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CROP RESIDUE QUALITY LOSS AND FORAGE CONSERVATION STRATEGY IN MECHA DISTRICTS OF AMAHARA REGION, ETHIOPIA

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ABSTRACT: A cross-sectional survey was employed during the first phase of the research to collect primary facts on major crop residues growing in the four peasant associations (PA's) of Mecha district West part of Amahara region. The objectives of the research were; to investigate the average harvesting time and conservation techniques of crop residues in the study area and to fill the gaps in the skill of improved forage harvesting and conservation techniques of the farmer. A semi structured questioner was employed to interview the farmers in each respective peasant association (PA's). Data collected from the survey was administered in excel spread sheet for further process and analyzed using SPSS version 21. The research findings 159 (99.3%) of the respondents have the experience of harvesting the crop residue for animal feed, while 1 (0.7%) was not practiced for harvesting of the residues may be the animal grazed by cattle as stand feeding. The other findings on collecting and transporting of the crop residue (CR) to their home was 154 (97.3%) which depicts to their home for dry period feeding of their livestock, while other 6 (2.7%) was not used for harvesting and transport the CR at all, this may be due to the residues consumed as stand feeding. The research result also significantly showed that (73.7%) of which 11.3 and 22.7% used the residues improvement mechanism by urea treatment and chopping mechanism respectively. Whereas 44.49 (26.3) were not used any improvement mechanism. The feeding of the CR for oxen, milking cow and heifer were fed to their animal about 68.8, 62.7 and 42.2 respectively. Again the research significantly showed that, 149 (93.9%) of the interviewers have showed communal grazing land in their vicinity whereas, 11 (6.1%) do not have communal grazing land in the respective area. Since, the CR is very paramount important for animal feed and one of the drought escape feeding strategy. Therefore, CR quality loss in each harvesting stages and further laboratory analysis should also be done.

Keywords: CR, Quality Loss, Conservation, Strategy, Amahara Region, Ethiopia.

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INTRODUCTION

Ethiopia is known for having large livestock populations of which 80% are found in the highlands where intensive mixed crop farming is the predominant activity using ox traction (Hurissa and Eshetu, 2002). Crop residues, particularly cereal residues are the major livestock feed mainly in the dry seasons of the year, providing 40-50% of the total annual livestock feed consumption (Malede and Mastewal, 2012). Evaluation of nutritional value of crop residues shows that they are generally low in digestibility, protein content as well as the energy value Lulseged et al. (2003). Crop residues are fibrous by-products which result deferred from grain cultivation so as to include leaves, leaf sheath and stems. The availability of crop residues at the farm level depends not just on production levels but also on a variety of social and economic factors Smith et al. (1990). Crop-livestock integrated farming is complex and dynamic with many interacting biophysical resources and socio-economic factors De Leeuw and Nyambaka (2005).

Ethiopia having huge livestock population couldn't meet the demand in animal origin food for the increasing human population mainly due to poor animal productivity due to poor nutrition, disease and genetic makeup (Duguma et al., 2012). A long history of animal nutrition research, feed assessment and development interventions that promote improved feeding technologies for smallholders, has given scanty returns and increasing domestic and export demand for livestock products, particularly for meat, is an important opportunity for Ethiopia's smallholders to improve their livelihoods Tolera et al. (2012).

Improving the management and use of the vast communal grazing land and crop residues, could contribute significantly alleviate the problem of feed shortage in the country Gebremedhin et al. (2009). This feed requirement would not be convene under any climatic condition (Ministry of Agriculture and ILRI, 2015). There is therefore a

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need for forage conservation and introducing fodder trees in lowland areas and enhancing the quality of crop residues and reduce loses during grain harvesting in the highlands of the country (Sarkunas et al., 2004). But little is known about the appropriate conservation practice of crop residues and the acceptability of highland areas so that enhancement of crop residues practices in the highlands of the country (Lukuyu et al., 2009).

Statements of the problem

The need to improve utilization of crop residues in developing nation has received considerable attention in recent years, but there have been few studies on the quality and quantity lost the crop residue, the availability of crop residues is closely related to the farming system, the crop produced and the intensity of cultivation. The potential for use of crop residues as livestock feed is greatest in integrated crop/livestock farming systems of the country. Where crop and livestock production are segregated, most crop residues are wasted. Crop residues are also wasted or used for non-feed purposes in many smallholder crop/livestock systems in developing countries which are used for fire wood and other small house construction purposes. Therefore; crop residue is the major animal feed in highlands and central highlands of Ethiopia which feeds mostly for ruminant animal in the dry period of the year. Crop residues from major cereals crop (straw, hulls, husks, cobs, awns, chaff etc.) are the most important livestock feed.

