

RESEARCH ARTICLE

Pastoral community perception towards forage technology production and utilization in Yabello Woreda, Borena zone of Southern Ethiopia

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Production and utilization of forage technology in resource-poor country has contributed a lion share in many aspects. It has a substantial role in livestock rearing community to get resources in case communal natural grazing lands shortage. Therefore, the overall objective of this study was to assess pastoral community perception towards forage technology production and utilization in Yabello Woreda, Borena Zone of Southern Ethiopia. Yabello woreda were selected purposively for due to the woredas accessibility for transportation and production potential. Accordingly, 311 households were participated in the household survey. In addition focus group discussion and key informant interview were carried out. Moreover, Statistical package for social sciences (SPSS v.22) was employed for collected data analysis. Furthermore, qualitative data was analyzed by narratively and content analysis. The result of this study revealed that most of the respondent households have awareness on forage technology production and utilization. Accordingly, about 72% of interviewed respondents perceived that there is a positive outlook towards the technology. Pastoralists in Borena Zone have been engaged in livestock-rearing as their primary livelihood for decades of a year. However, they have been faced several challenges associated with forage technology production and utilization. Insufficient access to water and fluctuation of climate change parameters has been devastating factors in the area among the rest. Moreover, technology in the area positively impacted socio-economic and environmental aspects. Enhancement of livestock productivity, nutrition for livestock, conservation of biodiversity and climate change resilience were socio-economic and environmental roles of forage technology production and utilization in the pastoralist area. The study concludes that policies that promote access to improved forage varieties, and build resilient agro-pastoral systems considering dynamic climate conditions should be prevailed to improve pastoralists livelihood.

Keywords: Forage technology production, Pastoral community, Perception, Socio-economic, Utilization.

Introduction

Production and utilization of forage technology in resource poor country has contributed a lion share in many aspects. It has a substantial role in livestock rearing community to get resources in case communal natural grazing lands shortage (Fenetahun, Y., et al., 2019). Community perception contributes a significant role in forage technology adoption and utilization in Ethiopia. Traditional rangeland production practices by the pastoral communities are based on accumulated knowledge in connection to their local environment. Pastoralism played a vital role in feed production and sustaining its inhabitants in arid environment for millennia

(Minyahel, T., et al., 2016). The forage production and utilization in Ethiopia has substantial role for feed sources during dry spells. Also, production of high qualified forage resources potentially enhances milk and meat production, in turn improves pastoral livelihoods (MacOpiyo, L., et al., 2013). Pastoral community in the area particularly southern Ethiopian parts has been heavily relied on it for years. The local grass and crop residues are the major feeding source for livestock farming in Ethiopia (Kassahun, A., et al., 2008). The Borena pastoral community of southern Ethiopia traditionally relied on cattle husbandry for livelihood and income generation. Besides, they have been effective through generations in producing animal products while maintaining rangeland resources (Pratt and Gwynne 1977; Helland, J. 1997).

Pastoral life-style in Ethiopia has been under various increased pressure recently. Numerous factors such as climate change, land degradation coupled with population growth limited the availability of natural forage to a great extent. Extremes of climate change including fluctuation of rainfall distribution and temperature increment makes the things daunting in the area (Fenetahun, Y., et al., 2019). Besides, unwisely utilization of rangeland resources has made the situation more challenging in pastoral community of Ethiopia. This has created a need for alternative forage production methods. Likewise, Borena pastoralists have been in trouble Zone due to man-made and anthropogenic causes. In Pastoral communities in the Borena Zone hold valuable perceptions regarding forage technology production and utilization. As an integral part of their livelihoods, these communities heavily rely on livestock rearing and management. The introduction of forage technology has brought about significant changes in their perception towards sustainable and improved pastoral practices. Adopting forage technologies as they can provide a more reliable and sustainable source of livestock feed (Abule, E., et al., 2005). They believe that by cultivating and conserving forage crops, they can reduce the vulnerability and dependency on natural grazing lands. On the other hand, there may be resistance and skepticism among some pastoralists towards forage technologies. This is primarily due to cultural beliefs, lack of awareness, and concerns about the potential costs and labor involved in adopting these technologies. Southern Ethiopia; notably Borena areas has been hit by climate change extremes in the last one decade recently. As a result, pastoralists have been lost a number of livestock assets due to resulted drought (Morton, JF. 2011; Birhanu, Z., et al., 2015). This might be associated with lack of sufficient feed sources. Besides, pastoralist in the area extremely relied on natural grazing lands. Pastoral communities in the area have not adopted forage technology production and utilization as a means to enhance their livestock rearing practices. Thus, to effectively promote forage technology production and utilization among pastoral communities in the area, awareness campaign should be launched. Thus, this particular study has been initiated to investigate pastoral community perception towards forage technology production and utilization in Yabello Woreda, Borena Zone of Southern Ethiopia.

