American Journal of Life Sciences
2024, Vol. 12, No. 6, pp. 104-112
https://doi.org/10.11648/j.ajls.20241206.11

Research Article

Feed Resources for Livestock and Improved Forage Production Status in Enor Woreda, Gurage Zone of Ethiopia

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Abstract

This study was conducted with the objective of assessing feed resources for livestock and improved forage production status in Enor woreda. Three kebeles were selected purposively based on livestock potential, 90 forage producer farmers, 30 from each kebele were selected using systematic random sampling from forage participant lists. SPSS (version 20) were used for analyzing the data. Mean land holdings of the area were 2.98 (SD=0.2), 2.86 (SD=0.19) and 2.93 (SD=0.21) in enset, cereal and mixed based farming system, respectively. Cereal dominate system has higher TLU than other two farming system. Feed shortage was the primary challenge in enset-based (Index=0.26), cereal-based (Index=0.32) and mixed (Index=0.32) farming system followed by water shortage problem in both enset and cerealbased system. Natural pasture (28%), crop residues (straw) (23%), hay (17%), improved forages (13%) enset (12%) and by-products from industries (7%) were observed to be the major feed resources in the area. In all the three agro-ecologies, Desho grass (Pennisetum pedicellatum) and Elephant grass (Pennisetum purpureum) were the dominant forage species, whereas Sesbania (Sesbaina sesban) was the dominant in cereal-based system

Keywords

Cereal-Based, Enset-Based, Farming System, Feed Resources

1. Introduction

Ethiopia is known by having largest livestock population in Africa [1]. The country is mainly dependent upon agriculture for its national income in which the livestock sub-sector plays a vital role. The overall livestock sector contributes about 15 to 17% of gross domestic product (GDP) and 37 to 87% of the household incomes.

Irrespective of their number with high potential for various products, however, it was not possible to bridge the gap between the existing demands for animal products and the level of production. This was the sult of insufficient and poor quality feed, particularly during the dry season. The availability of feed resources in the country rely on the quantity and pattern of rainfall distribution which fluctuate with seasons of the year. As a result, poor quality natural pasture existing on permanent grasslands, roadsides, crop aftermath and spaces between cropped plots was the main feed resources with low supplementation [2, 3].

Hence, it is difficult to expect sustainable output from the sector unless appropriate improvement approaches have to be designed. Therefore, current study was initiated to assess feed resources for livestock and forage Production status in study area.

2. Material and Methods

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Received: 26 September 2024; **Accepted:** 17 October 2024; **Published:** 11 November 2024

2.1. Description of Study Area

The study was under taken in Enor woreda, located at 198km from Addis Ababa and 42km from Wolkite town. Gunchire is the capital of Enor Woreda. The annual rainfall is ranges between 780 to 1200mm and average temperature of 19.50C with the range of 130C to 250C.

Agro-ecologically the woreda is classified as Low land (26.25%) that have an altitude of less than or equal to 1500m, Mid-land (57.52) which ranges 1500m-2500 m.a.s.l and Highland (16.32%) which have an altitude of 2500m to 3400 m.a.s.l. The area was dominated by crop-livestock mixed farming system and major crops grown in the area were enset, avocado, citrus, mango, barley, wheat, teff, chat, field bean, pea, potatoes and coffee. There was also different spice plants, horticultural crops, field crops along with wet and dry season rivers and other water bodies as well as non-agricultural land used for beekeeping [4].

2.2. Methods of Data Collection

Semi-structured questionnaires, focus group discussion and checklists for key informant interview were used for collection of primary data. Secondary data were collected from reviewing available literature, published articles, magazines written documents and annual report from the woreda livestock and fishery development office.

2.3. Sampling Method and Sample Size

Three kebeles, namely: Amogera, Agata and kerebed were selected purposively based on livestock population. Farmers for individual interview were selected purposively from forage production participants list using systematic random sampling. Accordingly, 90 households, 30 households form each kebele were selected.

