sell most of it leaving little for their families. The production of *ghee* came to a halt as men preferred buying it from shops without mutual consent.

3.2 Natural assets

Natural capital is the term used for the natural resource stocks from which resources flows and services (such as land, water, forests, air quality) useful for livelihoods are derived. It especially is important for those who derive all or part of their livelihoods from natural resource based activities, and particularly for poor farmers and herders. In more general terms, good air and water quantity and quality represent a basis for good health and other aspects of livelihoods (Kollmair, 2002).

3.2.1 Use of natural assets

Natural assets such as climate and ecosystems, largely determine the vulnerability context of poor men and women. The vulnerability context is shaped by trends (think of population increase), shocks (like droughts, floods and disease) and seasonality (dry and wet season).

Water is the key natural resource in livestock production. It is consumed directly as drinking water and indirectly through feed. In dryer areas, pastoralists have to move their animals to the sites where forage and water are available. Most pastoral communities move with their whole family. In more semi-pastoralist communities, only men move with all or some of the livestock in the dry season and women stay behind with the children and the elderly. In those cases women and children are taking care of the remaining animals.

In Sudan and elsewhere, a basic challenge for pastoralists is to maintain the maximum number of animals under dry season conditions in order to make use of the plentiful supplies of both water and forage during the rest of the year. Also McCarthy *et al* (2003) indicates that pastoralists in south Ethiopia keep large herds consisting of different species to cope with the environmental variability. To relieve pressure on both water and grazing around watering centres, pastoralists have traditionally tended to move away and disperse widely among the different regions during the rainy season to make use of the water pools formed by the rain as

well as the extensive grazing area (Shazali et al., 1999). Nowadays, these movements and the access to water are more and more obstructed by sedentary farming systems including large irrigated areas in Sudan (ibid) and privatisation in Southern Ethiopia (McCarty *et al,* 2003). The dependence of pastoralists on climatic conditions shape complex relations with other type of farmers (SLA: social capital) and government regulations (SLA: processes and structures). As grazing areas decline for the same or higher number of animals, the pressure on natural resources increases leading to land degradation, feed and food shortages as well as escalating conflicts. This is one of many reasons why pastoralist communities in Sudan and Ethiopia have been increasingly dependent on food aid during recent years (Shazali and Ahmed, 1999; McCarthy *et al,* 2003).

Within mixed crop-livestock systems, there is also a dependency on water and forage, but in addition to migration, other options are available to farmers. Examples are ground water wells, the cultivation of forages, using crop residues for fodder, and in the more industrialized areas, the use of industrial residues. Communal grazing land (with relatively open access) is not only practiced in the pastoral systems. Within some crop-livestock production systems like in the highlands of Ethiopia and public land in east-central Uganda, farmers have access to communal grazing lands. However, there is a trend that these communal lands are increasingly overgrazed because of the declining grazing area, increasing animal numbers partly related to an increase in household density and human population pressure (Benin *et al.*, 2004; Shiferaw and Holden, 1999; Place and Otsuka 1997). But also the expansion and intensification of cropping in responds to increased demand from higher human population affects the feed availability for livestock. Since all land is used and used every year for crop production with no fallow periods, animals now can only graze after harvest on cropping land. This also means that even marginal lands that are only suitable for grazing are now used for cropping.

The gendered access to grazing land is not well studied. The reason might be that most decision making about grazing belong exclusively to the male domain. Women and children usually only assist in grazing the animals. Also, grazing lands are often controlled by the village and thus not subject to the private ownership rules that gender studies tend to focus on. However, when forages are introduced often women are responsible for cutting and transporting the feed to the compound. It is not clear if this also leads to increased ownership of women within the livestock production system.

Within urban Livestock production systems in Uganda other livelihood assets like water infrastructure, markets and new technology options also become important besides the natural assets land and water. The system largely depends on zero grazing practices and waste from households, markets or restaurants. The less fertile soils are used for forage production, specially elephant grass is popular.

3.2.2 Livestock's positive contribution to natural assets

Livestock can also contribute to natural assets such as soil fertility, the succession of fauna and the livestock genetic diversity itself. Improvement of soil fertility is done in several ways, for example the grazing of animals on harvested plots, collection of animal dung by keeping animals in corals at night or just gathering droppings in the open field. Improved soil fertility increases the crop-water productivity as it enhances the optimal nutrient uptake per drop of water and reduces vulnerability to droughts. This means that the chance that crops survive and production is higher increases.

