REVIEW OF NUTRIENTS CONTENT IN FODDER TREES LEAVES, GRASSES AND LEGUMES AVAILABLE IN BUFFALO GROWING AREAS OF NEPAL[1]

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Abstract

Fodder samples of 30 fodder tree species and 32 grasses and legumes species were collected for proximate composition, fiber fraction, calcium (Ca) and phosphorous (P) from buffalo growing areas of Nepal. The samples were analyzed in animal nutrition laboratory in Khumaltar. The mean dry matter (DM), crude protein (CP), cellulose (Cel), hemicellulose (Hem), lignin (Lig), Ca. and P. content were 33.10, 14.37, 21.90, 6.45, 18.20, 2.20 and 0.25 percent on dry matter basis respectively recorded from fodder trees leaves. Similarly, the mean DM, CP, Cel, Hem, Lig, Ca, and P content were 24.70, 13.92, 34.21, 14.42, 12.38, 0.38 and 0.35 percent on dry matter basis respectively recorded from grasses and legumes. Combination of fodder trees leaves, grasses, legumes and concentrate could make the complete ration for indigenous as well as crossbred buffaloes in the hills and plain areas of Nepal.

Key words: Nutrients, fodder tree, grasses & legumes.

INTRODUCTION

Fodder tree leaves, grasses and legumes from bunds, fallow land, forest areas, grazing lands, and crop residues are major sources of roughages for ruminant animals in Nepal. From July to December there is little problems in feeding livestock, after January to late June all the green roughage sources are scarce (Sherchand and Pariyar, 2002). During these periods buffaloes are depends only on straw (Rice, wheat, and very little quantity from legume species like black gram, rapeseed, soybean, cow pea etc.), fodder trees leaves (Panday and Upreti, 2005) and cultivated green forges (Oat and berseem in very few areas) (Upreti, 2005) are the major sources of roughages in the diet. Due to unbalanced nutrients and unavailability, buffalo production (Milk and meat) goes down and animals looks like lean and thin during these lean periods (Shrestha, 2005). Considering these constraints nutrients content in fodder trees leaves, grasses and legumes has been evaluated.

MATERIALS AND METHODS

Leaf samples from fodder tree species, grasses and legumes were collected from different parts of Nepal. The collected samples were dried in hotair oven at constant heat 72 ^{o}C for 24 hours. The collected samples were shade-dried and representative samples taken to laboratory. The dried samples were milled in a hammer mill through a 1 mm sieve for chemical analysis. The dry matter was determined by drying the samples at 72 ^{o}C at constant weight overnight and ash by igniting the samples in a muffle furnace at 525 ^{o}C for 6 hours. Nitrogen (N) content was measured by the micro-kheldal method (AOAC 1990). The crude protein was calculated as NX6.25. Cellulose, hemicellulose and lignin were determined by the method of Van Soest et al (1991). The mean, standard error of mean (SEM), minimum and maximum values of samples were analyzed by using descriptive statistics (Statistix, 1996) in personal computer.

RESULTS AND DISCUSSION

The mean DM, CP, Cel, Hem, Lig, Ca, and P content recorded from fodder trees leaves were 33.10, 14.37, 21.90, 6.45, 18.20, 2.20 and 0.25 percent on dry matter basis respectively with min and maximum values 21 & 46 DM, 10.05 & 21.46 CP, 11.9 & 35.82 Cel, 2.47 & 11.28 Hem, 9.40 & 29.49 Lig, 0.65 & 3.65 Ca and 0.12 & 0.41 P respectively (Table 1). Similarly the mean DM, CP, Cel, Hem, Lig, Ca, and P content recorded from grasses and legumes were 24.71, 13.92, 34..21, 14.41, 12.38, 0.83, and 0.35 percent on dry matter basis respectively with min and maximum vales 15.04 & 47.95 DM, 6.19 & 23.70 CP, 20.41 &

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49.02 Cel, 4.18 & 29.30 Hem, 4.97 & 23.00 Lig, 0.33 & 2.37 Cal, and 0.11 & 0.65 P percent respectively (Table 2).

