Determinants of Adaptation Choices to Climate Change by Sheep and Goat Producers in Northern Ethiopia: The case of Southern and Central Tigray, Ethiopia

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Research Brief

Feed the Future Innovation Lab for Collaborative Research on Adapting Livestock Systems to Climate Change

Abstract

When addressing climate-driven effects, farmers' alternative adaptation choices are largely dependent on various factors. Accordingly, this study analyzed the determinants of climate change adaptation strategy decisions made by sheep and goat producers in the Southern and Central Tigray Zones, Ethiopia. Three hundred and eighteen sample households were included in the study from three potential livestock producing districts based on three agro-ecological settings. About 98% of the respondents recognized that the climate has changed over the last ten years. The most commonly used adaptation strategy in response to climate change was marketing during shock (96.5%) followed by home feeding (89.6%). The results demonstrated that access to information, farming experience, number of households in one village, distance to main market, income of household, and agro-ecological settings influenced farmers' adaptation choices to climate change. Furthermore, results showed that the adaptation strategies chosen by farmers had positive influence on the household income.

Farmers' Choice of Climate Change Adaptation Strategy

Among the livestock species, sheep and goats are the main source of livelihood for rural people due to their high reproductive rates and ease of conversion to cash to meet the financial needs of rural producers. Although the benefits from sheep and goats hold great promise, the current level of its contribution to rural livelihoods is low due to climate change related factors. Thermal, nutritional, and water related stresses along with restlessness are some of the consequence of climate change related factors that affect sheep and goat productivity. As these species are often owned by the poor sections of rural communities, any intervention that improves the productivity of sheep and goats could have positive contribution in reducing existing poverty in the area.

Figure 1: Women feeding her goats on a field. (Photo credit: Fikeremaryam Birara)

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Adaptation therefore remains one of the policy options to address climatic challenges affecting livestock sectors including sheep and goats. Adaptation is an action taken by people to reduce the negative impact of climate change. Farmers' choice of alternative adaptation strategies is affected by numerous socio-economic, institutional, and environmental factors. Thus, this study aimed to analyze the determinants of climate change adaptation strategy choices made by sheep and goat producers in Southern and Central Tigray Zones, North Ethiopia.

Data Collection

This study was conducted in three districts selected from two zones (Southern and Central Tigray Zones) of the Tigray regional state. The districts were Ofla, Alaje and Kolla-Tembein representing highland, mid-land and lowland agro-ecological setting, respectively. Both qualitative and quantitative data were collected from 318 selected respondents using semi-structured questionnaire and key informants through discussion. Descriptive statistics and appropriate econometric model were employed to analyze the data.

Majority of farmers perceived that the climate is changing

Farmers were asked their perception about whether the climate has been changing over the last ten years. Most of the respondents (96.0%) perceived that climate change is occurring. Among climate change indicators, temperature and rainfall were considered as parameters for the analysis. Most of the respondents acknowledged that there has been a rise in temperature (86.0%) and a decline in rainfall amount (82.0%).

Common climate change adaptation strategies

Through focus group discussion and key informant interviews, four of the most commonly used adaptation strategies were identified. Marketing during shock , home feeding, cross-breeding animals, and provision of shade during extreme weather were found to be the strategies used by sheep and goats producers.

The distribution of adaptation strategies used by sheep and goat producers in response to climate change is shown in Table 1. The most common adaptation strategy was marketing during shock. About 97.0% farmers were found to use marketing during shock as a climate change adaptation strategy. This practice enabled farmers to sell their sheep and goats during extreme weather events when animals were otherwise unable to resist long dry periods due to deficiency of feed and water. However, this has its own drawbacks, as animals will likely be sold for lower value than if kept longer and in improved condition. Ideally, it is recommended that farmers participate in normal time marketing to get a better price for their livestock.