3. Methods of Data Analysis

SPSS (Version 20) was used for analyzing the collected data and tables, percentages, mean and index were used to present the results. Chi square and t-test were employed at 5 % significant level. For calculating the index, the following formula was used.

$$Index = \frac{[(N * F1) + (N - 1 * F2) + ... + (1 * Fn)]}{\sum[(N * F1) + (N - 1 * F2) + ... + (1 * Fn)]}$$

Where N for maximum level of rank, F1 for Frequency of the first rank, F2 for Frequency of the second rank, Fn for Frequency of last rank.

4. Results and Discussions

4.1. Characteristics of Households

The Category of Sex, age and education level of households were shown in Table 1. Almost all households are male headed. On the other hand about 93 % of household heads were in age range between 31 and 65 years, indicating that, active working force is dominant in the study area. Majority of households (77.78%) have education level of primary and above, which helps for the ease of technology dissemination, as educated people appropriate for accepting useful technologies. These results are in agreement with the result of [5] and [5] reported in Damot Gale district.

Table 1. *Description of household characteristics (N=90).*

Response variables		Farmingsystem			Overall	X^2	Sig
		Enset dominated	Cereal dominated	Cereal & Enset			
HH_sex	Male	100.00	93.33	100.00	97.78	4.091	0.129
	Female	0.00	6.67	0.00	2.22		
HH age group	18-30	10.00	6.67	3.33	6.67	1.292	0.863
	31-45	40.00	36.67	43.33	40.00		
	46-65	50.00	56.67	53.33	53.33		
	> 65	0.00	0.00	0.00	0.00		
HHEL*	Grade 11-12	0.00	0.00	0.00	0.00		
	Grade 9-10	16.67	0.00	23.33	13.33		
	Grade 5-8	13.33	6.67	10.00	10.00		
	Grade 1-4	40.00	83.33	40.00	54.44		

Response variables	Farmingsystem			Overall	X^2	Sig
	Enset dominated	Cereal dominated	Cereal & Enset			
Illiterate	30.00	10.00	26.67	22.22	17.165	0.009

*HHEL = Household education level; Chi square at 5% significant level was tested

Majority of educated (in primary and secondary education) family members lied in the age range of 15 to 30 years old (Figure 1). This again can help in the facilitation of information flow related with various technologies that can have impact of agricultural development.

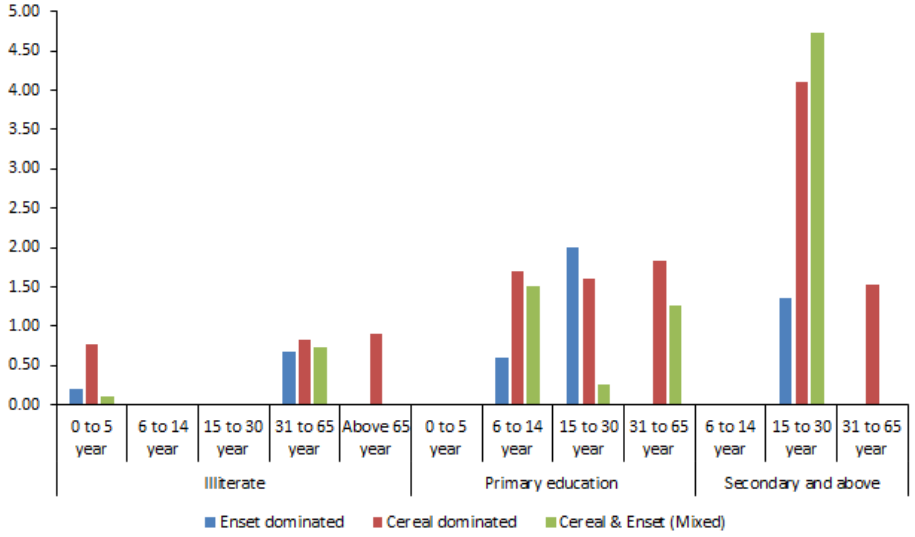

Figure 1. *Education level by age group.*

Majority of family members can actively participate on different agricultural activities (Figure 2). Ages ranged from 15 to 65 years old are more dominant family members with active participation on farm activities in all farming systems.