Table 1. Quantity of nutrients available in different fodder trees (% on DM basis)

S/N	Local Name	Scientific Name	Nutrients					Minerals	
			DM	CP	Hem	Cel	Lig	Cal	P
1	Badahar	*Artocarpus lakoocha*	33.72 ±5.85 (18)	13.49 ±2.84 (45)	4.58 ±2.62 (41)	19.69 ±6.7 (41)	18.10 ±7.6 (39)	1.91 ±0.57 (37)	0.28 ±0.14 (37)
2	Bakaino	*Melia azedarach*	30.96 ±2.77 (2)	19.85 ±6.43 (4)	9.1 ±5.32 (3)	18.28 ±1.72 (3)	17.77 ±6.34 (3)	2.16 ±1.57 (4)	0.28 ±0.06 (4)
3	Bamboo	*Bambussa spp*	42.49 ±5.81 (8)	12.95 ±3.1 (14)	8.32 ±7.43 (11)	35.82 ±11.63 (11)	15.9 ±5.94 (11)	0.67 ±0.2 (13)	0.15 ±0.06 (13)
4	Barro	*Terminalia belerica*	32.56 (1)	11.15 ±3.26 (8)	4.60 ±2.35 (8)	16.55 ±3.54 (8)	9.40 ±10.51 (8)	3.35 ±0.55 (5)	0.41 ±0.13 (5)
5	Bedulo	*Ficus clavata*	32.21 ±4.84 (6)	15.81 ±2.34 (17)	6.33 ±3.19 (10)	24.35 ±6.03 (10)	16.48 ±8.58 (10)	1.96 ±0.45 (15)	0.27 ±0.07 (15)
6	Bhimal	*Grewia optiva*	40.15±2.62 (2)	14.49±3.58 (20)	6.59 ±1.93 (17)	23.02±2.85 (17)	16.6±4.23 (17)	2.27±0.49 (12)	0.26±0.09 (21)
7	Bhimsenpati	*Buddleja asiatica*	32.49 ±6.39 (2)	14.74 ±5.8 (5)	9.17 (1)	30.1 (1)	9.76 (1)	1.41 ±0.54 (3)	0.3 ±0.11 (3)
8	Chiple Kaulo	*Machilus gamblei*	28.93 ±5.35 (3)	18.67 ±4.65 (6)	7.51 ±3.72 (4)	18.18 ±1.92 (4)	15.46 ±2.93 (4)	2.31 ±0.28 (2)	0.3 ±0.05 (2)
9	Chiuri	*Aesandra butyracea*	28.7 (1)	12.48 ±1.56 (4)	3.58 ±0.3 (3)	22.71 ±3.63 (3)	20.67 ±8.26 (3)	2.56 ±1.06 (4)	0.16 ±0.04 (4)
10	Chuletro	*Brassiopsis hainla*	21 (1)	13.55 ±2.96 (20)	4.58 ±1.6 (18)	19.18 ±4.26 (18)	21.75 ±11.0 (18)	2.61 ±1.19 (19)	0.25 ±0.1 (17)
11	Dabdabe	*Garuga pinnata*	36.93 ±19.24 (11)	16.0 ±5.25 (50)	5.48 ±4.12 (47)	18.55 ±4.9 (47)	16.96 ±6.31 (47)	1.91 ±0.76 (41)	0.24 ±0.08 (41)
12	Dudhilo	*Ficus nemoralis*	29.65 ±0.49 (2)	11.83 ±2.78 (24)	4.88 ±1.6 (16)	20.34 ±4.12 (16)	14.67 ±6.48 (16)	3.18 ±1.53 (22)	0.25 ±0.07 (22)
13	Gayo	*Bridelia retusa*	34.1 ±7.84 (5)	13.83 ±4.88 (23)	5.67 ±2.91 (23)	22.85 ±8.94 (23)	18.81 ±7.23 (23)	1.81 ±0.77 (17)	0.21 ±0.07 (20)
14	Ginderi	*Premna integrifolia*	32.76 ±7.43 (11)	18.49 ±6.4 (44)	6.68 ±3.2 (40)	22.67 ±4.66 (40)	22.67 ±8.31 (40)	1.77 ±0.5 (33)	0.35 ±0.22 (33)
15	Harro	*Terminalia chebula*	46.41 (1)	12.83 ±3.1 (17)	4.85 ±2.98 (16)	22.31 ±4.33 (16)	16.03 ±8.35 (16)	1.24 ±0.35 (12)	0.28 ±0.1 (12)
16	Ipil ipil	*Leucaena leucocephala*	38.06 ±15.45 (19)	21.46 ±6.07 (30)	6.80 ±3.71 (14)	17.46 ±4.96 (14)	20.13 ±7.61 (14)	2.42 ±1.5 (18)	0.22 ±0.05 (18)

