



Capacity-building and Strengthening of Livestock Production Systems While Adapting to Climate Change in Nepal

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Adapting Livestock to Climate Change Collaborative Research Support Program

Abstract

Livestock production systems in Nepal are experiencing a significant downturn as critical resources such as water, soil, forests, agricultural productivity and farm labor are affected by rapid land use changes and climate change impacts. To ensure livestock climate change adaptation and strengthen livestock production systems, it is critical to understand and enhance feed, nutrition, and animal health. As a part of a larger livestock production system project, we started a detailed study on the status of feed, nutrition, and animal health in the Thulokhola watershed in Nuwakot district of Nepal in August 2011. We kept records on livestock production and the available food supply; analyzed fodder and feed samples; assessed body condition and fecal photos; and tested fecal samples for parasites. Our analyses indicated that most cows were consuming low quality fodder, but their average body condition was reasonably good. More than half of the local livestock were infected with internal parasites. These results clearly indicate that enhancing livestock feed and nutrition, as well as veterinary care, is necessary in order to strengthen livestock production systems in Nepal. 

Adapting Livestock Production System to Climate Change: Assessing Feed, Nutrition, and Animal Health

Introduction

Livestock production is an integral part of the mixed-farming system in Nepal. The livestock sector contributes about 18 percent to the national GDP and 31.5 percent to agricultural GDP. However, land use changes, deforestation, declining agricultural productivity, dwindling water resources, and the prevalence of diseases and parasites in recent years have resulted in a deterioration of these systems. In addition, climate change effects such as rising temperatures, droughts, floods, emerging new diseases, and forest degradation have threatened the very existence of livestock production systems in the mid-hills of Nepal.



Members of the community livestock group gather for a workshop. (Photo by Dhruba Bhattacharai)

Adapting Livestock Systems to Climate Change Collaborative Research Support Program

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Insufficient feed availability and the prevalence of diseases and parasites are the major causes of decreasing productivity in livestock systems in Nepal. Currently, farmers are treating their livestock without any epidemiological plan due to lack of information on patterns of internal parasites. They refer for treatment when they find symptoms of parasitism like diarrhea, body condition deterioration, and decreased weight gain, but are often not in time to save the animal.

This study was conducted as a part of a larger study on community capacity-building to strengthen livestock production systems while adapting to climate change impacts in Nepal. The objectives of this study were to assess per household number of livestock heads, fodder availability, and feed supply to livestock; determine nutritional status and physical condition of livestock; and identify major species of internal parasites of cattle, buffalo, and goats and their epidemiological patterns.

Our Study

We collected feed and fodder samples for nutritional analysis, took photos of livestock and feces and collected fecal samples to evaluate parasite infestations in the Thulokhola watershed, a minor tributary of the Trishuli River, in Nuwakot district in central Nepal.

In June 2011, nine Community Livestock Groups (CLGs) were established to strengthen livestock production systems and adaptations to climate change in the watershed. CLG members took photos and samples for the study and kept daily records of variables such as feed type, source and quality, manure production, livestock health and reproduction, livestock sale and income, grazing, crop production, and soil nutrient management.

“Land use changes, deforestation, declining agricultural productivity, dwindling water resources, and the prevalence of diseases and parasites in recent years have resulted in a deterioration of livestock production systems in Nepal.”

Fodder sample collection and analysis

Fodder samples were collected from late November to early December 2011. We collected leaves and other material from each fodder tree. Samples were brought to the NARC fodder and nutrition laboratory in Khumaltar for analysis.



Household members tend a Jersey cow with a body condition rating of 4 out of 10. (Photo by Durga Poudel)



A cow with a body condition score of 8 out of 10. (Photo by Durga Poudel)