The access and control over animal dung differs between systems and depends often on the type of crops that are grown (cash crop or subsistence crops), who is controlling the

cultivation process (men or women) and what animals produce it (small or large ruminants). Women are more often involved in subsistence cropping and have access to dung of small ruminants since they are closer to the house. When women have access to animal dung, like in Ethiopia, they tend to use it as fuel for cooking or sell it as a commodity. Since wood branches are scarce it is impossible or time consuming to prepare daily food on just wood.

3.3 Human capital

Human capital represents the skill, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives (DFID, 2000). At the household level it varies according to gender, age, household size, skill levels, leadership potential, health status, etc. and appears to be a crucial factor in order to make use of any other type of assets (Kollmair, 2002).

3.3.1 Nutrition as a key benefit

The main human capital value that livestock provide is nutrition. Nutrition has been the conventional indicator of poverty and well-being with 2000 calories per adult person per day set as a minimum (Meinzen-Dick *et al*, 2002). The superior nutritious value of animal products to overcome malnutrition among young children has thoroughly been studied. Health and nutrition are important elements in the development process. Adequate nutrition enhances physical health, thereby improves labour productivity. It should be noted here that men and women have different physiologies and fulfil certain tasks and therefore have different energy and thus specific nutrition requirements (Kimhi 2004). Good nutrition is also associated with learning ability; hence good nutrition leads to higher human capital accumulation (Schultz, 1997). However, a key constraint is the limited consumption of livestock products among the poor. Appleton (2003) presents in table 3 the percentage of calories derived from livestock products in the diet of the poorest 50 percent of the people in Uganda, which is only 1.2 percent[5].

Table 3: Contribution of livestock products (percent of total calories) to the food basket of the poorest 50% of the population in Uganda (Appleton, 2003).[6]

	East		Central		North		West		All
	rural	Urban	Rural	urban	rural	urban	rural	Urban	
Other meat	0.1	0.1	0.2	0	0	0	0.2	0.4	0.1
Beef	0.4	0.8	0.5	0.5	1	0.8	0.6	1.2	0.6
Chicken	0.1	0.1	0.1	0	0	0	0.2	0.2	0.1
Eggs	0	0	0	0	0	0	0	0	0
Milk	0.4	0.4	0.9	0.8	0.3	0.5	0.1	0.1	0.4
Total	1.0	1.4	1.7	1.3	1.3	1.3	1.1	1.9	1.2

Consumption preference is another important issue to consider when valuing livestock products. Consumption content, quantity and patterns are highly influenced by cultural practices, gender and age and vary between regions. For example in the pastoral areas in Ethiopia people drink milk of cows, goats, sheep and camels. In the highlands however people

[5] People in developed countries obtain an average of 27 percent of their calories and 56 percent of their protein from animal food products. The averages for developing countries are 11 and 26 percent, respectively (Delgado *et al*, 1999).
[6] Figures are based on a survey done in 1993.

refuse to consume other kinds of milk than cow milk as other milk is associated with 'low land' habits. A well known example of religious consumption rules is the consumption of pig. In both Ethiopia and Sudan the Orthodox Christian and Muslim religions forbids people to eat pig meat. In contrast, Christians in Uganda do raise and eat pig meat.

Some gender studies also indicate that food security at a household level does not automatically mean that all household members are adequately nourished. In Ethiopia but also in other countries, women often suffer from nutritional depletion as they have the least priority in the household and will try to feed their children first. Also nutritional taboos during pregnancy or after giving birth may impact women's health (SIDA, 2002).

It should be noted that besides positive benefits, livestock can also have negative health impact for human beings. These may take the form of the pollution of drinking water or the transmission of diseases as many people eat undercooked meat and drink raw milk. Often the care of ill household members is an extra burden for women. Also these measures that can prevent zoonotic diseases like cooking of meat, boiling of water and milk, cleaning sheds are most of the time women's tasks.

3.3.2 Who is doing what and who has the skills and knowledge?

Labour: *Pastoral system in Sudan*

Gender division of labour in pastoral societies is distinct. Men are decision makers for livestock production and herd management. Women are responsible for young and sick animals, milking and dairy related activities, while children undertake daily herding duties. When necessary, women assist in herding and watering, and men in milking (Tanka *et al,* 2000; Amuguni, 2002).

Within the Nuer society in South Sudan women perform at least 50% of the activities that are related to livestock (Amuguni, 2002). Besides the tasks stated before, women are responsible for collecting grass, fetching water and firewood, cleaning cattle areas if their husband is not around, collecting cattle dung, building of corrals (together with their husbands) and the care of calves, goats and chicken close to the homestead. Among the Beja (agro pastoralist) of Sudan it is mostly the men and boys who milk the cows and allocate the milk to different uses (Morton, 1990)

Because of the war, roles are shifting in South Sudan. For example in the study executed by UNICEF some of the Dinka mention that these days girls grow up in the cattle camps too and are involved in activities previously only done by boys. Also because of the growing number of female headed households women are more involved in the management of larger animals like cattle (Adolph *et al,* 2003).