The second most commonly used adaptation strategy by surveyed farmers was home feeding; about 90.0% of respondents practiced this adaptation strategy. This was mainly because of the introduction of area enclosures in almost all communal lands where farmers were obliged to keep and feed their animal at home. More than half of the farmers (54.4%) purchased or bred crossbred animals as a climate change adaptation strategy. Provision of shade during extreme weather events, in both hot and cold seasons, was the least practiced adaptation

Figure 2: A goat fighting to feed itself . (Photo credit: Fikeremaryam Birara)

chosen to cope with climate change effects. This may be because of incidental expenses related to building houses and preparation of bedding require higher costs for materials and skilled human capital. The results show that marketing during shock is the most commonly used adaptation practice; whereas providing shade during hot and cold seasons is the least practiced option in all three agro-ecological settings in the study area (See Table 1).

Socio-economic, institutional and agro-ecological characteristics affect the adaptation

Table 1: Distribution of adaptation options used by sheep and goat producers

Adaptation options	Agro-ecological settings			
	Low-land	Mid-land	High-land	Total
Provision of shade	27 (22.8)	48 (54.0)	57 (52.7)	132 (41.5)
Home feeding	103 (87.2)	86 (96.6)	96 (88.8)	285 (89.6)
Use of crossbred animals	63 (53.3)	43 (48.3)	67 (62.0)	173 (54.4)
Marketing during shock	117 (99.0)	85 (95.5)	105 (97.0)	307 (96.5)

Numbers in parenthesis indicate percentage

Farmers' choice of climate change adaptation strategies are affected by numerous factors. The effects of socio-economic, institutional and agro-ecological characteristics were investigated in this study. Among the socio-economic variables, farming experience, number of households in a village, and income of the household were found to have significant effects on the choice of adaptation measures. Farming experience increased the likelihood of having cross-bred animals and adopting shading practice. This may be due to farmers with long-time experience observing changes over time that can be compared with the current climatic condition, enabling them to respond to climate

change. The findings showed that the number of households in a village decreased the probability of adopting shading practice. This might be due to an inability to find enough places to prepare shade for their animals, since increases in the number households in one village may result in land shortages. Household income negatively affected the likelihood of having crossbred animals and implementing home feeding as climate change adaptation practice, since household with higher income may be less risk averse.

Institution related characteristics, distance to the main market, and access to information were identified as determinants of choice of adaptation practice by sheep and goat producers. Evidently, it is difficult to offer supplementary feed to animals as farmers' residence is far away from markets where farm inputs are available. In turn, study results revealed that as a farmer's walking distance to market increased, the probability of choosing home feeding as an adaptation to climate change decreased. Market is one means of exchanging information with other farmers, providing an opportunity for sharing experiences on climate change adaptation. Access to information was another important variable. The likelihood of choosing home feeding, having crossbred animals, and marketing during shock as adaptation measures were positively affected by a farmer's access to information. An individual exposed to climate information is more likely to take an immediate action to cope with risks related to climate change.

As expected, different farmers living in different agro-ecological settings take up different adaptation options. Farming in highland agro-ecological zone had a positive relationship with having crossbred animals and shading adaptation practice but not for keeping and feeding practice. On the other hand, farmers living at lowland agro-ecological zone were less likely to practice shade management and home feeding.

Practicing adaptation options has positive effects on farmer livelihoods

Exploring determinants of climate change adaptation strategies in response to risk alone will not provide full information on factors affecting farmer decision making. Thus, it is critical to investigate the advantages of the climate change mitigation strategies farmers consider fitting. Results show that farmers' adaptation practices were positively related to the sales of sheep and goats. Among the adaption strategies considered in this study, having crossbred animals and home feeding were found to have significant effects on the sale of sheep and goats. Revenue from the trade of sheep and goats increased by 1,877 and 1,182 Birr due to implementation of home feeding and having crossbred animals as an adaptation strategy, respectively. These indicate that adaptation strategies have positive effect on the livelihood of the farmers in the study sites.

Conclusions

Adaptation strategies commonly used by sheep and goat producers include; home feeding, having crossbred animals, marketing during shock, and provision of shade during extreme weather. The results show that access to information, farming experience, distance to main market, household income, agro-ecological setting and number of households in a village have a significant effect on choice of adaptation method. The results also demonstrate that home feeding and having crossbred animals as adaption methods had positive influence on household income through improving the sale of sheep and goats.