Materials and Methods

Description of the study area

The study was conducted at Dida Yabello, Tolkassa and Harawayu kebele of Yabello Woreda Borena zone, southern Ethiopia. The area situated at 566 km south of Addis Ababa along Addis Ababa to Moyale road. The area coverage of Yabello town is 5426 km². It situated between 4°30'55.81" and 5°24'36.39" north latitude and between 7°44'14.70" and 38°36'05.35" east longitudes. Similarly, the altitudinal range of the area attributed about 1000-1500 m.a.s.l. Besides, climate type the study area exhibited arid and semi-arid, annual average temperature is 19-26 °C. The rainfall of the area is characterized as bi-modal. Which is the 73% of rainfall occur in March to May, the 27% of rainfall occur in September to November (Gemedo-Dalle, GD., et al, 2006).

Methods

Data sources and types: For the purpose of this study, data from both primary and secondary data sources were collected and used to achieve the objectives of the study. To best suits the objectives of the study, cross-sectional survey research designs were employed to collect data.

Primary data sources and types

Primary data were collected directly from sample households through a household survey, focus group discussion, and key informants interview as well as field observation. Primary data were mainly related to respondents' demographic characteristics. In addition to this, pastoral community perception towards forage technology production and utilization were incorporated through interviewing households with open and closed-ended questionnaires.

Secondary data sources and types

Relevant Secondary data were collected from the woreda and Borena Zone pastoral level Bureau of animal and fisheries development, agricultural and natural resources and, Kebele administration offices were relevant secondary data sources. Besides, Published materials, including books, journals, and unpublished materials played a significant role as a data sources at a time. Moreover, Meteorological station and website data were used as secondary data sources.

Sampling techniques and sample size

At first, Yabello woreda were selected purposively for this particular study due to the woredas accessibility for transportation. Besides, prevalence of potential rangeland sources was other criteria for selection of aforementioned study area. From the specified Woreda, three kebeles were selected purposively due to existence of forage technology production and representativeness of rangelands. To this end, Dida Yabello, Tolkassa and Harawayu were the three representative kebeles where the research was carried out. Then, the respondents total sample size were determined from the respective kebeles. Accordingly, the number of sample households of the target population at 95% confidence level and 0.05 (5%) level of precision were determined by using a simplified formula provided by Yamane (1967) and reviewed by Israel, (2012);

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

$$n = \frac{1405}{1 + 1405(0.05)^2}$$

$$n = \frac{1405}{1 + 1405(0.0025)^2} = \frac{1405}{1 + 3.5125} = \frac{1405}{4.5125}$$

$n = 311$. Therefore, this implies that, 311 sample respondents were selected to conduct study in the area. Where n is the sample size, N is the population size, and e is the level of precision at 95% significance level. In the third stage, Probability Proportional to Size (PPS), sampling technique was used to determine the number of sample households selected from each kebele. Finally, simple random sampling (SRS) technique was used to select sample households from the three kebeles.

Data collection method

Both qualitative and quantitative approaches were employed to address the objectives of the study. In this study, the perceptions and preferences of the pastoral community towards forage technology production and utilization were investigated. Variety of methods was used to collect both qualitative and quantitative data. These include semi-structured household surveys, key informants interview, focus group discussions, and direct observations.

Household survey: Both closed and open-ended questions were administered on representative sampled households to obtain primary data pertaining perceptions of the pastoral community towards forage technology production and utilization. Besides, the items in the questionnaire were developed on the basis of the objectives of the study.

Key Informants Interview (KII) and Focus Group Discussions (FGDs): The study was employed key informants interviews (KII) to obtain information that could not be easily gathered through the household questionnaire. Also, KII was employed in order to validate and triangulate the data which were collected from the household survey. KIs for this study are defined as persons who are knowledgeable about topic. Besides, KIs should aware well about historical background of forage resources and who lived there for a long years. In this regard, sixteen key informants (8 participants from each kebele) were selected by the help of Bureau of animal and fisheries development experts. Thus, KIs were selected three from community leaders, three elderly farmers and two extension officers from each kebele. The questionnaire was conducted in Amharic language. For those who cannot speak and hear Amharic language, the questions were translated into Affani Oromiffa language. Likewise, FGDs were also used to gather useful and detailed information which is hard to capture by the household questionnaire. In this particular problem, FGDs were used to explore their perceptions, challenges, and suggestions regarding forage technology production and utilization.

Field observation: In this study, direct observations of the actual production and utilization of forage technology within the pastoral community was gathered to insight additional information. The information which had been gathered using field observation were used to triangulate information provided by household respondents and focus group discussants.