Photographic analysis

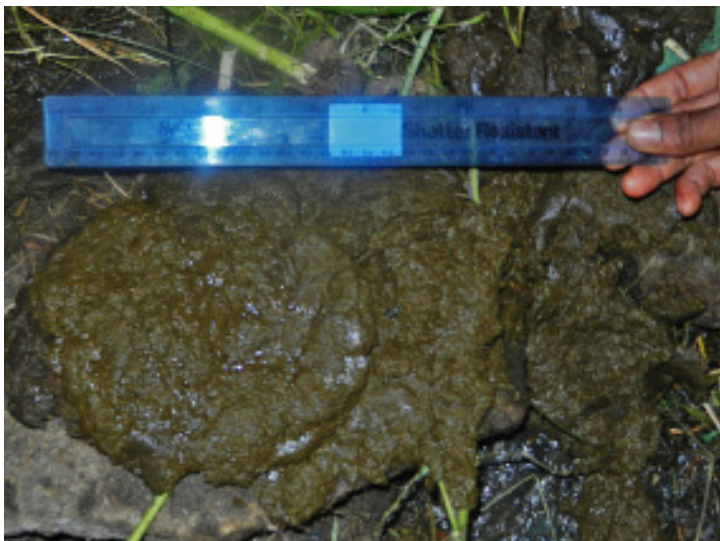
Photos from a group of community cattle were used to appraise current diets and to project needs for supplements to improve livestock productivity according to the *Forage Quality Photo Guide* (Lyons et al., 2000). The physical condition scores of the eighteen cows ranged from 3 to 8 out of 10. The cattle with higher condition scores had been eating enough fodder to allow for some body fat accumulation. The thin cows' diets were below maintenance levels, causing weight loss.

Fecal sample collection and analysis

Fecal samples from the three different elevations representing high, mid, and low altitude of the watershed were collected monthly. All together, 150 animals of different ages were identified. The objectives of the study were explained to farmers who agreed not to treat animals for parasitic infections or sell the animals during the study.

Results and Discussion

Based on livestock records, the livestock population in the Thulokhola watershed was 59 percent goats, 21 percent buffalo, and 20 percent cattle. A household had an average of 9.4 heads of livestock of varying age: 1.8 cattle, 2 buffalo, and 5.6 goats. Households provided an average daily amount of 132.65 kg feed and forage, which included green grasses, straw, and feed concentrate. Ninety percent of this daily feed supplement consisted of natural and cultivated green grasses. This indicated household feed supplements were inadequate, and livestock had to graze to meet their daily feed requirements.



A community group livestock group member measures cow feces to evaluate the digestibility and protein content of the animal's feed. (Photo by Durga Poudel)

Animal Health

One way of evaluating animal health and diet quality is to estimate the digestibility and protein level using animal excreta. This study indicated a lack of nutrition among cows in the watershed. The fecal photos indicate most cows were consuming relatively low quality fodder (< 10 percent protein and < 55 percent digestibility). The proportion of fat, moderate, and thin cows was 39 percent, 50 percent, and 11 percent, respectively. Although analyses indicated low diet and nutrition, the average body condition of the cows was not terribly low. Further investigation is required to understand why body condition appeared to be high while feed and nutrition levels were relatively low.

Fodder

Based on livestock record keeping, a household in the Thulokhola watershed has 37 fodder trees, on average. Of the total 37 fodder trees per household, 12 percent were large, 59 percent were medium size, and 29 percent were small trees. Major fodder trees recorded by the farmers included ipilipil, nemaro, dudhilo, khanyu, badahar, syalfusre, tanki, koiralo, kutmiro, dabdabe, and bakaino.

Parasites

Major buffalo parasites were trematode parasites followed by few cases of stongyle and moneizea. Losses caused by the trematode parasites are more severe than other nematode parasites in buffalo. Common cattle parasites were trematode parasites; however, paramphistomes were frequently observed. The most common goat parasites were gastrointestinal parasites (stongyles) and tapeworm (moniezea).

The highest (74 percent) prevalence of parasites was reported in buffalo in October. Similarly, the highest cattle parasite prevalences were recorded in August and September. This may be due to high temperature and humidity during October. We will continue studying seasonal variation in parasites. No significant differences in parasites due to altitude were observed, possibly because only six months of data were analyzed. We predict that during the hot rainy season, prevalence of parasites will be higher in animals at low and mid altitudes compared to animals at higher altitudes.

