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Sheep Nutrition Survey in Banaskantha District

P. C. Shukla, H. B. Desai, M. C. Desai, L. P. Purohit, J. S. Patel and R. T. Dangarwala

Department of Animal Nutrition, GAU, Anand Campus, Anand-388 110

ABSTRACT

Sheep nutrition survey was carried out in randomly selected talukas and villages of Banaskantha district during different seasons (July-August, 1980; January-February, 1981 and May-June, 1981). During survey samples of feeds, fodders, vegetations, soils together with information on sheep husbandry practices followed in the region were collected. Most of the grasses, shrubs and vegetations were relatively low in Crude protein and phosphorus content in summer season than in those collected in monsoon and winter seasons. Majority of samples were found deficient in zinc. Therefore, there is a need for supplementations of zinc. The soil samples were also found to be deficient in zinc. Summer period was found to be the most critical period for grazing sheep.

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INTRODUCTION

Banaskantha district is having arid and semi arid conditions and lies between 71° to 73° eastern longitude and 23° – 30′ to 24° – 30′ northern latitude. It is among one of the districts of Gujarat state with a larger population of sheep. The breed of sheep is predominantly Marwari. The sheep are mainly raised by shepherds or *Maldhari* community whose major source of income is from sheep. Sheep in this tract are mainly raised on grazing and no supplemental feeding is done even under period of greater demand of nutrients e.g. pregnancy and lactation. Therefore, it was thought to carry out survey work in this district to find out the nutritive value as well as trace mineral content of the vegetations grazed by sheep.

MATERIAL AND METHODS

Sheep nutrition survey in Banaskantha district of Gujarat state was carried out in six randomly selected talukas in three different seasons during 1980-81. From each taluka two to four villages were selected for survey work. The details of villages selected for survey work are given in Table 1.

During survey work information about common sheep husbandry practices were collected together with feeds, fodders (grasses & vegetations) and soil samples. The feeds and fodder samples were analysed for proximate composition following AOAC (1975) methods. Trace minerals (zinc, copper, manganese and iron) in feeds and fodders were determined by wet digestion technique using atomic absorption spectro-

TABLE 1

Villages visited in different seasons during sheep nutrition survey in Banaskantha district.

Taluka	*Season/Village*		
	Monsoon	**Winter**	**Summer**
Dhanera	S. K. Nagar	S. K. Nagar	S. K. Nagar
	Dharnodhar	Dharnodhar	Dharnodhar
	Pathawada	Pathawada	Pathawada
	Jorapura	—	—
Tharad	Naroli	Naroli	Naroli
	Duva	Duva	Duva
	Tharad	—	—
	Rah	—	—
Wav	Dhima	Dhima	Dhima
	Tithgam	Tithgam	Tithgam
	Wav	Suigam	Suigam
	Balutri	—	—
Danta	Kuwarsi	Kuwarsi	Kuwarsi
	Mandali	Mandali	Mandali
	Danta	Danta	Danta
Kankrej	Thara	—	—
	Nanata	—	—
Santalpur	Garamdi	—	—
	Gadha	—	—
	Varahi	—	—

photometer. Soil samples were analysed for above minerals with the help of atomic absorption spectrophotometer.

RESULTS AND DISCUSSION

Proximate composition of grasses and vegetation usually grazed by the sheep in waste and other lands is given in Table 2.

The grasses and shrubs (pasture grasses) had enough of Crude protein (11.75%) in monsoon season. It was intermediate (9.16%) in winter season which was marginal and during summer season the value of Crude protein was very low (5.97%). Therefore, summer period was a critical period as far as protein nutrition is concerned when sheep are maintained on grazing alone. During summer, grasses and shrubs were more fibrous and deficient in phosphorus. The ash and silica content were also higher in pasture grasses in all the seasons. However, they are adequate in calcium content. The other vegetations typical to semiarid region like *budo* (*Aerva javanica* (Burm. f) W & A), *dharo* (*Cynodon dactylon*), *Kharhania* plant (*Tephrosia pumila* (Lam) Pers), *Sangatro* (*Fagonia hetice*), *Ankada* leaves (*Calotropis gigantea*) showed similar seasonal trend in chemical composition especially for protein content. The leaves of *Arajia* (*Acacia leucopholea*), bamboo (*Bambusa arundinacea*), *bore* (*Zizypus nummularia* (Burm. f) W & A), *gundi* (*Cordia*

TABLE 2

Chemical composition (% on D.M. basis) of pasture grasses, shrubs, tree leaves and other fodders samples.