17	Kabhro	*Ficus lacor* / *Ficus infectoria*	36.26 ±7.55 (9)	12.79 ±4.04 (37)	6.60 ±3.77 (34)	24.77 ±7.49 (34)	21.47 ±6.51 (34)	2.46 ±0.83 (28)	0.25 ±0.1 (28)
18	Khanayo	*Ficus cunia*	37.33 ±15.14 (26)	12.5 ±2.8 (62)	6.43 ±3.02 (51)	21.87 ±5.78 (51)	17.37 ±7.0 (53)	2.68 ±0.67 (52)	0.21 ±0.06 (55)
19	Khasreto	*Ficus hispida*	31.64 ±10.39 (11)	14.56 ±4.45 (36)	6.33 ±3.13 (32)	23.37 ±5.36 (32)	13.35 ±4.95 (32)	2.96 ±0.87 (28)	0.2 ±0.05 (31)
20	Kimbu	*Morus alba*	28.56 ±8.06 (9)	18.43 ±6.13 (23)	6.83 ±3.21 (18)	17.77 ±7.06 (18)	15.56 ±5.19 (18)	2.76 ±1.14 (20)	0.4 ±0.13 (21)
21	Koiralo	*Bauhinia variegata*	37.81 ±8.49 (6)	14.78±3 .29 (27)	4.53 ±1.95 (20)	25.46 ±1.81 (20)	19.15 ±4.04 (20)	1.73 ±0.74 (25)	0.24 ±0.09 (25)
22	Kutmiro	*Litsea monopetala*	31.44 ±3.90 (15)	15.46 ±3.62 (72)	5.86 ±2.6 (58)	20.9 ±5.04 (58)	29.14 ±10.23 (58)	1.64 ±0.99 (59)	0.33 ±0.16 (59)
23	Nimaro	*Ficus roxburghii*	25.07 ±6.83 (8)	11.7 ±2.36 (52)	4.81 ±2.14 (49)	22.10 ±4.99 (39)	15.89 ±8.47 (39)	2.8 ±1.32 (35)	0.24 ±0.07 (44)
24	Painyu	*Prunus cerasoides*	30.0 (1)	13.92 ±3.52 (8)	7.14 ±3.94 (4)	11.9 ±2.46 (4)	14.42 ±1.76 (4)	1.47 ±0.38 (7)	0.27 ±0.08 (5)
25	Pakhuri	*Ficus glaberrima*	27.45 ±5.72 (5)	11.67 ±3.34 (19)	6.59 ±3.90 (16)	21.63 ±7.15 (16)	19.34 ±9.52 (16)	2.95 ±0.75 (7)	0.2 ±0.04 (12)
26	Panch-pate	*Saussuria spp*	34.75 ±4.46 (3)	12.55 ±2.93 (5)	7.2 ±3.92 (4)	21.4 ±4.13 (4)	29.49 ±3.34 (4)	1.34 ±0.25 (3)	0.22 ±0.12 (3)
27	Peepal	*Poplus spp*	34.88 ±2.66 (2)	12.96 ±1.88 (6)	10.04 ±3.03 (5)	23.59 ±1.02 (5)	14.7 ±3.0 (5)	3.65 ±1.66 (3)	0.2 ±0.04 (3)
28	Sal	*Shorea robusta*	31.6 (1)	10.05 ±1.99 (4)	11.28 ±2.3 (3)	22.65 ±4.21 (3)	22.93 ±2.77 (3)	1.42 ±0.48 (4)	0.19 ±0.05 (4)
29	Sanjh	*Terminalia alata*	33.75 (1)	10.89 ±3.42 (7)	2.47 ±1.03 (6)	13.34 ±2.29 (6)	24.36 ±12.4 (6)	2.17 ±0.27 (3)	0.12 ±0.04 (3)
30	Tanki	*Bauhinia purpurea*	30.99 ±9.68 (20)	17.09 ±4.07 (39)	8.82 ±10.15 (30)	25.13 ±6.13 (30)	17.61 ±8.11 (30)	2.31 ±0.89 (26)	0.3 ±0.09 (26)
		Mean	33.09	14.37	6.45	21.60	18.20	2.20	0.25
		Maximum	46.41	21.46	11.28	35.82	29.49	3.65	0.41
		Minimum	21.00	10.05	2.47	11.90	9.40	0.67	0.12