Conclusions

Low nutritional diets, high levels of gastrointestinal parasites, and limited feed and forage supplies characterize the livestock production system in the Thulokhola watershed. Because of high incidence of internal parasites, community level veterinary services are critical for livestock climate change adaptation in this watershed. We will complete a thorough analysis of feed, nutrition data, and parasites by season and by elevation which will help livestock producers to adapt to climate change impacts by ensuring better feed and nutrition and animal health. 🐄

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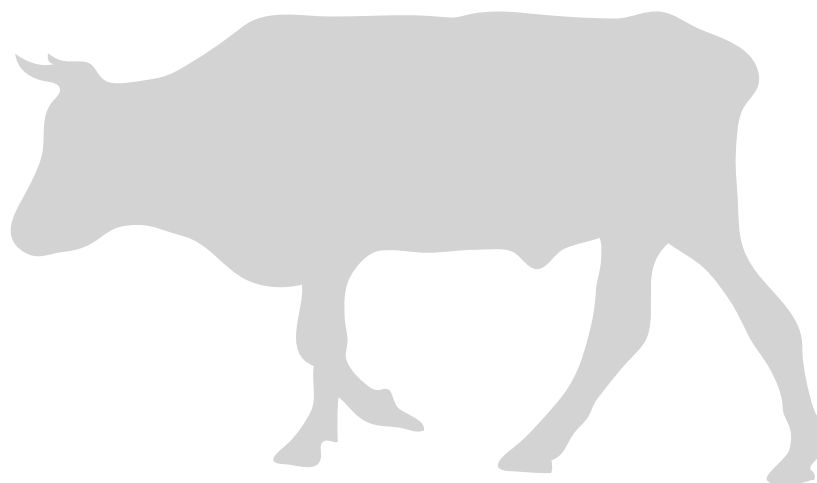
Further Reading

Hayashi Y, Shah S, Shah S K and Kumagai H 2005: Dairy production and nutritional status of lactating buffalo and cattle in small-scale farms in Terai, Nepal. *Livestock Research for Rural Development*. Volume 17, Article #64. Retrieved January 30, 2012, from <http://www.lrrd.org/lrrd17/6/haya17064.htm>

Lyons, Robert K.; Machen, Richard V.; Stuth, Jerry W. (2000). *Forage Quality Photo Guide*. Available electronically from <http://hdl.handle.net/1969.1/86934>. Retrieved January 31, 2012.

Morel, A.M. 1985. The diseases situated in the eastern hills of Nepal and problems associated with their alleviations. In *Proceedings of the Workshop on Livestock in the hills of Nepal*, Pakhribas, Nepal, 5-7 February, 1985. Pakhribas Agricultural Center, Pakhribas, Dhankuta, Nepal, pp. 65-94.

Thakuri, K.C., Mahato S.N., Thakur R.P. and Giri R.K. (1996) A retrospective study of goat disease in the Eastern Hills of Nepal. *Vet Review* 1996 Vol. II



Capacity-building and Strengthening of Livestock Production Systems While Adapting to Climate Change in Nepal (SLPS)

Principal Investigator: Durga D. Poudel, University of Louisiana at Lafayette

The SLPS project was initiated to: (1) identify factors responsible for the downward spiral of the livestock production system, (2) identify impacts of climate change on livestock production and the adaptation measures practiced, and (3) assess opportunities and challenges for capacity-building at the national, district, and local level.

Rapid land use changes, forest degradation, soil erosion, climate change, policy deficits, and community inability to handle these challenges have caused a downward spiral of the livestock production system in Nepal. We hypothesize that the livestock production system in Nepal is intricately related to forest resource, soil quality, and crop productivity, and its development and adaptation to climate change requires capacity-building and strengthening of the production system. We identified a representative watershed in Nuwakot district for this study. An interdisciplinary team has been involved in reconnaissance surveys, household surveys, group interviews, field visits, and round table discussions for a comprehensive understanding of the livestock production system and its adaptation to climate change. Assessment of challenges and opportunities for capacity-building at the community level have been done by forming Community Livestock Groups in the watershed and conducting various activities in relation to skills development such as feed storage, feed quality improvement by enriching rice straw with urea, and livestock monitoring. Similarly, capacity-building at the national, district and local levels have been assessed through institutional analyses, policy reviews, and office visits. Research results will be disseminated through various media outlets including scientific journals, newspapers, meetings, workshops, conferences, and community organizations.



The Adapting Livestock Systems to Climate Change Collaborative Research Support Program is dedicated to catalyzing and coordinating research that improves the livelihoods of livestock producers affected by climate change by reducing vulnerability and increasing adaptive capacity.

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