Crop-livestock system in Ethiopia

In the crop-livestock system in the Ethiopian highlands, women are more involved in cattle production than in arable farming. They clean cow sheds, milk cows, look after calves and sick animals, cut the grass and supervise feeding and grazing of cows, make dung cakes, butter and cheese and sell these products once or twice a week. Women decide on the allocation of milk for different uses. Men feed the oxen and take the animals for veterinary treatment when need arises. Joint decisions by husband and wife are made on the purchase and sale of livestock. Boys and sometimes girls, generally graze the ruminant livestock. During the rainy season, women assist their husbands in keeping the animals away from growing crops (Whalen, 1984)

Urban agriculture in Uganda

Women are mainly involved in the urban agriculture system in Uganda. They provide up to 70% of the labour. A large number of these women practice zero grazing which means that they keep livestock at their homestead and collect, grow or purchase animal feed. The system were forages are grown is largely promoted by the 'in-calf heifer projects' of the government and NGO's. However growing forages for dairy cows requires a lot of labour since forages have to be planted, chopped, weeded, fertilised, collected and transported. In urban areas women are the key players in executing those activities. Also the collection of water is done by women and children (Tumwine, 2002; Kabonesa and Happy, 2003). Female headed households have in general less labour available than male headed households (Dolan, 2002)

Knowledge

All activities require specific knowledge. Often a distinction is made between 'indigenous or traditional' and 'modern' knowledge.

Animal health

Most literature is dedicated to knowledge systems related to animal health. This knowledge is important as extension or veterinary services provided by the government or private institutions, both forms of physical capital, are often limited or not there. The UNICEF study mentioned above gives insights in the local knowledge among Nuer and Dinka in South Sudan. Specifically the Dinka have extensive botanical knowledge. Unfortunately this local knowledge of both men and women is endangered by the displacement of people from their villages to the battle field or refugee camps (Adolph *et al,* 2003). In other places traditional knowledge is also eroded by the introduction of modern medicine.
Several studies mention the important role of women in discovering diseases while milking and their responsibility to care for sick animals (Amuguni, 2002; Adoph *et al,* 2003; pers com CARE). However most interventions aimed at the improvement of animal health care in the past excluded women or projects were inconvenient for women to join because of the time, language or location. Box 3 describes the experience of Vets without Frontiers (VSF) in South Sudan.

Box 3: Women as local animal health workers

Vets without frontiers (VSF) is working with Nuer communities in Western Upper Nile Province, South Sudan. They executed a study to identify ways to encourage the participation of women to be trained as community based animal health workers. It turned out that the main reason that women are not participating is because men are asked to select the candidates within the communities. They viewed women as incapable to perform veterinary services as they had no experience with animal husbandry (at least that was what they thought). Apparently the men were not aware of the different tasks women performed related to animal husbandry in general and health care specifically. Also women never thought of themselves as local animal health worker because they where illiterate (Amuguni, 2002).

Marketing

Less obvious forms of knowledge systems, although very important, are the ones that relate to livestock marketing systems. The decision of men and women on when and how to sell their animals depends very much on the reason why they are selling a specific animal. The distinction between livestock keepers who may only sell live animals in response to specific needs, versus livestock producers who sell their stock when prices are right needs to be considered. In the latter case knowledge on marketing systems becomes more important

and influential. Men in general have a better access to this knowledge as they are going to the market on a regular basis and are more often literate.

Processing

Other forms of knowledge, traditionally the domain of women, are the different ways of processing animal products. When production chains are developed this knowledge often shifts to men. Kakwanzi-Kezaabu (2001) describes in detail how this is the case in Uganda where women lost their control over milk and income from *ghee* (butter) in the commercialisation process of milk production (box 1)

3.4 Physical capital

Physical capital comprises the basic infrastructure and producer goods needed to support livelihoods, such as affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean, affordable energy and access to information (Kollmair, 2002).

3.4.1 Using animals for transport, traction and energy.

The physical capital for transportation and traction of the rural poor in Ethiopia, Sudan and Uganda is at a very basic level. Animals that are kept mainly for transport and traction are; oxen, camels, donkeys and horses. Many poor can not afford mechanised farm equipment, motorized transport and many communities are not connected to the road network.