Based on the evidences obtained from this study the following suggestions can be forwarded:

- Establish an early warning system about upcoming climate induced shock, so that farmers take proactive steps to market their animals.
- Improve farmers' capability to apply suitable and effective climate change coping mechanisms.
- Conduct research to identify which adaptation methods best fit different agro-climatic conditions.
- Increase the access of fodder and forage at the local level and train farmers to produce their own feed.

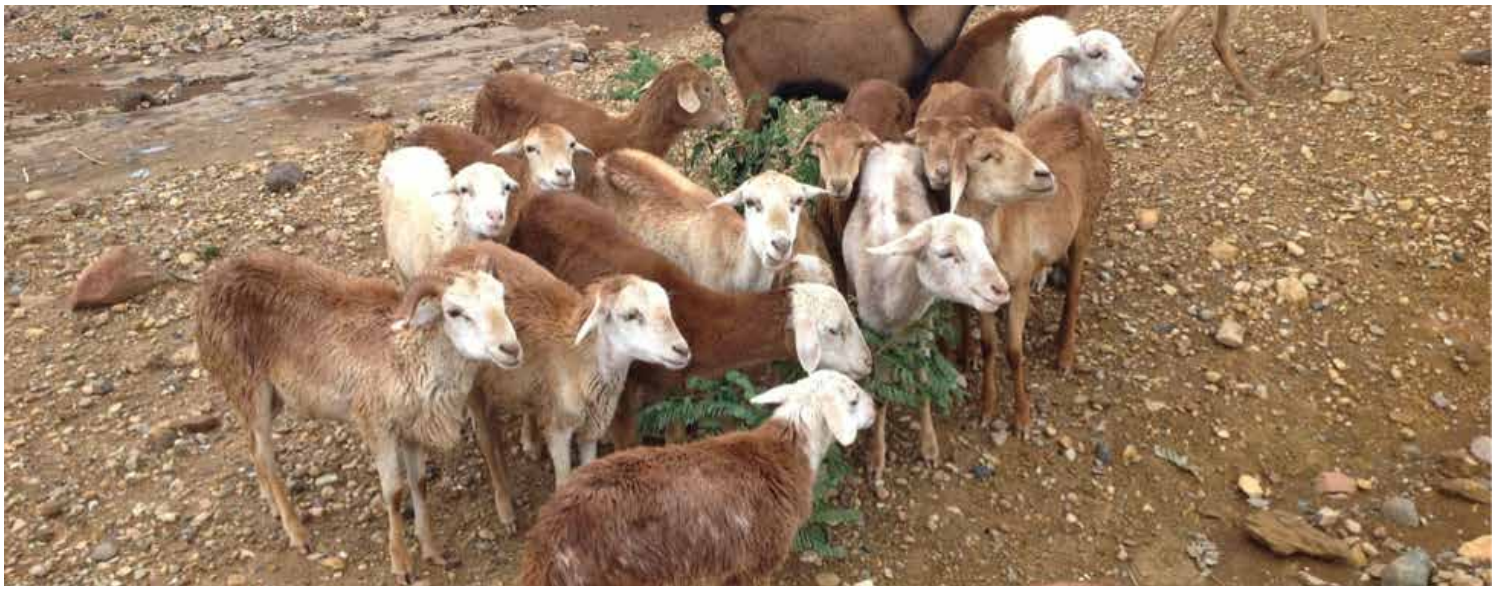

Figure 3: Sheep and goats suffering from coldness during rainfall. (Photo credit: Fikeremaryam Birara)

TIRI, Targeted Investment for Research Impact, identifies early-career researchers who are interested in tackling livestock production problems through innovative approaches and fresh perspectives. This small-grant program is open to early-career researchers (five or fewer years into research career) in any discipline, from student to professor, and from any organization that is engaged in applied research on livestock production in South Asia and East Africa — colleges and universities, government research centers or laboratories, or non-profit organizations.

Proposals are selected based on their potential to make livestock production systems more resilient to increasing climate variability and severity. At the end of one year, TIRI scholars are expected to demonstrate concrete outcomes and real potential for future impact. The 10 selected East Africa TIRI scholars and the 18 selected Nepal TIRI scholars are addressing research problems on various livestock and climate research themes.

Feed the Future Innovation Lab for Collaborative Research on Adapting Livestock Systems to Climate Change 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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