Methods of data analysis

Descriptive analysis: First, data collected from the interview and questionnaire were coded, enters into a computer, analyzed, interpreted and synthesized using Statistical Package for Social Sciences (SPSS) software Version 22. Moreover, quantitative data were analyzed through SPSS to run descriptive statistics like, frequency distribution, percentages, figures, tables and means. Moreover, the collected qualitative data were described through narratively as well as content analysis.

Results and Discussion

Demographic characteristics of respondents

Distribution of respondents by their sex and educational status: From the three representative kebeles, three hundred and eleven respondent households were interviewed through arranged questionnaire. Out of the total number of interviewed households, about 187 were male-headed while 124 were female-headed households (Table 1). In line with this, respondent households from Dida Yabello, Tolkassa and Harawayu Kebeles were taken. It was concluded that the number of males encountered in the survey outweighed their female counterparts. This probably reports that the dominance of the practice in male category rather than the female households. Regarding to educational status, Dida Yabello kebele shows less un-literate category for male and female counterparts. This might be associated with the area proximate to Yabello Town. That's why residents may have got access to education nearby.

Table 1. Distribution of respondents by their sex and educational status in the study area.

Variable						
Sex	Male (187)			Female (124)		
	Kebeles	Frequency	Percent	Frequency	Percent	
	Dida Yabello	71	38	44	35.5	
	Tolkassa	62	33	39	31.5	
	Harawayu	54	29	41	33	
	Total	187	100	124	100	
Education	Dida Yabello		Tolkassa		Harawayu	
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Can't read	18	39	51.6	66.7	52	72.5
Primary	28	34	37.1	33.3	28	27.5
Secondary	33	18	11.3	-	15	-
College and above	21	9	-	-	5	-
Total (%)	100	100	100	100	100	100

Source: Field survey, 2022/23

Pastoralist's perception of forage technology production and utilization in the study area

In the Borena Zone, where pastoralism is predominant way of life, the perception of forage technology production and utilization can vary among pastoralists. Forage technology production and utilization was perceived by different perspectives in the study area. In line with this, most of them have been perceived, positive outlook. The survey result revealed that most respondents, about 72% perceive that there is a positive outlook of the technology (Table 2). The results of key informant interview argued that some pastoralists may perceive forage technology as beneficial for their livestock's well-being. This might be associated with the technology can lead to better animal health, productivity, and ultimately, increased income for pastoralists (Paul, B. K., et al., 2020). The interviewed participants replied that the technology enhances income generation potential from the livestock resources. The results of present study corroborated with study finding of (Minyahel, T., et al., 2016).

Besides, about 48% of interviewed respondents perceived that the technology has devastating effect on the environmental concerns. Some pastoralists in the area may express concerns about the potential ecological impact of introducing new forage technologies. They may worry that increased cultivation of certain forage crops could lead to deforestation, soil degradation, or displacement of natural grazing lands. The result of respondents view in lined with the study findings of Gemedo-Dalle, et al., (2006). The authors finding claimed that the major cause of rangeland degradation and forage reduction in pastoralist areas are over population coupled with numerous anthropogenic factors. In line with this, 26.7%, of respondents perceived that there is a technology as challenges in implementation. Furthermore, 23.5% of the respondents didn't support the technology due to cultural and social aspects. According to elders and key informants interview, conversion of rangeland resources to modern utilization way might bring challenges for pastoralist's future life. This is study result is in agreement with (Tafere, K., et al., 2013). The authors result claimed that the consequence of inappropriate interventions aggravated the enemy takes advantage of their resources.

Table 2. Pastoralist perception about forage technology production and utilization in the study area.

Perceptions	Frequency	Percentage
Positive outlook	223	72
Challenges in implementation	83	26.7
Environmental concerns	73	23.5
Cultural and social aspects	63	20.3

Source: Field survey data 2022/2023

Pastoralist's challenges associated with forage technology production and utilization in the study area

Pastoralists in Borena Zone have been engaged in livestock-rearing as their primary livelihood for decades of a year. Forage technology plays a substantial role in supporting their animals' nutrition and well-being in the area. However, pastoralists have been faced several challenges associated with forage technology production and utilization (Table 3). From the (Table 3), respondent households strongly highlighted that insufficient access to water and fluctuation of climate change parameters has been devastating factors for production of technology relative than others. This might be due to the area has been highly pronounced by water scarcity and impacts of climate change adversely for a decade. This is study result is in lined with the study findings of Gemedo-Dalle, et al., 2006). The prevalence of insufficient access to water aggravates reduced productivity among livestock in the area. Respondents in the area unanimously stated that access to water is crucial for both livestock and forage production. They added that many pastoralists in the area have been experienced limited water resources. This might in turn leading to inadequate irrigation for forage crops or difficulties in sustaining grazing lands, ultimately affecting forage availability. According to FGDs, seasonal variation including fluctuation of climate change parameters has been considered as major problematic. This is study result is in agreement with (Abdeta, A A., et al., 2012). Authors finding stated that climate change coupled with land degradation hinders livestock production in Yabello rangeland area. Most of the informants acknowledge climate variability and drought as part of the Borena ecosystem. Majority of the interviewed elder's suspect that Land Use and Land Cover Change (LULC) observed in the area