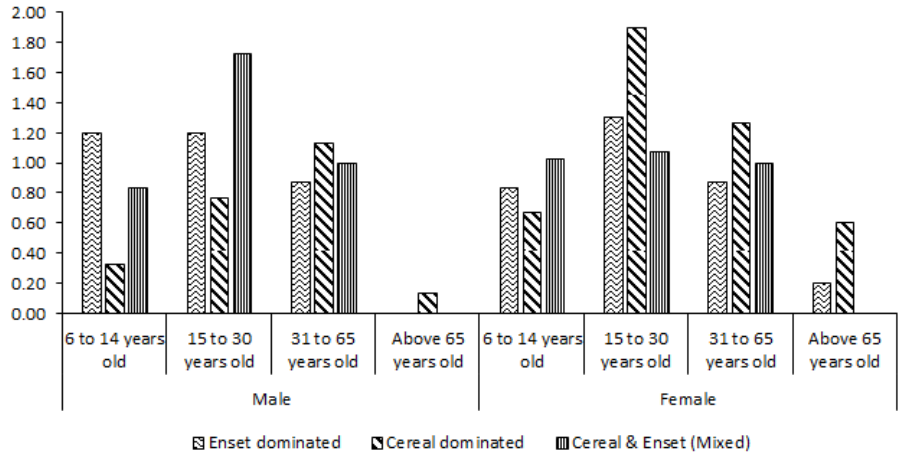

Figure 2. *Active working family members.*

4.2. Occupation and Wealth Category

The primary occupation in the study area was farming

followed by farming and mini trading. Low-income category of farmers is dominant in enset based farming system. But, in cereal dominated and mixed farming system, major households lie under middle wealth category (Figure 3).

Figure 3. *Occupation under different farming system.*

4.3. Land Holding Under Different Farming System

Mean land holdings are 2.98 (SD=0.2), 2.86 (SD=0.19) and 2.93 (SD=0.21) in Enset, cereal and Mixed based farming system, respectively (Table 1). The results for land holding size in the current study was observed to be higher than the results of [6] that reports land size of 0.80 ha in Damot Gale district.

Table 2. *Land holding in different farming system in Enor district.*

	Land holding in different farmingsystem (N=90)					
Land use type	**Enset based**		**Cereal based**		**Cereal and Enset (Mixed)**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Cultivatedland	2.04	0.71	1.91	0.67	1.96	0.69
Grazingland	0.45	0.47	0.47	0.47	0.40	0.50
Woodlot	0.47	0.48	0.46	0.48	0.57	0.50
Foddercrop	0.01	0.03	0.02	0.03	0.01	0.01
Total	2.98	0.20	2.86	0.19	2.93	0.21

SD = standard deviation

But higher results (3.23 ha) was reported by [7] in Adami Tullu, Oromia region and 3.6 ha reported by [8] in Burji District, Segen Zuria Zone of southern part of Ethiopia.

4.4. Livestock Holding

Cattle holding in cereal-based system (7.3) was significantly higher ($p \leq 0.001$) than the rest farming systems which have no significant different among themselves. This could be related with availability of more roughage feeds in the expense of cereal straw. Sheep holding (1.9) on the other hand was higher ($p \leq 0.001$) significantly in enset dominated than cereal and mixed farming systems. Whereas goat holding is higher in cereal-based (1.33) and mixed (0.87). These

two cased could be attributed to agro ecological adaptation where enset based (highland) and cereal based (lowland) favors sheep and goats, respectively. Chicken holding (7.3) was significantly higher ($p \leq 0.001$) in cereal dominated systems, which might be associated with more availability of grains and grain byproducts in the system than other two farming systems. Higher values (15.6, 4.4, 7.6 and 11.8 heads of cattle, sheep, goats and chicken, respectively) than the current study were reported by [8] in Burji District, Segen Zuria Zone of southern Ethiopia. [9] also reported higher livestock holdings (13.99, 6.14, 11.37, and 8.45 heads of cattle, sheep, goats and chicken, respectively) per household in Metekel zone of Benishangul Gumuz Regional State of Ethiopia.

