Assessment of Livestock Feed Situation in the Semi Arid Areas of Kewet District, North Shoa, Ethiopia: The Case of Chare and Yellen Villages

Aschalew Tsegahun[1], Lemma H/Yohanes[1], Tefera Mekonen[1], Nake Ziku[1], Getachew Gebru[2] and H. Dana[3]

[1]Debre Birhan Research Center P. O. Box 112, Debre Birhan, Ethiopia
[2]MARIL, Ethiopia
[3]Colorado State University
Corresponding author: aschalewtsega@yahoo.com

Abstract

A survey was conducted to assess the feed situation of the semi arid areas of Chare and Yellen villages in the semi arid area of Kewet District, North Shoa, Amhara Regional State, Ethiopia. Chare represented the peri-urban production system while Yellen represented crop-livestock mixed production system of the district. Respondent farmers were randomly selected in both villages. From the village household listing, 10% of the households were randomly selected to represent both male and female headed households. Sorghum, teff and maize are the dominant crops, and horticultural crops are also produced. Cattle, goats, sheep and camels are the dominant livestock species and grazing land is owned communally. Average farm plots owned by households ranged between 0.5 and 2 ha. Farmers do not allocate land for forage production. About 10% of the male respondents in Chare are landless and thus rely on livestock production activities for their livelihood, and they have good access for marketing their products. Crop residues are conserved as a dry season feed in a loose form, and no respondent reported to stack sorghum stalks under shed. Lack of awareness and resources were mentioned as the main reason for not constructing shed for crop residues. Provision of adequate feed, especially in the dry season, remains a challenge to farmers in the villages of Chare and Yellen.

***Key words**: livestock, crop residues, feed*

Introduction

Inadequate feed supply is one of the factors hampering productivity of the livestock sector in Ethiopia. Feed deficit of 35% was reported to occur in normal years while the gap could rise to 70% in drought years (ELDMPS, 2007). Grazing accounts to the larger proportion of livestock feed supply (82%), followed by crop residues and ago-industrial by-products. The use of agro-industrial by-products by smallholder farmers is minimal owing to financial constraints (Zinash and Seyoum, 1991). Proper utilization of crop residues as sources of feed during the dry season was reported to result in significant change in productivity levels (Alemu *et al*., 1991). The use of conserved sorghum stover was reported to play a pivotal role as dry season feed in the semi-

arid areas of Kewet district (Aschalew *et al*., 2014) as there is no much alternative feed to bridge the gap. Therefore, this study was initiated with the objective of assessing the feed situation in the semi arid areas of Kewet District taking two villages representing two major production systems, (peri-urban and mixed crop-livestock).

Materials and Methods

The survey was conducted at Kewet District of North Shoa. The district is located at longitude of 39.90^{o}E and latitude of 10.00^{o}N. Chare village is situated 2 km away from Shoa Robit town while Yellen is located at a distance of 17 km from Shoa Robit. The major crops grown in the district include sorghum, tef, maize and different horticultural crops. Cattle, goats, sheep and camels are the dominant animals in the district. The two villages were selected based on the information collected from agricultural development agents and extension officers at Kewet District.

Chare represents the peri-urban livestock production system where milk sale and small ruminant fattening are practiced to support family income while Yellen represents rural villages where crop and livestock production are integrated and crop production is the dominant occupation. The number of respondents was set based on the population size of each village, where about 10% of the inhabitants were selected randomly and interviewed individually on a pre-set questionnaire with the help of enumerators. Female headed households were well represented and accounted for 20% of the interviewed farmers. The data were entered in Excel data sheet and analyzed using SPSS software.

Results and Discussion

Socio-economic characteristics of Chare and Yellen households

The survey revealed that 19% of respondents from Chare and 18% from Yellen are female-headed households (Table 1). Twenty four percent of the respondents of Chare were under the age of 30 years, while none of Yellen respondents were in this age category indicating the inclination of the youth to participate in peri-urban agricultural activities compared to those living in deep rural villages of the district. With regard to age, only 19% of Chare were above the age of 51 whereas in Yellen they constitute 24%, indicating rural farmers to have less chance to move out of their birth places and change occupation. Eighty percent of Chare and 76% of Yellen respondents were within the productive age of less than 50 years.

Educational status of the respondents varied from those who are illiterate to those with high school education. The larger proportion of the respondents, 90% in Chare and 82% in Yellen, were able to read and write. The proportion of female in Chare and Yellen that attended elementary and high-school educations (Table 2) were 19% and 6%, respectively. Such a difference, among others, can be attributed to cultural factors; girls are forced to marry at earlier

age in the area. Education brought up attitudinal change and both village respondents are keen to taste technologies that are not capital intensive.