(Note: The figures in parentheses indicate the number of sample examined).

Table 2. Quantity of nutrients available in different grasses and legumes (% on DM basis)

S/N	Local name	Scientific name	Nutrients					Minerals	
			DM	CP	Hem	Cel	Lig	Cal	P
1	Amriso	*Thysanolena maxima*	28.94 ±7.39 (5)	9.54 ±2.39 (7)	10.5 ±5.03 (6)	31.31 ±8.59 (6)	15.9 ±7.7 (6)	0.58 ±0.2 (7)	0.17 ±0.05 (7)
2	Anjan	*Cenchrus ciliaris*		9.94 ±0.75 (4)	9.07 ±1.59 (4)	37.22 ±8.98 (4)	21.1 ±7.73 (2)	0.33 ±0.03 (4)	0.4 ±0.02 (4)
3	Banso	*Eragrostis tenella*	21.28 ±6.75 (2)	11.70 ±4.1 (6)	17.84 ±4.2 (4)	34.13 ±2.37 (4)	9.12 ±0.75 (4)	0.75 ±0.1 (2)	
4	Barseem	*Trifolium alexandrium*	19.62 ±20.56 (26)	22.7 ±2.86 (29)	10.2 ±4.42 (28)	23.87 ±5.07 (627	14.4 ±2.55 (27)	1.64 ±0.46 (4)	0.41 ±0.18 (4)
5	Bodi	*Lablab purpureus*	24.5 ±19.09 (2)	11.2 ±0.21 (2)					
6	Centro	*Centrocema pubescens*	23.25 (1)	20.8 ±0.88 (2)	8.69 ±0.83 (2)	27.61 ±0.04 (2)	17.7 ±0.17 (2)	1.12 ±0.1 (2)	0.34 ±0.05 (2)
7	Cocks-foot	*Dactylus glomerat*	47.95 ±24.1 (2)	16.3 ±2.82 (7)	12.5 ±3.77 (5)	21.32 ±7.02 (5)	13.1 ±7.75 (5)	0.52 ±0.2 (5)	0.28 ±0.09 (5)
8	Desmo-dium	*Desmodium intortum*	19.75 ±5.23 (3)	16.3 ±3.42 (10)	7.67 ±6.71 (9)	30.61 ±4.16 (9)	15.3 ±5.14 (9)	0.9 ±0.51 (9)	0.29 ±0.12 (9)
9	Dhimchi	*Pennisetum flaccidum*	16.08 ±1.66 (4)	14.7 ±1.64 (4)	7.99 ±3.06 (4)	29.26 ±13.5 (4)	23.0 ±19. (4)	0.52 ±0.13 (4)	0.39 ±0.15 (4)
10	Dubo	*Cynodon dactylon*	26.23 ±5.93 (15)	12.4 ±4.39 (20)	20 ±10.4 (19)	32.33 ±9.92 (19)	16.1 ±8.8 (19)	0.62 ±0.22 (19)	0.32 ±0.11 (17)
11	Kans grass	*Saccharum spontaneum*	40.4 (1)	8.29 ±3.2 (5)	24.5 ±9.26 (5)	39.35 ±8.6 (5)	8.42 ±1.7 (5)	0.5 ±0.11 (5)	0.29 ±0.07 (4)
12	Khar	*Themeda triandra*		6.19 ±2.58 (13)	16.1 ±11.1 (11)	47.92 ±3.41 (8)	10.9 ±4.3 (10)	0.51 ±0.1 (11)	0.11 ±0.6 (11)
13	Kikuyu	*Pennisetum cladestinum*		20.3 ±2.6 (2)	20.0 ±12 (2)	29.09 ±12.1 (2)	8.29 ±2.0 (2)	0.48 (1)	0.65 ±0.12 (2)
14	Kote	*Medicago falcata*	18.33 ±4.05 (3)	23.7 ±1.59 (3)	4.18 ±0.8 (3)	20.41 ±2.54 (3)	8.45 ±1.3 (3)	2.37 ±0.2 (3)	0.27 ±0.06 (3)
15	Kudzu	*Puraria thunbergiana*	20.15 (1)	16.8 ±0.59 (3)	7.98 ±2.63 (3)	27.4 ±5.01 (3)	8.97 ±5.8 (3)	1.64 ±0.7 (3)	0.31 ±0.05 (3)
16	Lucern	*Medicago falcata*	19.54 ±2.5 (44)	21.4 ±2.57 (44)	14.9 ±5.76 (42)	30.86 ±7.43 (42)	11.8 ±9.94 (42)		
17	Maize leaf	*Zea mays*	15.04 ±1.48 (4)	10.2 ±4.03 (4)	14.3 (1)	43.82 (1)	6.41 (1)	0.57 (1)	0.31 (1)