Table 3. *Mean livestock holding in the study area.*

Livestock type	Enset based	Enset & Cereal based	Cereal based	F	Sig.lev
Cattle	4.47[b]	4.57[b]	7.30[a]	49.924	0.000
Sheep	1.90[a]	0.63[b]	0.27[b]	24.724	0.000
Goat	0.00b	0.87[a]	1.33[a]	14.547	0.000
Equine	0.63[a]	0.30[b]	0.83[a]	10.868	0.000
Chicken	4.47[b]	4.57[b]	7.30[a]	24.603	0.000
Bee colony	0.77[b]	5.10[a]	5.47[a]	24.315	0.000

Analysis of variance was tested at 5% significant level

In terms of total tropical livestock unit (TLU) holding, cereal dominate system has higher TLU than other two farming system (Figure 4). This is attributed to the overall effect of holding of different livestock classes.

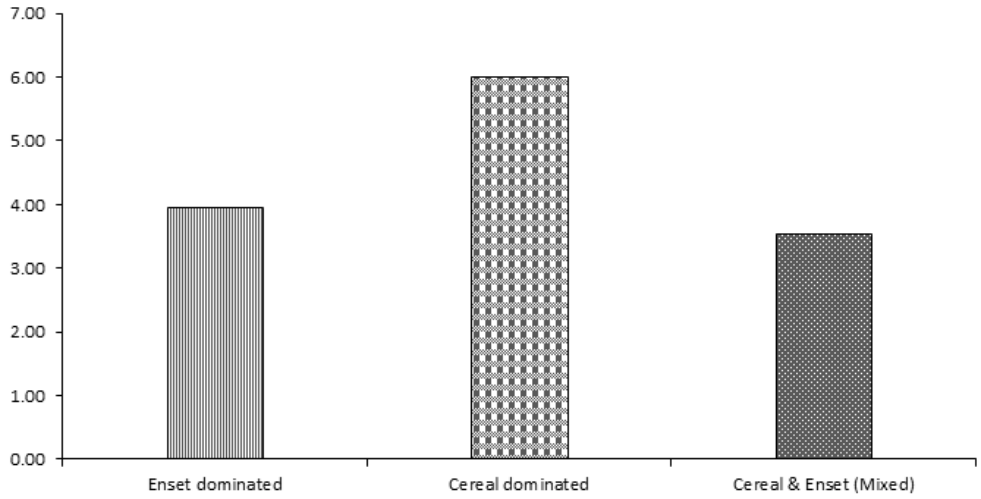

Figure 4. *Tropical Livestock Unit (TLU) Holding.*

4.5. Challenges for Livestock Production

Feed shortage was the primary challenge in Enset (Index=0.26), Cereal (Index=0.32) and mixed (Index=0.32) farming system followed by water shortage problem in both enset and cereal based, and breed problem in mixed (cereal & enset) system.

Table 4. *Major livestock production Problems.*

Major problem	Enset based		Cereal based		Enset & Cereal (Mixed)	
	N (Index)	Rank	N(Index)	Rank	N(Index)	Rank
Feed problem	120 (0.26)	1	150 (0.32)	1	146 (0.32)	1
Disease problem	73 (0.16)	4	60 (0.13)	4	89 (0.19)	3
Water problem	112 (0.24)	2	110 (0.23)	2	63 (0.14)	4
Breed problem	90 (0.19)	3	100 (0.21)	3	122 (0.27)	2
Market problem	72 (0.15)	5	53 (0.11)	5	39 (0.08)	5

4.6. Livestock Feed Resource

Natural pasture (28%), by-products of crop (straw) (23%), hay (17%), improved forages (13%) enset (12%) and industrial by-products (primarily wheat bran and noug seed cake) (7%) were the main feed resources for livestock in the study area (Figure 5). This result status is agree with reports of [2, 3] and [1] in other areas of Ethiopia.