Table 1. Demographic characteristics of Chare and Yellen (% of respondents)

Age category	Villages					
	Chare			Yellen		
	Male	Female	Total	Male	Female	Total
< 30	24	0	24	0	0	0
31 -40	24	5	29	47	6	53
41 – 50	19	10	29	18	6	24
51 – 60	10	5	15	18	5	23
Above 61	5	0	5	0	0	0
Total	81	19	100	83	17	100

Table 2. Educational level of respondents of Chare and Yellen farmers (% of respondents)

Education level	Villages					
	Chare			Yellen		
	Male	Female	Total	Male	Female	Total
Illiterate	10	0	10	18	0	18
Read and write	29	19	48	24	18	42
Grade 1- 8	29	19	48	29	0	29
Grade 9-12	14	0	14	18	6	24
>12	0	0	0	0	0	0

Table 3. Land holdings of Chare and Yellen respondents by sex (% of respondents)

Land holding	Villages					
	Chare			Yellen		
	Male	Female	Total	Male	Female	Total
No land	10	0	10	0	0	0
< 1 ha	29	10	38	35	6	41
1 – 2 ha	37	10	47	41	12	53
>2	5	0	5	6	0	6

The average size of arable land per household was less than 2 ha and it ranged from 0 to 4 ha. Forty eight percent of Chare and 53% of Yellen respondents possess land between 1 and 2 ha per household (Table 3). Ten percent of Chare's male respondents do not own arable land at all; as they were below the age of 18 at the time of the 1997 land redistribution program of Amhara Regional State. The landless residents of Chare rely on livestock for their livelihood which is favored by better access to markets for animal products. No considerable difference was observed with regard to land ownership between female and male headed households in both villages. In the highly populated zone of North Shoa, land is the main factor that determines the

wealth status of a family. Only 5 and 6% of Chare and Yellen respondents, respectively own more than 2 hectares of land (Table 3). In the study period no respondent allocate land to produce cultivated forage crops the reason being small land size holding per family.

Integrated food-feed production practices

Yellen respondents mainly depend on rain-fed sorghum and vegetables as they do have reliable irrigation facilities throughout the year. All potentially cultivable land in the villages is allocated to crop production and none of the respondents reported to allocate a piece of land for forage production. Farmers of both villages depend on crop residue as dry season feed, and all respondents (100%) reported to conserve crop residues for dry season feeding using traditional system. None of the respondents bale crop residues; nor they collect and store sorghum stalk in a shade, to avoid quality deterioration due to exposure to weather and pest damage. Lack of awareness and resources (labor and capital) were mentioned to be the main determinants to feed conservation practices in the area.

Table 4. Relative importance of crops grown in the two villages

Crop type	Chare			Yellen		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Tef	14	48	10	18	24	29
Onion	-	-	19	12	59	6
Maize	-	5	2	-	6	12
Sorghum	57	19	-	70	12	-
Tobacco	-	5	-	-	-	=
Mungbean	5	5	-	-	-	-
Papaya	5	-	-	-	-	-
Vegetables	-	5	-	-	-	-
Total	81	86	31	100	100	47

Fallowing is not a common practice in the study villages and no land is allocated for hay production. Few stands of *Leucaena* and *Sesbania* trees are observed around homesteads which are used to supplement preferred animal classes in the dry season. Sorghum is the main cereal crop grown by 57% of Chare and 70% of Yellen respondents; followed by secondary crops of tef and onion, with a respective of 48 (Chare) and 59% (Yellen). Eighteen and 12% of Yellen respondents produce tef and onion as a primary crop respectively, while 14% of the respondents of Chare village produce sole crop of tef as a primary crop (Table 4). Only 5% of Chare respondents produce Mungbean and Papaya as primary crops. In the same village, 5% of the respondents reported to produce tobacco as secondary crop as the village is close to Shoa Robit Tobacco Processing Plant. Onion at Yellen and tobacco at Chare are cash crops produced under irrigation. Though farmers were not able to quantify, they indicated sorghum residue to be the dominant livestock feed resource followed by tef straw in both sites owing to the comparatively larger proportion of land allocated to sorghum and tef (Table 4). The stalk is fed mainly to draught oxen and milking cows in the dry period which lasts for 5 to 7 month. Any part of the

stalk not used for feed is used for fuel and/or construction purpose. Among the zones of the Amhara Region, North Shoa is the top producer of sorghum both in area coverage (147,189 ha) and productivity (23.79 quintal/ha) (CSA, 2013).