Transport

Studies show that most of the transport activities of rural households take place within the community and are mainly related to subsistence tasks such as the collection of fire wood and water and transport to and from the fields (Dawson and Barwell, 1993). In Ethiopia 42% of livestock output is used for draft power, manure and transport (Degefe and Nega, 2000). Donkeys are the major mode of transport in this country[7]. They transport at least 12 different commodities including vital food supplies. Donkeys also enable women to carry a double amount of water from further distances and they allow for example women in Uganda to collect larger amounts of animal feed (Olupot and Sseruwo, 2004). In most cases, there are no cultural obstructions for women to use donkeys.

Besides subsistence tasks, transport is becoming critical as households begin to depend on income from marketing cash crops. In Ethiopia both men and women use donkeys to transport marketable goods (Marshall and Ali, 2004). Camels are used in Ethiopian and Sudanese pastoral communities by men to transport, for example, salt (Van Hoeve, 2004). For transport of persons horses are used to pull carriages in the rural towns of Ethiopia and for riding in many rural areas.

Traction

In Ethiopia, traditionally two oxen are needed for ploughing. Sometimes, a donkey is used as substitute when there is no second ox available. The use of cows is culturally impossible as people perceive it as torturing their animal. In Uganda and the south of Ethiopia people culturally cultivate by hand. In most countries women can not use oxen for ploughing since this job is perceived as 'to heavy' for women. In case women have their own plot, for example when they are widowed, they rely on male relatives or have to hire male to plough.

[7] Ethiopia has the highest number of donkeys in Africa in total (Fernando and Starkey, 2004)

Energy

Energy is another important physical capital. Animal dung and crop residues are often used as fuel. For example in Ethiopia these resource provide up to 50% of the household energy supply (Shiferaw, 1999). Animal dung is gathered by women and children and dried in the sun, and used afterwards in stoves for cooking. Besides energy, animal dung is also used for house construction. Alternatives are often more costly and take more time, specially for women and children.

3.4.2 Basic infrastructure and produced goods needed for livestock production

An other obvious example of physical capital is the road network. Roads are also of importance to livestock production as they provide access to markets and services. Other physical capital values that have a direct impact on livestock productivity are; access to basic veterinary and extension services, and access to water sources. In areas where farmers have begun to use improved or exotic livestock breeds, access to artificial insemination (AI) facilities is also important.

Services

From a gender perspective, veterinary and extension institutions are mostly targeting men. Table 1 gives a nice example from Ethiopia that illustrates how inputs and extension services are far less available to women than men. Many farming wives even have no access at all to these resources (Percy, 1997). As earlier discussed and illustrated in box 3 extension and veterinary services often operate at times and in places that are inconvenient for women. In some cases women may be illiterate (or less literate) and as such, often perceived as ignorant by the service institutions. Frequently, when a certain degree of technology is involved, such as AI facilities, introduction of improved breeds, commercialisation of milk, women are most of the time not recognised as a stakeholders and therefore not targeted by service institutions.

Water

Access to water is of primary importance for livestock productivity. Table 4 gives an illustration of the facilities that provide drinking water to urban and rural communities in the three countries. The percentages indicate the households that have access to safe drinking water within a distance of 1 km. The access to water for livestock is higher than for people as quality standards are lower for livestock; livestock can easily drink from unprotected springs, etc. But the percentages give a general indication of the water infrastructure that is present in the countries. Most of these structures are also used for livestock, and some are specially designed to serve both people and animals. In urban systems in Uganda tap water is even the major source of water for livestock (Kabirizi, 2004).

Table 4: Improved drinking water[8] coverage in Ethiopia, Uganda and Sudan (Unicef, 2002)

Country	***Total***		***Urban households***		***Rural households***	
	Access to drinking water	HH connection	Access to drinking water	HH connection	Access to drinking water	HH connection
Ethiopia	22	4	81	23	11	0
Sudan	69	26	78	46	64	13

[8] Improved drinking water technologies are those more likely to provide safe drinking water. These include; household connection, public standpipe, borehole, protected dug well, protected spring, rainwater collection.

Uganda	56	1	87	8	52	0

As mentioned earlier, fetching water for household consumption and small animals is most of the times a woman's task. However, for large animals, men are mostly responsible as they bring the animals to the water source while herding (Tangka *et al,* 2000). When access to water is low like in Ethiopia, opportunity costs for both women and men are very high. Box 5 gives an example how the improvement of water infrastructure changes women's lives dramatically.