Therefore, the aim of this research was to investigate the average harvesting time and fill the gaps in the skill of improved forage harvesting and conservation techniques in the study area

MATERIALS AND METHODS

Description of the study area

The study was conducted in Mecha district of West Gojam zone of Amahara region. Mecha district has the total land mass of 156027 hectare of which the actual and potential cultivated land is 72138 and 14418.88 respectively and the grazing land, forest and bush land becomes 14723 and 21553.5 hectare correspondingly and 6512 hectare is used for construction. The land escape of the Mecha district is flat, mountains and gorge which accounts 75%, 8% and 4% respectively. The annual average rainfall (2500mm), altitude range (1800-2500), soil type (93% red and 4% brown in color) and average temperature is 26 ^{0}C (CSA, 2011).

Research design and sampling procedure

In the districts four peasant associations (PA's) were selected and from each PA's 40 respondents were also used to collect primary data. All the research area were purposively selected based on the major crop grown and use of crop residue for animal feed and the presence of relatively high livestock population and its accessibility to conducted the research.

A cross sectional survey was conducted in six purposively selected districts of four peasant association (smallest administrative area in the district) in each districts. A total of 4 and 160 peasant association and farmers were participated in each respective district respectively. In each district, the selected peasant association, 40 modest farmers were selected to participate during the interview process for collecting the primary data and a total of 160 farmers were actively participated and interviewed during the research process.

RESULT AND DISCUSSION

Socio-demographic characteristics of the respondents

Age distribution of the repondants iwere varied beteewn 20 to 80 years of old while the mean age of the respondants was showed with value found 44.99 years of old and the standard devation (std) was also showed 9.99 during the research process.

The sex of the respondant was found 136 (88.9%) was showed male while, 17 (11.1%) was found female participants with the missing value 1 and 6 for female and male respectivelly. The education level of the respondants was found 23 (16 %), 88 (61.1 %) 32 (22.2 %) and 1 (0.7%) were found to be literate, iliterate, compeleted elementary school and compeleted high school respectively and 6.5 % was the misining value in which intervier may missed the required parameters during the interview process.

The major problems of the grazing land in the study area 105 (68.2%) was shifting of the grazing area in to crop land which could be either by illegal or by legal ordered by any government officials to resolve the shortage of youth people in the research area. the other constraints of the grazing land found to be 9 (5.8%) used the land for forest land as woodlots may be initiated by the government or by any individual farmers since if the any individual used the grazing land as a forest land the pressure in the side of any higher official is very minimal or may be

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enraged. the other problems which could not be known accounted about 29 (18.8%) as most important problem in the grazing land (Hatchson, 2006).

Livestock population varies from a single animal of cattle and equines and 16 to 67 populations of cattle and chicken respectively with the range from 2 which is donkey and 15 and 66 of cattle and chicken were found respectively in the study area.

Harvesting length of the crop residue may vary from a week up to more than three weeks that represented in the table above. In the table above, 55 (35.7%), 41 (26.6%), 26 (16.9%), and 21 (13.6%) of the of the crop residue were harvested after one week, after two week, three and above three weeks of cutting the grain correspondingly, whereas, 11 (7.1%) of the respondent may not have any information or idea about the various stages of cutting the CR as a whole, which has a similar result with (Daniel, 2005). During the harvesting stages of the crop residues, it perceptibly that, there is significant loss of nutritional quality due to over dried and lignifications process of the feed, the findings showed in agreement with the study (Nordblom, 2015).

Table 1 - Sex distribution of the respondants in the study area

Sex Items		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	139	88.3	88.9	88.9
	Female	20	11.0	11.1	100.0
	Total	159	99.4	100.0	
	Missing	1	.6	-	
Total		160	100.0	-	-

Table 2 - Educational level of the respondants in the study area

Education level		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Literate	27	14.9	16	16
	Iterate	92	57.1	61.1	77.1
	CES	36	20.8	22.2	99.3
	HSC	5	0.6	0.7	100
	Total	166	93.5	100	-