Feed price trends and water sources for livestock

Respondents in Chare indicated that they expend much money for feed purchase, as they do not own enough land to produce food crops, the byproduct of which would have been used as livestock feed. The expenditure for feed annually ranges from 200 to 500 Birr at Yellen, and from 300 to 1300 Birr at Chare. Prices of crop residues are usually negotiable and the well-to-do farmers tend to buy crop residues right after harvest, when prices are comparatively lower than during the dry season. All respondents complained about the escalating price of crop residues from year to year which challenges the profitability of the small livestock enterprise that they own. This is in agreement with the findings of Binyam *et al*., (2013) who reported soaring feed prices to be an important factor that destabilize milk prices in the Central Highlands. The other factor of high feed expenditure noted by Chare respondents is associated with the increasing intervention of the village with Shoa Robit City Administration, converting large tracts of arable and grazing lands to residential plots, reducing the amount of feed to be produced. As a result, 52 and 14% of males and females of Chare respondents respectively indicated that they purchase additional feed for their animals while zero and 35% of Yellen female and no male respondents respectively use bought-in feed resources (Table 5). In the study villages, water for livestock comes mainly from rivers and pipe water. Only 24% of Yellen respondents reported to use pipe water for their livestock.

Table 5. Percentage of respondents indicating feed purchases, water availability and supply system in the surveyed villages

Village	Sex	Feed bought		Water availability		Water supply system	
		Yes	No	Yes	No	River	Pipe
Yellen	Male	35	65	82	-	59	24
	Female	-	18	18	-	18	-
Chare	Male	52	29	81	-	81	-
	Female	14	5	19	-	19	-

Livestock types and their management systems

Cattle, goats, donkey, camel and chicken are important species in the study villages. In crop-livestock mixed production system, cattle are the dominant species and are kept mainly for traction and milk production purposes and this is in agreement with earlier reports (Fekede *et al*., 2013). Twenty-four percent of the respondents from both villages owned one ox while 10% of the respondents from Chare did not own any. The majority of the respondents in Chare (62%) and Yellen (47%) owned a pair of oxen. Only 5 and 12% of Chare and Yellen respondents respectively owned two pairs of oxen. In the two villages, the survey result revealed that number of oxen owned is proportional to the size of cultivated land.

Camels and donkeys are used to transport farm products to home and market places. Though number of chicken (in TLU) is too small at Chare (0.65) and Yellen (0.06), the income obtained from their sale covers most of the daily/weekly expenses of the family (Table 6). Fresh milk is either marketed/used at home or processed to butter and cheese for sale. Sheep and goats are raised to cover immediate cash needs of the household such as medicament, school fee, clothing, taxation, etc. Respondent farmers indicated that there is no improved management practice employed to enhance productivity of communal grazing land.

Table 6. Livestock types and species owned by the sample population (in TLU)

Animal species	Villages					
	Chare			Yellen		
	Male	Female	Total	Male	Female	Total
Oxen	31.0	4.0	35.0	34.0	3.0	37.0
Cow	11.0	5 .0	16.0	17.0	2.0	19.0
Heifer	6.75	3.75	10.5	6.75	0.75	7.50
Steer	6.75	0.75	7.5	8.25	0.75	9.0
Calf	3.0	2.25	5.25	6.75	0	6.75
Sheep	0	0	0	3.77	0.26	4.03
Goats	1.17	1.04	2.21	6.89	0.13	7.02
Donkey	2.8	1.4	4.2	4.2	0	4.2
Camel	2.2	0	2.2	2.2	1.1	3.3
Poultry	0.46	0.33	0.79	0.05	0.013	0.06

Note: One TLU is equal to 250 kg live weight. 1 TLU = 0.25 weaned calf, 0.75 heifer and steer, 1.00 oxen and cow, 1.10 horse, 0.70 donkey, 0.13 sheep and goat, 0.013 chickens.

Sources of labor for farm operations

All respondents unanimously reported that they require additional labor to accomplish agricultural activities on time. In the area, farm labor is obtained from three sources (hired, family and shared) or a combination of them. Female-headed families in both villages required more hired labor than the male-headed families. As shown in Table 7, male-headed families of Yellen use more hired labor (47%) than in Chare (33%). Labor shortage and lack of sufficient time were reasons reported to induce delayed collection and stacking of crop residues.

Table 7. Labor sources employed by male-and-female headed households in the two villages (% of respondents)

Village	Sex	Labor source					
		Family	Hired	Shared	Family+ shared	Family + hired	Total
Yellen	Male	-	47	-	12	24	83
	Female	6				12	18
Chare	Male	10	33	14	-	19	76
	Female	5	-	-	5	10	20

Access to information on livestock husbandry

Respondent farmers of both villages are well aware of the value of improved breeds, though male-headed families have better information in this regard. In both villages male respondents are aware of improved breeds of cattle (24%), cattle and sheep (6%), cattle and chicken (6%) and chicken only (12%). Only 5% of female respondents from Chare are aware of improved breeds of cattle and chicken, while females of Yellen are aware of cattle and sheep (6%) and sheep (6%) (Table 8). None of the respondents own any improved breeds during the survey time.