due to anthropogenic and natural factors might also have aggravated climate change impacts. Furthermore, the present study result is in lined with study findings of (Shibru, M., et al., 2023). Besides, informants unanimously stated that pastoralists often face limitations in accessing improved forage technology. They added that pastoralists didn't have awareness on improved pasture seeds and cultivation techniques. This might be associated with limited availability of quality seeds, lack of awareness about new technologies, and limited extension services in remote pastoral areas. This is study result is corroborated with (Balehegn, M., et al., 2021, Shapiro, B I., et al., 2015). Eventually, the key informants claim in lined with the study findings of (Abdeta, A A., et al., 2012). Pastoralists face challenges in accessing markets and value-chains for their forage products. The interviewed KIIs stated that lack of proper storage facilities, transportation infrastructure market information and bargaining power hampers their ability to derive optimal value from forage technology production.

Table 3. Pastoralist's challenges associated with forage technology production and utilization.

Variables	Frequency	Percentage
Insufficient access to water	270	87
climate change and land degradation	255	82
Limited access to improved forage	198	63
Limited Market opportunity	98	31

Source: Field survey data 2022/2023

Socio-economic and environmental impacts of forage technology production in the study area

Forage technology production in the Borena Zone can have several socio-economic and environmental impacts. It has positively impacted pastoralist's livelihood in various ways. Table 4 depicted a household survey result of socio-economic and environmental impacts of forage technology production. Accordingly, respondents were asked the possible socio-economic and environmental impacts prevailed through forage technology production. Consequently, 79% and 75% of the interviewed household's believed that the forage technology has been enhanced livestock productivity and nutrition for livestock (Table 4). In line with this, KIIs and FGDs confirmed that adoption of advanced forage technology can enhance livestock productivity in the area. This might be associated to the fact that the technology can increase income and food security for farmers and pastoral communities dependent on livestock rearing. This finding is in corroborated with the study carried out (NPC, 2015). The authors declared that improving animal feed resources is one of the main strategies to realize these objectives together with breed improvements and better management of animal health issues. Also, the present study is in lined with the study findings of Mekonnen, K., et al., 2022. Besides, 72% and 76% respondent household assured that the technology has played a lion share in terms of conservation of biodiversity and climate change resilience (Table 4). KIIs anonymously assured that forage technology can contribute to climate change mitigation efforts indispensably. They added that by promoting sustainable land use practices, it helps sequester carbon in the soil and reduces greenhouse gas emissions associated with overgrazing. Similarly, FGDs stated that utilization of forage technology can help to protect native plant species and preserve biodiversity. They added that by reducing the pressure on natural grazing lands, it allows for the regeneration and conservation of indigenous plants and ecosystems. This present interview result is in lined with the study findings of Paul, B. K., et al., 2020. The authors finding stated that improved fodder and forage production are the options for better feeding in climate-changing scenarios. Furthermore, the authors added that the technology rehabilitate the degraded landscape thereby increase climate adaptation capacity. Besides, the present study finding supported the study finding of Cgiar, 2015.

Table 4. Socio-economic and environmental impacts of forage technology production in the study area.

Variables	Frequency	Percentage
Enhanced livestock productivity	243	78
Nutrition for livestock	226	72.6
Conservation of biodiversity	191	61.4
Climate change resilience	205	66

Source: Field survey data 2022/2023

Conclusion

In the study area, forage technology production and utilization were well perceived by pastoralist community in Yabello Woreda. Most respondents, about 72% perceive that there is a positive outlook towards the technology. While, certain respondents perceive that the technology is challenging to adopt, brings environmental problems and culturally un-acceptable. Insufficient access to water, climate change and land degradation, limited access to improved forage, and limited Market opportunity are barriers which hinders forage technology production and utilization. This is because the area mostly pronounced by scarcity of water resources and impacts of climate change effects adversely for a long period of time. Forage technology production and utilization positively impacted pastoralist community in the area. This is associated due to communal natural rangelands are in under numerous increased pressure recently. Enhanced livestock productivity, nutrition for livestock, conservation of biodiversity, and climate change resilience were socio-economic and environmental impacts of forage technology production in the pastoralist community of Yabello Woreda, Borena Zone, Oromia Region of Southern Ethiopia.

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Conflict of Interest

The authors declare no conflict of interest.

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