Natural pasture resources were higher in enset and mixed farming system, while straw was primary contributor in cereal-based system (Figure 6). This could be related with higher crop production status in cereal dominated and relatively lower rate of tillage on pasturelands in enset and mixed farming systems.

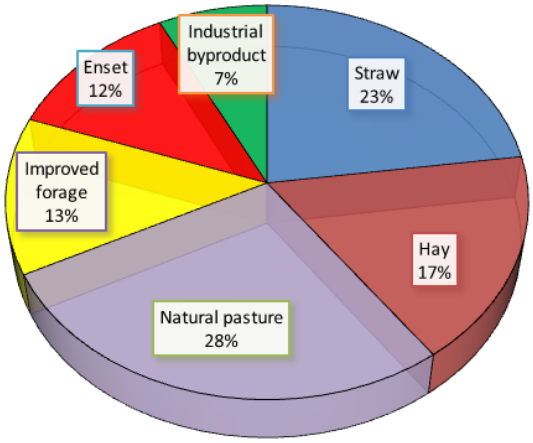

Figure 5. *Major feed resource and their contribution in Enor district.*

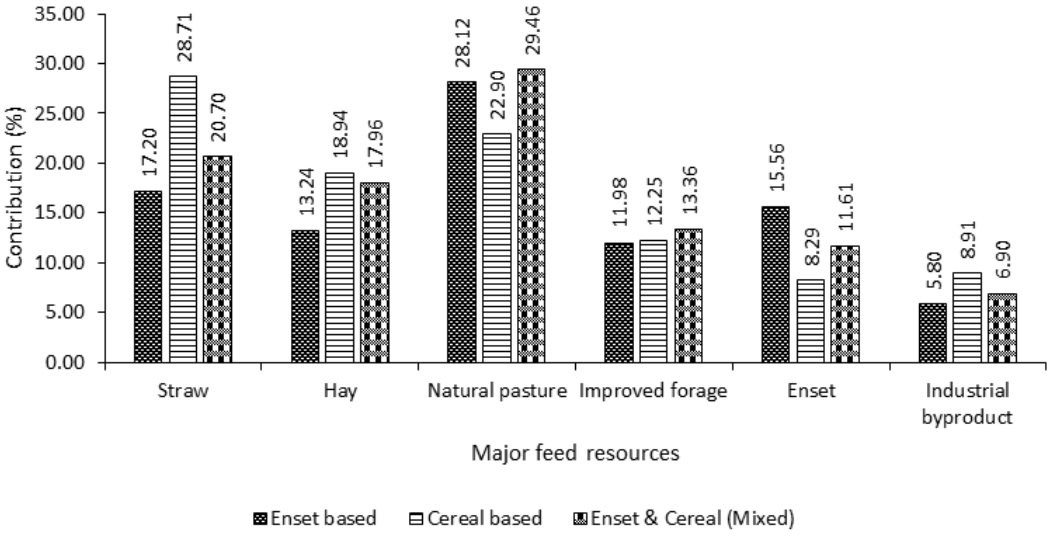

Figure 6. *Major livestock feed resources in the three farming systems.*

4.7. Improved Forages Adopted in the Area

Desho grass (Pennisetum pedicellatum), Elephant grass (Pennisetum purpureum), in all the three agro-ecologies and Sesbania (Sesbaina sesban) in cereal-based system were the dominant forages species adopted in Enor district (Table 5). These forage species found in the study area were in the list of forages species evaluated by [10] and recommended for different agro-ecologies of the southern parts of Ethiopia.

Table 5. Major improved forage and coverage under different niches.

Improved forage type	Farming system		
	Enset dominated	Cereal dominated	Cereal & Enset(Mixed)
Desho on farm land	0.04	0.05	0.05
Desho on terrace	0.01	0.02	0.01
Desho homestead area	0.01	0.01	0.01
Napier homestead area	0.02	0.01	0.01
Sesbania homestead area	0.00	0.20	0.00
Land potential	0.27	1.19	0.23

District report showed that majority of the farm hou hold, 84%, 85.79%, and 61.3% in Enset, mixed and cereal based system, respectively; participate on improved forage production regardless of the intensity (Table 6).