Table 8. Percentage of respondents who previously owned improved animal breeds or have information.

Village	Sex	Animal species					
		Cattle	Sheep	Cattle + sheep	Chicken	Cattle + chicken	No idea
Yellen	Male	24	-	6	12	6	35
	Female	-	6	6	-	-	6
Chare	Male	-	-	-	-	5	71
	Female	-	-	5	-	-	14

None of the respondents have the experience of silage making. Though farmers in the study villages don't cultivate improved forages, they identified elephant grass, *Leucaena*, and *Sesbania* as the most popular improved forage species. The respondents further indicated lack of improved inputs such as AI or bull service, veterinary services and small farm implements have hampered productivity of their farms. Lack of access to product markets, labor and capital shortages were also mentioned to be critical challenges that deserve significant attention. Supporting private input suppliers and strengthening marketing channel can be an option to address animal related problems in the district.

Conclusion and Recommendations

Animal production is an important activity in the villages and is constrained mainly by shortage of feed, labor, capital and the ever-increasing feed price. The existing grazing lands are too poor to support any sound livestock productivity. Educated youths are keen to adopt new technologies such as growing improved forages although small land holdings limits their occupation to be in favor of crop production and utilize crop residues as animal feed. Most of the respondents purchase additional feed to overcome dry season feed shortage. The overall crop residues produced per household is proportional to farm size and is conserved in loose form without shed. Crop residues post-harvest management seems crucial to maintain palatability and nutritive value of these immense resources, which would improve the performance of the livestock. Sorghum stalk is the main feed resource conserved as dry season feed and special attention need to be given to its conservation and utilization. Feed improvement strategies such as ensiling with urea could be introduced and demonstrated to improve the nutritional quality of the stalk, as the technology requires small investment (urea, plastic sheet, labor) that can be implemented at

household level. Supporting private input suppliers and strengthening marketing channel might be an option to address animal related problems in the district.

Acknowledgements

The activity was conducted through the grant obtained from Colorado University, USA. The first author would like to thank specifically Dr. Dana for all the invaluable assistance he rendered from inception up to completion.

References

Alemu Yami, Zinash Sileshi and Seyoum Bedye. 1991. The potential of crop residues and agro-industrial by-products as animal feed. Pp. 57-64. In proceedings of the 3rd National Livestock Improvement Conference. 24-26 May, 1989. Addis Ababa, Ethiopia.

Aschalew Tsegahun, Lemma HabteYohanes and Tefera Mekonen. 2014. Effect of harvesting stage and urea-molasses treatment on quality of sorghum silage. Pp. 647-655. In Zeleke Mekuriaw, Getnet Zeleke and Likawent Yeheyis (eds), 2014. Proceedings of the 6th and 7th Annual Regional Conference on Livestock Completed Research Activities 25-27, January, 2012 and 22-24 January, 2013, Amhara Agricultural Research Institute, Bahir Dar, Ethiopia.

Binyam Kassa, Firew Kassa, Friew Kelemu, Deresse Teshome, Getahun Kebede, and Addisu Abera. 2013. Improving dairy market through products diversification. Pp. 47 – 58. Getnet Assefa and Firew Kassa (eds). In the proceedings of the national workshop on exploiting market opportunities for the value added milk and meat products in Ethiopia.

CSA (Central Statistical Authority). 2013. Agricultural Sample Survey 2012/2013 (2005 EC) (September – December, 2012) Volume III. Report on area and production. Addis Ababa, Ethiopia. June, 2013

ELDMPS (Ethiopian Livestock Development Master Plan Study). 2007. Livestock Development Master Plan Study, Volume 1- Dairy. Phase 1 Report data collection and analysis. Government of Ethiopia Ministry of Agriculture and rural development. (www.igaddata.org/index.php).

Fekede Feyissa, Shiv Prasad, Getnet Assefa, Getu Kitaw and Seyoum Bediye. 2013. The status of production, conservation and utilization of natural pasture hay for feeding dairy cattle in the greater Addis milk shed central highlands of Ethiopia. Agricultural Research and Development 3: 82-93.

Zinash Sileshi and Seyoum Bediye. 1991. Utilization of feed resources and feeding systems in the central zone of Ethiopia, pp 129 -132. In Proceedings of the 3rd National Livestock Improvement Conference. 24-26 May 1989. Addis Ababa, Ethiopia.