CES= Complete elementary school, HSC= High school complete

Table 3 - Major constraints of the Grazing land in the study area

Shifting Items		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Shifting of the grazing land into crop land	109	68.2	72.9	72.9
	Shifting of the grazing land into forest land	13	5.8	6.3	79.2
	Shifting of the grazing land into investment	5	0.6	0.7	79.9
	Any other	33	18.8	20.1	100.0
Total		160	100.0	–	–

Table 4 - Livestock population in the different area the research

Type of animal	N	Range	Minimum	Maximum	Std.
Cattle	152	15.00	1.00	16.00	2.98363
Sheep	56	14.00	1.00	15.00	2.57201
Goat	16	11.00	1.00	12.00	2.87228
Donkey	61	2.00	1.00	3.00	0.47102
Mules	37	0.00	1.00	1.00	0.00000
Horse	2	0.00	1.00	1.00	0.00000
Chicken	137	66.00	1.00	67.00	11.28170

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Table 5 - Length of time waited in the different stages of cutting of the residue

Items		Frequency	Percent	Std. Dev.	Std. Err of Mean
Valid	One week	59	35.7	0.497	0.046
	Two weeks	45	26.6	0.470	0.098
	Three weeks	30	16.9	0.447	0.200
	Above three weeks	25	13.6	0.577	0.333
	Total	160	92.9	0.501	0.041
Total		160	100.0	–	–

CR = crop residue, HRC, harvesting of crop residue, CCR, collecting of crop residue, UT, urea treatment, CGL, communal grazing land

Table 6 - Crop residue as basal feed and grazed by livestock

Different uses of CR	Yes		No		Total	
	Count/n	Row N %	Count/n	Row N %	Mean	SD
HCR	146	99.30%	4	2.70%	1.03	0.16
CTR	143	97.30%	1	0.70%	1.01	0.08
Chopping/Cutting	34	22.70%	116	77.30%	1.77	0.42
Urea Treatment	17	11.30%	133	88.70%	1.89	0.32
Adding Salt	73	48.70%	77	51.30%	1.51	0.5

CR, crop residue, HCR, harvesting of crop residue, CCR, collecting of crop residue, UT, urea treatment, CGL, communal grazing land, CTR, collect and transport the residues

Table 7 - Feeding strategies of crop residue in the study area

Type of animal	Count/n	Row N %	Count/n	Row N %	Mean differ	St.dv	CI (0.5)
Milking Cow	94	62.70%	56	37.30%	1.37	0.49	1.29
Ox	119	78.80%	32	21.20%	1.21	0.41	1.14
Heifers	63	42.30%	86	57.70%	1.58	0.50	1.49
sheep	13	8.70%	136	91.30%	1.91	0.28	1.21
Communal grazing land	139	93.90%	9	6.10%	1.06	0.24	1.22

CR= crop residue, HRC, harvesting of crop residue, CCR, collecting of crop residue, UT, urea treatment, CGL, communal grazing land

The use of the CR in the study area were showed in the different peasant association (PA's) found to be 146 (99.3%) have the experience of cutting the CR as animal feed, while 143 (97.3%) of the respondents have also the collecting and storing the CR in the homestead for dry period feeding. moreover, using the mechanism of treating the residue showed 34 (22.7%) of the farmer have the experience of chopping/cutting the residue to increase the intake of the livestock however, 77.3% of the participants were not used this mechanism before giving to their animal. whereas around 17 (11.3%) used to improve the CR by urea treatment while 133 (88.7%) of the farmer have no any experience of using urea treat for increase the quality of CR as a whole in the research area. adding salt in the basal feed 73 (48.7%) of the farmer used to add salt whereas 77 (51.3%) have not used to add salt in the animal feed the result in agreement with the findings Mengistu (2005).

The feeding strategy of the CR 94 (62.7), 119 (78.8), 63 (42.3%) and 13 (8.7%) of the feed were consumed by the cattle (milking cow, oxen, heifer and sheep) respectively and 139 (93.9%) of the community have a communal grazing land in their vicinity of the study area. since, the farmer has their own preference of feeding their animal due to the function of the cattle and first for ploughing of oxen and lactating cows respectively, has similar result with Sintayehu et al. 2008).

Conclusion and Recommendation

This study highlighted about the use of crop residue which is one of the most versatile and basal feed for livestock. Therefore, crop residue is one of the most important to drought season escaping feeding steratgy in the study district. Hence, different stage of harvesting and loss of quality during each respective phases of cutting should be evaluate in its quality loss in the nutritional laboratory.

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Competing interests

The authors declare that they have no competing interests.

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