3.5 Financial capital

The availability of cash or equivalent that enables people to adopt different livelihood strategies is financial capital. Two main sources of financial capital can be identified as:

- *Available stocks comprising cash, bank deposits or liquid assets such as livestock and jewellery, not having liabilities attached and usually independent on third parties.*
- *Regular inflow of money (conventional poverty indicator of less than one dollar a day) comprising labour income, pensions, or other transfers from the state, and remittances, which are mostly dependent on others and need to be reliable (Kollmair, 2002).*

3.5.1 Livestock to generate financial capital (income, saving and as a coping strategy)

Box 4: contribution of livestock to the income of the poor

In Ethiopia livestock only contributes 5% to the cash income of lower income households. Within upper income households this is 24% (Webb *et al*, 1992). The poorest of the poor, comprising more than 50% of the households, do not have any livestock at all (Rahmato and Kindanu, 1999).
In the rural areas of Uganda[9] only 6% of the total income in male headed households is derived from livestock and 1% within female headed households[10] (Dolan, 2002).
As in Ethiopia the very poor in rural Uganda, between 5 to 25% of the community's population,[11] have no livestock (Smith, 2001).

Income

In Ethiopia about 24% of the livestock outputs are used to gain cash income with most of the income coming from the sale of live animals (Benin *et al,* 2004). In the highlands, revenues from the sales of butter and cheese are the main sources of income for women (Whalen, 1984). In the lowlands, women sell milk and eggs to cover small household costs such as kerosene, grain milling, and cooking oil and to invest in goats. Men tend to sell larger animals like cattle and camels to increase their herd by purchasing a larger number of younger animals, buy goats or generate cash. Cash may be used to cover major investments like house construction and marriage and to cover emergencies. Smaller animals like goats are sold to cover larger household expenses like clothes and food in times of shortage (Van Hoeve, 2004)

In some societies like in South Sudan and parts of Ethiopia, livestock are used by men as in- kind payments for marriage costs and fines. Sometimes, women exchange chicken for soap, salt and used clothes, either for themselves, their husbands or their children (Amuguni, 2000).

[9] Study executed in three districts in central and eastern Uganda; Mbale, Kamuli and Mubende
[10] A significant proportion of the FHH even have no livestock (only 15% have cattle, 30% have goats and 38% have chickens).
[11] study executed in two districts in central and eastern Uganda; Rakai and Kumi

The time of selling is determined by seasonal conditions for example when animals are fat, people hungry, beginning of school terms and special cultural events. In Ethiopia, animals (in this case chicken and sheep) are mostly consumed and thus marketed on special occasions such as Christian and Muslim holidays (Van Hoeve, 2004). When farming systems move from livestock keeping to livestock production the market influences the time of selling more and more.

It must be noted here that gender relations underpin the paradox that an increase in farm income is not automatically leading to increased food security. For example, Adamo (2001) mentions that in central Ethiopia men control household expenses and women have to request for household allowance. Also, Maxwell (1995) writes that women in focus groups discussions repeatedly insisted that if their husbands knew the real value of women's economic activities, the result would be a lower financial contribution for household expenses from their husbands. This would result in an increased financial strain on women and reduce their options for maintaining food security.

Saving

People try to maintain a balance between more and less liquid convertible assets to enable them to maintain their regular consumption requirements while at the same time protecting savings for larger scale investments or to meet large expected consumption needs in the future. Poorer people often impose disciplines and protection on their saving by placing savings 'out of easy reach' to prevent them from being cashed and spent by themselves or by others (for example relatives or neighbours) on more immediate consumption needs. Moreover, their access to saving institutions, like rural banks or pawn institutions, is often limited and extremely costly. Poor people, therefore, tend to invest in 'lumpy' assets such as jewellery or livestock (Dolan et al, 2001).

Especially oxen, cattle and camels are difficult to sell, and the poor only sell them in times of dire need to richer farmers at very low prices. Other species like chicken and goats have a higher liquidity[12]. In Uganda several female heads referred to the importance of livestock as an asset that could be quickly liquidated in circumstances of economic shortfall or for bigger expenditures such as medical care, school fees or to pay bride price for marrying daughters (Dolan, 2002).

Coping

Livestock as a 'lumpy' asset has a saving, buffering and insurance function that can be an important coping mechanisms of the poor (Dorward *et al* 2001). During the nineteen-nineties, the worst years of famine in Ethiopia, 55% of the upper income households and 30% of the lower income households sold most of their animals. The majority of livestock sold were male cattle, calves and small ruminants although donkeys, cows and draft oxen were sold as conditions worsened (Webb *et al*, 1992). Rahmato and Kidanu (1999) observed in Dessie and Ada Liben, that livestock were sold as a last option (distress coping). Farmers living in those areas perceived that 'once livestock were sold, nothing prevented households from falling into poverty with no way out'. Table 5 gives an indication of the change in livestock numbers during those times in Amhara region.