18	Molasses	*Melinis minutiflora*	21.45 (1)	9.83 ±3.4 (15)	14.9 ±6.56 (15)	47.04 ±5.70 (15)	11.7 ±4.9 (15)	0.37 ±0.2 (6)	0.42 ±0.6 (11)
19	Napier	*Pennisetum porpureum*	28.83 ±14.1 (3)	9.28 ±3.23 (11)	21.4 ±10.8 (7)	29.77 ±8.5 (6)	12.8 ±16.2 (6)	0.73 ±0.4 (6)	0.39 ±0.27 (6)
20	Oat	*Avena sativa*	40.19 ±35.37 (22)	11.5 ±4.48 (29)	12.2 ±4.3 (13)	34.69 ±11.52 (17)	8.43 ±4.75 (19)	0.47 ±0.17 (20)	0.34 ±0.09 (20)
21	Para grass	*Brachiara mutica*		6.32 ±1.62 (2)	25.6 ±9.26 (2)	36.79 ±0.26 (2)	4.97 ±0.98 (2)	0.49 ±0.15 (2)	0.41 ±0.11 (2)
22	Paspalum	*Paspalum dilatatum*	27.41 ±7.53 (4)	15.0 ±0.62 (4)	16.5 ±10.6 (3)	34.29 ±4.55 (3)	14.1 ±5.86 (3)	0.54 ±0.2 (2)	0.44 ±0.17 (3)
23	Rhodes	*Chloris gayana*	21.85 (1)	11.0 ±3.85 (2)	11.9 ±2.52 (2)	37.59 ±4.4 (2)	21.4 ±9.2 (2)	0.47 ±0.13 (2)	0.54 ±0.03 (2)
24	Rye grass	*Lolium perenne*	30.04 ±15.9 (13)	14.6 ±2.65 (14)	29.3 (1)	33.67 (1)	5.27 (1)	1.08 (1)	0.33 (1)
25	Setarai	*Setaria spp*	21.53 ±9.16 (2)	10.5 ±4.37 (8)	13.7 ±3.84 (7)	43.87 ±7.15 (7)	14.1 ±0.94 (7)	0.41 ±0.13 (7)	0.43 ±0.17 (7)
26	Signal	*Brachiaria decumbens*	20.3 (1)	9.54 ±2.95 (7)	17.7 ±4.24 (7)	42.58 ±4.45 (7)	10.9 ±2.53 (7)	0.48 ±0.3 (7)	0.26 ±0.05 (7)
27	Siratro	*Macroptilium atropurpureum*	16.95 (1)	17.3 ±1.58 (4)	9.04 ±4.16 (4)	31.4 ±1.42 (2)	13.4 ±4.14 (2)	1.42 ±0.46 (3)	0.28 ±0.02 (3)
28	Siru	*Imperata cylindrical*	32.19 ±4.23 (8)	6.87 ±2.21 (16)	17.1 ±8.76 (14)	49.02 ±13.25 (11)	10.4 ±3.7 (14)	0.97 ±1.2 (15)	0.18 ±0.08 (13)
29	Stylo	*Stylosanthes spp*	21.45 ±34.4 (3)	13.6 ±2.45 (21)	8.59 ±3.4 (19)	38.82 ±6.82 (19)	12.8 ±3.17 (20)	1.17 ±0.3 (10)	0.28 ±0.14 (10)
30	Teosinte	*Euchlaena maxicana*		13.7 (1)	23.1 (1)	35.43 (1)	5.81 (1)	0.44 ±0.12 (2)	0.52 ±0.01 (2)
31	Vetch	*Vicia sativa*	28.55 ±21.64 (28)	22.2 ±2.4 (28)	10.0 ±3.46 (28)	29.49 ±5.64 (28)	16.1 ±4.63 (29)	1.11 ±0.34 (5)	0.25 ±0.04 (5)
