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"Development on the margin"

Farmer innovations in livestock feeding and management in semi-arid areas of Ethiopia

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Introduction

Production system of the large livestock resource in Ethiopia is broadly classified into crop-livestock mixed and pastoral/agro-pastoral systems. In the crop-livestock mixed system in the highlands, animals provide inputs (eg. draught power), and generate consumables or saleable outputs (eg. milk, meat). In the lowlands, the livelihoods of pastoralists/agro-pastoralists depend on their livestock. The lowlands cover about 78 million ha (61-65 % of the total land area), and are home for 12% of the human and 26% of the livestock population (BERUK YEMANE AND TAFESSE MESFIN, 2000). About 80-85% of feed comes from natural pasture and the quantity and quality varies with altitude, rainfall, soil and cropping intensity (Alemayehu, 1998). Shortage of feed is a key constraint and challenge for ruminant production in Ethiopia. Farmers and pastoralists/agro-pastoralists have developed different innovations in livestock feeding and management as a coping mechanism. This paper documents these innovation practices in a semi-arid agro-ecology of Mieso Woreda (district) as part and parcel of the rural community's agile endeavors and presents the lessons to producers in other similar ecologies.

Materials and Methods

The study was conducted in Mieso Woreda of Oromia Regional State, located 300 km south east of Addis Ababa (Figure 1) bordering Somali and Afar Regional States. The woreda has a land area of 2,574 Km^2 and human population of 115,568. Altitude ranges from 900 to 1600 masl. Mean annual temperature is 21^oC, while average annual rainfall is 790 mm. The rainfall is unreliable and recurrent drought is a major problem (IPMS, 2006). Agro-ecologically it is classified as semi-arid lowland. Pastoralists make up 80%, agro-pastoralists 15%, while 5% are engaged in crop-livestock production. Sorghum, maize, sesame, haricot beans and sweet potatoes are major crops. The livestock population composed of cattle (92,411), goats (41,869), camels (11,445) and sheep (7,325). The major feed resource comes from rangelands which cover about 73,658 ha (38%) of the total land area (IPMS, 2006).

In this study, representative households and communities from the pastoral, agro-pastoral and crop-livestock production systems were selected and their innovations in livestock feeding and management practices documented through structured questionnaire, observations and group discussions with key informants.

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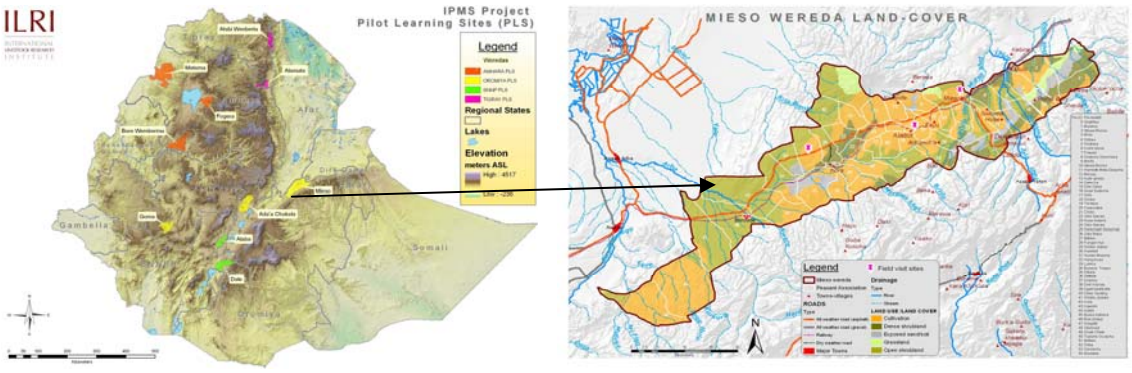

Figure 1. Location of Mieso Woreda (district) in Ethiopia

Results and Discussion

Community mapping of feed resources

Seasonal feed resources and water scarcity is one of the most limiting factors in livestock production in the Woreda. In the pastoral/agro-pastoral areas, feed shortage is more severe and harsh and is compounded by water shortage. The problem persists for nearly two-third of the year and the period from December to June is critical. In the crop livestock system the critical feed deficit period persist for about 195 days per year. Feed is relatively abundant from the last week of June to December.

Local innovative in fodder production and utilization

Innovation encompasses activities and processes associated with the generation, production, distribution, adaptation and use of existing or new technical, institutional, organizational knowledge. It is about creating habits, practices, skills and incentives that promote interactions, knowledge sharing and learning between appropriate groups of people and organizations. There are several innovative livestock producers who effectively manage the feed problem through proper natural resource management and development. These innovative practices evolved locally, are tested practically and are being used by the community with no outside involvement.

Fodder enclosure management and strategic use: The size of privately owned enclosures varies from 0.5 to 1.5 ha. Only 47% practice cut and carry feeding system while 53% allow free grazing. The community also rehabilitates communal hill side grazing lands through planting grasses and leguminous forages. This has improved the natural resource management, controlled soil erosion and enhanced soil moisture retention. The reward from productivity of enclosures is dependent on management and utilization pattern. These include soil type, vegetative cover, stage of development, method of feeding, period of exclusion from livestock and humans, irrigation, planting of legumes, manure application, weed control, time of harvest, the type of animals targeted and the type and level of interventions toward rehabilitation.