Table 6. Forage production participants in the district.

Study kebele	Agro ecology	FS	Total HH	Forage Participant	Participant (%)
Agata	Highland	Enset based	1200	1008	84.00
Amogera	Midland	Cereal & Enset (Mixed)	380	326	85.79
Kerebed	Lowland	Cereal based	460	282	61.30

The current study showed that land potential available was not efficiently utilized for forage production (Figure 7). This indicates that there should be strong awareness creation work on effective and efficient land resource utilization.

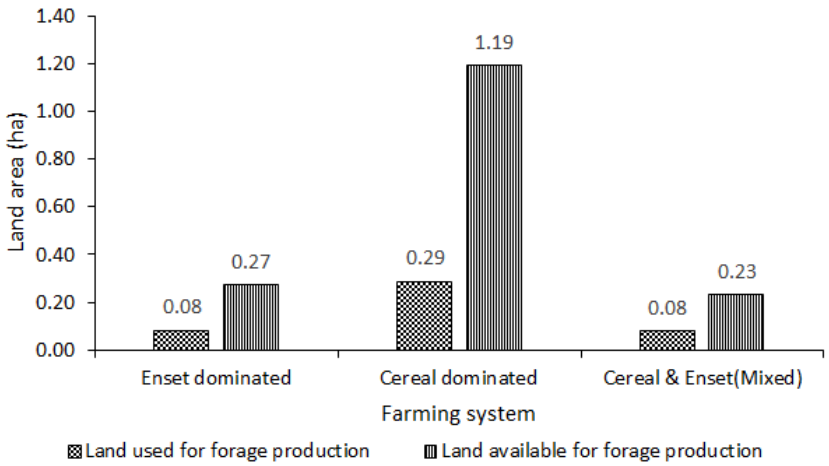

Figure 7. Land used and potential for forage production.

4.8. Challenges for Improved Forage Production

The main challenges for improved forage production are indicated in Table 7. Input constraints (lack of forage seed/planting material) were observed to be the primary constraints in all the three farming systems followed by awareness problem and water shortage challenges.

Table 7. Major improved forage production challenges.

Forage production challenges	Enset based		Cereal based		Enset & Cereal (Mixed)	
	N (Index)	Rank	N (Index)	Rank	N (Index)	Rank
Input constraints	150 (0.29)	1	120 (0.25)	1	150 (0.29)	1
Land shortage	90 (0.17)	4	86 (0.18)	4	81 (0.16)	4
Awareness problem	93 (0.18)	3	97 (0.20)	3	130 (0.25)	2
Water shortage	124 (0.24)	2	71 (0.15)	5	118 (0.23)	3
Free grazing	63 (0.12)	5	105 (0.22)	2	36 (0.07)	5

5. Conclusion and Recommendation

5.1. Conclusion

The result of current this study show that the common feeds for livestock were natural pastures, crop residues, hay, improved forages, enset and by-products from industries. In spite of this, feed shortage problem is the primary constraint in the area. The percentage of individuals involved in improved forages cultivation was encouraging, but type of improved forage technologies and their coverage is limited. Input shortage was the major constraint in the study area affecting for sustainable improved forage production.

5.2. Recommendation

Sufficient and variety of improved forage technologies should be disseminated for the farmers.

Awareness creation should be designed for the farm households in the district strongly about efficient land resource utilization forage conservation.

Abbreviations

TLU	Tropical Livestock Unit
SD	Standard Deviation
HH	House holder

Acknowledgments

First of all, I would like to express my sincere gratitude to wolkite University for financial and overall supports for my whole works. I am also grateful to Mr. Mubarek Mohamed for his support during data collection. Lastly, I would also like to extend my appreciation to all my friends from Department of Animal Science who have been supportive throughout and provided a stimulating environment for my work.

Author Contributions

Kedir Adem is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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