32	White Clover	*Trifolium repens*	15.28 ±8.35 (58)	21.5 ±3.31 (63)	9.42 ±4.73 (53)	29.66 ±4.97 (53)	12.6 ±6.47 (53)	1.76 ±0.36 (3)	0.46 ±0.1 (4)
		Mean	24.71	13.92	14.42	34.21	12.38	0.83	0.35
		Maximum	47.95	23.70	29.30	49.02	23.00	2.37	0.65
		Minimum	15.04	6.19	4.18	20.41	4.97	0.33	0.11

(Note: The figures in parentheses indicate the number of sample examined)

January to late June is the most critical scarce period to feed livestock specially mid hills across Nepal. Dry matter and CP content in fodder trees leaves were relatively good, but due to tannin (Provenza, 1995) content and may be more ligno-cellulose bonds content nutrient may not available to buffalo and production goes down in these period. Calcium content in fodder trees leaves were found very good

(2.20%), may be due to binding effect of tannin and ligno-cellulose bond this nutrient also limitedly available to the animals (Kamalak, 2005). In the mid hills of Nepal the terraces make such situation where irrigation could not possible wherever get irrigation in these lean season, farmers grow winter rice. Rice crop does not favors shade that why farmers does not grow fodder tree in rice field bonds. Authors experienced some shrubs like pigeon pea were green in these dry seasons even up to April. If such forage or grasses dilute in the diet with fodder tree leaves buffalo production may persist in these lean period.

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CONCLUSION
Fodder trees leaves, grasses and legumes forage if make available in lean period (January to late June) and concentrate mixture could make complete diet for buffalo and may persist milk and meat production in lean period.

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