Regular and strategic destocking: In the crop-livestock system farmers fatten cattle during feed abundant period (July - November) and dispose them between September and December. In this system, farmers operate buy-plow-fatten-sale and/or buy-fatten-sale system. There is also an emerging and very specialized system where farmers entirely pursue oxen fattening for a period of 3-6 months by matching with period of feed availability (June to November). This allows best

use of the available feed resources and matching with the market; generates cash income, and the oxen could be used for draught power for at least one month. Pastoralists and agro-pastoralists do have an annual destocking program of young male goats at the age of 5-6 months. Goats are disposed prior to the exhaustion of feed resources while they are in best body condition and fetch high prices. At the same time, producers are in best position to buy food grain at cheaper prices as this period coincides with the post harvest period of cereal crops.

Production of food/feed crops: Sorghum, maize, haricot bean and sweet potato production in Mieso woreda cover 73%, 22%, 3% and 1%, respectively of the arable land area. They are used as food/feed crops, for cash income, up keep of soil fertility and for fulfilling various social functions.

Sweet sorghum is cultivated in the crop livestock and agro-pastoralist areas on about 80% of the arable land (about 13,000 ha). The crop is hardy, drought tolerant and can survive as high as seven shocks per cropping season and stays on field for about 7 months and produces tillers. It is palatable, has higher voluntary intake, and fresh sweet sorghum stalk is eaten by humans. Dry stover is used for construction and firewood. Because of the expansion of fattening business the price of one stack of sweet sorghum stover on average rose by 260% over the last two year.

Maize is the second important staple food crop in Mieso. It also serves as livestock feed. Farmers who fatten cattle extensively use dough stage of maize and haricot bean as supplementary feed. Cattle fed on dough stage maize and haricot bean respond well in body condition and fetch higher prices. Generally maize plant parts used for livestock feeding are thinning, fresh leaves, stalks, tassels, head covers, dry leaves and stalks and cobs. Maize is also grown under irrigation for feed during feed deficit period.

Sweet potato is a food/feed crop and is also used for income generation. It is often inter-cropped with cereals. About five types are cultivated and the criteria used in selection are early maturity (>120 days), drought resistance, yield and market demand. Tubers are used for fattening, while leaves and vines are used for lactating animals. Farmers reported that cows become over fat and infertile when supplemented with tubers, and fattening cattle do not respond to supplementation with leaves and vines. Supplementation with vines and leaves increases milk yield and shortens the post-partum anoestrus period.

Farmers use fresh human urine on roughages and provide salt and mineral soils to improve voluntary feed intake. Mineral soil (known as '*Haya*') is often fed during the early rainy season to provide nutrients and reduce internal parasite burden. Fresh urine is poured on crop residues and fed to cattle to encourage intake, improve body condition and temperament.

Market-oriented farmers use home grown and locally available concentrate feed supplements to fatten their cattle. Innovations include drenching fenugreek powder mixed with water to clean up the digestive system and internal parasites; cut and carry feeding; provision of water; feeding maize, haricot bean, sweet potato tubers, grain flours and dough stage maize, drenching sugar, use of salt, mineral soil and small quantities of di-ammonium phosphate (DAP); regular use of antihelmintics and massaging finished cattle at night.

Young steers (2-4 years of age) are given out to fellow farmers for plowing in return to feed and fattening. This temporary provision of animals fulfills the social dues to both parties the scheme and enables animals get adequate feed, get trained for plowing and are eventually fattened for sale. This '*indigenous social capital*' strives to match feed resources to livestock and ultimately fulfills both economic and social roles. It has advantages in terms of relieving the feed and oxen shortage and accomplishes strategic fattening while maintaining social status in the community.

Both in the crop livestock and agro-pastoral systems several innovative farmers use manure on their crop lands with the intention of improving soil fertility and thereby raise the production and the productivity of cereal crops. Producers indicated that manure application improves water retention and utilization, increases grain yields by 2-3 folds and biomass yield by threefold.

The use of locally available medicinal plants is a widely spread innovative practice. Some medicinal plants ('*Harmel*') are shrubby whitish perennial plant that grows as high as 1.50 m. The root is chopped, dried, powdered, mixed with water and administered to livestock around the onset of the short rainy season (March to May) to treat diarrhea and internal parasites. Tubers are shared among the community as gifts and some farmers sell them in local markets.

Conclusions and Outlook

Key factors that stimulate local innovative practices include economic incentives, recurrent drought and cyclical household food insecurity, availability of local genetic materials, strong social bond and agile community asset. Shortage of water, lack of appropriate credit, sporadic conflict over water and feed resources among pastoralists and agro-pastoralists are some of the problem in livestock production in the area. Poor reproductive performance and high pre-weaning mortality due to various environmental factors are critical problems in improving productivity. To enhance sustainability of local fodder innovations, rangeland rehabilitation, control of noxious invasive weeds like *Prosopis juliflora*, responsive extension system, partnerships with research and institutionalized monitoring and learning mechanisms are essential and critical. Determination of the community to learn to innovate and internalize innovativeness is superb quality and these innovative behaviors serve as a spring board in adapting, sustaining and transforming the livelihoods of the rural community.

References

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