Table 5: Proportion of households owning livestock in the drought prone areas[13] in the highlands of Amhara region, Ethiopia (Benin *et al*, 2004) [14]

[12] Liquidity can be defined as the easiness of converting an asset into cash

[13] Drought prone areas are classified by the Ethiopian Disaster Prevention and Preparedness Commission

Type of livestock	*1991*	*1999*	*Change*	*% remaining*
Oxen	0.71	0.41	-0.30	58
Cows	0.50	0.28	-0.22	56
Young cattle (bulls and heifers)	0.36	0.16	-0.20	44
Small ruminants (goat and sheep)	0.42	0.17	-0.25	40
Poultry	0.80	0.70	-0.10	88
Equines (donkeys, mules and horses)	0.18	0.14	-0.04	78

The study of Lawson *et al* (2003) looks into the rational behind poverty persistence and transition in Uganda. It clearly shows that livestock is an indicator of moving in and out of poverty. Farmers that have become poor between 1992 and 1999 had a declining number of cattle per household (from 1.02 to 0.82). At the same time the category 'never in poverty' showed an increase in number of cattle per household (1.01 to 1.56). The question is if livestock can help people getting out of poverty…

3.5.2 Financial cost of livestock production

Financial capital is needed to purchase animals, medicine and sometimes feed and water. For women in particular, asserting claims to smaller species such as goats, sheep, and poultry rather than cattle and camels is more likely since the initial costs are lower. Profits may be low but so are the risks, and men are less likely to interfere in decisions to sell (Sinn *et al*, 1999).

However, many poor farmers, especially women, lack access to saving and credit facilities. In Ethiopia, credit is far less available to women than men (Percy, 1997), with many women having no access at all (see also table 1). In Uganda, a formal credit system is in place for both men and women. But many women have difficulty accessing these systems since they can not prove their creditworthiness based on wealth or social standing (Freeman *et al*, 1998; Dolan, 2002). Participation in local saving and credit groups (strongly related to social capital) is therefore very popular and enables some women to hire land and labour. Disadvantages of such systems include the accumulation of relatively small amounts and the restriction to middle income men and women. Therefore women in poor female-headed and male-headed households face an even stronger shortage of credit to invest in productive assets such as livestock than poor men (Dolan, 2002).

There are also credit systems based on live animals. Many NGO's use this principle in their popular 'give a cow' and 'give a goat' programs. They provide low-income small-holders with training and dairy animals through an in-kind loan. The contract requires the family to pay back for example two (cattle) or three (goats) offspring to new families. Similar traditional arrangements exist in the Ethiopian highlands were some women borrow a sheep or goat from other farmers until delivery. The women keep one of the lambs and return the rest to the owner (personal observation in south Gondor).

3.6 Social capital:

In the context of the SLA, social capital means the social resources upon which people draw in seeking for their livelihood outcomes, such as networks and connectedness, that

[14] Farmers in this study revealed that a combination of losses due to drought and diseases and sales during crop failure were the primary causes for the declining trend in ownership of livestock. It is however not clear what the influence of food aid is here as access to food aid is often conditioned by poverty status based on livestock numbers.

increase people's trust and ability to cooperate or membership in more formalised groups and their systems of rules, norms and sanctions (Kollmair, 2002).

Investigating social capital helps us to understand how livestock keepers engage among themselves and with other actors in the spheres of market, state and civil society in order to gain access to resources, to influence the rules of access in a society, or to turn their assets into commodity bundles. These networks therefore play a vital role in helping people act to improve their livelihoods, mobilise and defend their assets. But at the same time, they often provide fora for people to discuss. They enhance rural people's capacity to be their own agent of change in a world with increasing influences from outside (Bebbington, 1999).

Quite often access and amount of social capital is determined through birth, age, gender, tribe, religion, marriage, wealth or number of children and may even differ within a household (Kollmair, 2002; Adamo, 2001). To ensure and strengthen their social capital men in Ethiopia give goats or donkeys to close friends and family. Obviously and often parallel to positive impacts social capital also may cause effects that are restrictive for development. For instance the membership of groups always entails excluding other stakeholders (Kollmair, 2002).

Women tend to be resource poor farmers because, in many cases, they have little, if any, access to financial, natural, or technical resources and are often not part of official 'political' groups. This is one of the reasons why women's groups have become important. Cooperative initiatives like the credit groups in Uganda or the milk-groups in Ethiopia (box 5) enable women to access resources that otherwise would have been out of their reach. It makes women more powerful and helps them to overcome obstructing governing arrangements (see section 3) However, women as individuals and women's groups will only strengthen women's positions if they have social networks and if they have trust in each other (De Haan, 2000)

Box 5: The women's milk group in Lege-Diny, Dire Dawe, east Ethiopia

Women used to spend four to six hours on fetching water before a multiple water use system was established in their village. Because of the improved access to a better quality of water, dairy animals have become more productive and women save a lot of time. The combination of extra milk and time enables them to go to the market. Since this is an eight hour walk (one way) women decided to organise themselves in two groups of 14 members. The idea of the milk group is based on the traditional funeral groups that are also known in the highlands. The women gather every morning to collect the milk (mixed cow, goat and camel milk) and eggs and they go in turns to the market. Part of the income is saved collectively (in this community, they are saving for a grinder) and the other part is for the woman selling milk that day.
As all women are illiterate, they developed a system in which women give a fixed amount of milk (0.5 or 0.75 litres). Every woman just remembers how much the others contributed in 'her' round, and she will return the same amount to these women in 'their' rounds. In total, they are selling around 8 litres (for 4 USD) per day on the market. If women have no milk because their cow or goat is pregnant, they can contribute eggs to stay part of the group. When women are not able to come, they will send a relative. (Van Hoeve, 2004).

Other examples of (gendered) networks directly related to livestock are the 'resource (labour, oxen and donkeys) sharing' groups in both the high and low lands in Ethiopia (Adamo, 2001). Percy (1997) gives a nice example of female household heads in West Harar using this capital to deal with their cultural barriers. "Ploughing with oxen is a man's domain.

This normally leaves widows and divorcees in a difficult situation. The women in West Harar were able to get around this by availing themselves to one of the labour sharing groups. By exchange of labour they didn't lose control over their land".

Social capital directly affects other capitals by improving the efficiency of economic relations or by reducing the 'free rider' problems associated to public goods through the mutual trust and obligations it imposes on the community (De Haan, 2001). Within the livestock production system overgrazing causing land degradation is the prime example of the 'free rider' problem (Hardin, 1968). In the case of Ethiopia, Benin *et al* (2004) observe in Amhara region that the availability and quality of communal grazing lands are positively affected when managed by the community itself. As natural resources become scarce, improvement of collaboration can avoid conflicts between different resource users.

As table 6 shows social capital often represents a place of refuge in mitigating the effects of shocks or lack of other capitals through informal networks (Kollmair, 2002).

Table 6: Percentage of households that received assistance from their communities and relatives during different climatic phases in South Ethiopia and Central and South West Uganda (derived from Ndikumana *et al*, 2000)

Aid from; community - relatives	***Pre-drought Jan-May '95***	***Drought June '95-April '97***	***Minor rains April-Oct'97***	***El Nino rains Nov '97-June '98***	***La Nina dry June '98-Dec.***
Ethiopian pastoralists	16 - 27	18 - 27	4 - 5	1 - 4	4 – 2
Ugandan agro-pastoralists	0 - 3	88 - 4	1 - 1	1 - 1	0 - 1

4. Discussion and recommendations: applying the GSLF

Numerous changes are taking place within the livestock production systems, like for example the transition from livestock keeper to producer and the increasing number of female headed households. Thus, the livelihood costs and benefits are also changing due to different feeding strategies and increased requirement of veterinary care and other external inputs, access to markets and credit systems and information.

These changes also result in a shift in roles and responsibilities at the household level. When moving away from subsistence farming (e.g. commercialisation of milk), women tend to lose control over (some or all) household food resources and depend on their husbands to provide them with cash to cover household costs. This involves more bargaining at the household level and might result in a decrease of food security for individuals in the household.

However, the introduction of technologies does not necessarily have to be negative for women. If it leads to a reduced work load for women (think of improved access to water in dry areas) without losing their access or control, it can have a positive impact on food security. Women then have more time to look after the children, get involved in other income generating activities, etc. But the introduction of new technologies might also involve extra labour for women (e.g. forage technologies) without any means of control over the eventual output of their work.

The GSLF can be used for three different purposes:

1. To assess livestock-productivity. Analyse the role of a specific animal in the livestock production system in order to gain insight in what animals are most valuable for men and for women in a specific system. This information can contribute to a more holistic and meaningful assessment of LWP, particularly in terms of changes in water allocation.
2. To perform a gender impact assessment. Predict what the expected impacts on the gendered costs and benefits will be when a specific technology is introduced, particularly in a water scarce area.
3. To enhance learning. Use as a tool at different levels (community, development agent, researchers) for communities to analyze the importance and role of livestock in their lives, as it relates to water, in order to stimulate mutual understanding about the importance and limitations of livestock rearing.

4.1 Tools for applying the GSLF

Central in the assessment of livestock-productivity is to determine what the specific values are of different animals in the livelihood systems of men and women. The assessment gives a gender specific picture of livestock productivity at the community level. This picture can be evaluated with the LWP framework.

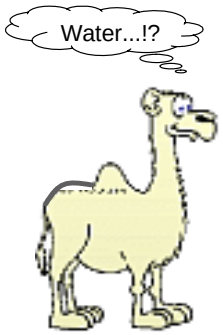
Box 6: Selection of discussion groups

- Social groups: with help of participatory poverty mapping/ranking several groups can be identified with different levels of well-being or ethnic background. Key informants can be used to get this information.
- Gender: One can work with both mixed and women's and men's groups depending on what people are used to. However, groups should also include married women (not only widows) and second wives (if polygamy is practiced).
- Youth: it is good to include the youth of the community since they are the future land users and they give insights on the involvement of children in livestock rearing.

Programs focussing on livestock-water productivity can consider the following gendered livestock information, taking the different common animal species as starting point.

- First of all, it is important to get a good overview of the existing livestock production system in a specific area. With help of the five capital values the system can be evaluated to gather the costs and benefits for men, women (and children) as depicted in Table 6. Also, explore what kind of benefits are more important than others and why.
- In a second stage, the governing processes and structures related to livestock keeping can be identified. Discuss questions like who has access and who has control over the costs and benefits and how flexible are these arrangements?
- Finally one has to assess how these governing arrangements enable or disable men and women in reaching their specific livelihood objectives, if there are opportunities for change and how these changes would impact others (gendered SWOT assessment of governing arrangements).

Table 6: analysing the gendered costs and benefits and the related governing mechanisms that are involved in female camel rearing.

Assets	Costs	Access	Control	Livestock specie…	Benefits	Access	Control
N	Feed, water, traditional herbal medicine/go at sheep meet	-men -men/ women -men	-PA -WaCo Open? -?		-dung→fertiliser -dung for cooking	-Com -old or sick women	Comm.
H	-milking -herding -taking care of the weak	-men -men -women	-men -men -men		Consumption of milk	hh	women
P	-Vet care -shed for the young born	-men -men	-Gov. -men		-Vehicle to transport salty soil, goods and - -Move the house	-mainly men -hh	-men
F	-Money to buy camels, -medicine	-men -men	-men -men		-Selling of milk -Selling of life animal	-women -men	-women -men
S	Milk group	-women	-women		-Cons. at village level to celebrate the beginning of harvest period -Status symbol	-all hh	Village head

The assessment is based on discussions using different participatory tools (e.g. ranking, historical mapping, calendars (table 7), observation, individual biography, resource mapping, rich picture). Information (related to LWP) from other studies can be added to the tables and maps to quantify the costs and benefits and changes over time like for example the litres of water consumed/year, availability of feed, litres of milk produced/day, money spent on vaccination, income derived from selling milk, hours spent on collecting water, herd size, etc.

Table 7: Example of how all costs and benefits for women can be summarized in a seasonal calendar

WOMEN	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
Costs												
Walk to the market to sell milk/eggs	x	x	x	x	x	x	x	x	x	x	x	x
Milking goats/ sheep/cows	x	x	x	x				x	x	x	x	
Looking after sick animals					x	x	x					x
Etc.												
Benefits												
Income from milk/eggs	x	x	x	x	x	x	x	x	x	x	x	x
Milk/eggs own consumption	x	x	x			x	x	x		x	x	

Meet own consumption in hh	x		x			x		x		x		
Religious celebration	x					x				x		
Etc.												

The participatory assessment of livestock productivity enhances discussion between community members. To pinpoint these discussions on LWP we can do a ranking exercise (table 8). In this exercise the relative gendered importance of livestock as decided by the local community is compared with the LWP. The ranking can be done for dry and wet years. Leading question could be; what animals are most important in a dry year and why?

Table 8: example of comparing community interests with LWP

	Ranking of livestock species by importance to community (1: least important)		***Ranking of species according to LWP***
	Men	Women	
Male sheep	8	5	5
Female goat	9	10	4
Female camel	7	7	10

This table can be used as a learning tool by discussing why men, women and the 'LWP' assign ranks in this particular way. Realising the differences and similarities can be a starting point to explore options to improve LWP of the livestock production system. All material derived from the participatory exercises can be used to see if proposed changes are realistic, what the impacts might be in the costs and benefits of men and women, if governing institutions need to be adapted or strengthened, and if it contributes to poverty alleviation.

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