Name of sample	*Season*	*Crude Protein*	*Ether Ext.*	*Crude fibre*	*N.F.E.*	*Ash*	*Silica*	*P*	*Ca*
				Pasture Grasses and Shrubs					
Pasture grasses	M(24)	11.76	2.30	25.67	41.71	18.56	9.55	0.26	0.96
		±0.50	±0.14	±0.87	±1.12	±1.50	±1.19	±1.01	±0.06
	W(5)	9.16	2.90	21.58	52.73	13.63	9.03	0.20	0.66
		±2.06	±0.37	±2.66	±2.98	±1.92	±1.75	±0.03	±0.12
	S(4)	5.97	2.29	28.11	50.07	13.56	8.25	0.22	0.67
		±1.50	±0.16	±4.37	±2.63	±1.69	±1.09	±0.01	±0.17
	G.AV. (33)	10.66	2.39	25.34	44.39	17.22	9.31	0.25	0.87
		±0.60	±0.12	±0.92	±1.23	±1.20	±0.91	±0.01	±0.05
Budo(Aerva javanica (Burmf Juss.) (Flower & Stem)	W(4)	10.16	3.43	27.57	48.13	10.71	2.15	0.16	1.72
		±1.73	±0.23	±3.00	±1.27	±0.89	±0.50	±0.03	±0.11
Budo(Aerva javanica (Burmf Juss.) (Stems & Leaves)	S(3)	8.03	3.06	28.87	48.44	11.60	3.04	0.11	1.34
		±1.11	±0.15	±1.15	±5.03	±2.06	±1.10	±0.01	±0.71
Dabhado (Demostachya bipinnata, (Linn)Stapt.)	S(4)	3.84	2.22	38.45	47.02	8.47	3.74	0.07	0.66
		±0.11	±0.16	±3.59	±3.19	±1.17	±1.65	±0.01	±0.21
Dharo (Cynodon dactylon, (L) Pers.)	M(1)	11.50	1.47	29.33	47.29	10.41	4.91	0.21	0.41
	S(1)	5.39	2.33	27.05	53.95	11.28	5.90	0.22	0.48
G.Av. (2)		8.45	1.90	28.19	50.62	10.84	5.41	0.22	0.45
Kharhania plant (*Taphrosia pumila,* (Lam.)Pers.)	M(3)	22.66	3.74	22.72	41.13	10.15	0.90	0.34	2.22
		±0.26	±0.25	±0.32	±0.59	±0.46	±0.03	±0.01	±0.14
	W(1)	12.88	3.97	26.26	49.50	7.39	0.96	0.15	1.60
(Leaves and Tender Stem)	S(1)	14.50	4.20	21.02	45.75	14.53	1.65	0.21	4.46
G.Av. (5)		18.83	3.88	23.09	43.72	10.48	1.06	0.28	2.54
		±2.12	±0.16	±0.88	±1.73	±1.61	±0.15	±0.04	±0.50
Kanjaro (Digera muricata (L) Mert.)	M(1)	20.45	2.20	15.26	37.54	24.55	1.84	0.27	2.69
Kanti (Achyranthes aspera L.)	M(1)	14.67	2.42	27.27	39.45	16.19	1.10	0.23	3.91
Manso (Dactyloctenium aegyptium)	M(3)	12.22	2.01	29.61	43.07	13.09	2.67	0.23	1.07
		±2.14	±0.37	±2.51	±2.69	±0.79	±0.63	±0.02	±0.20

TABLE 2 (contd.)

Name of sample	Season	Crude Protein	Ether Ext.	Crude fibre	N.F.E.	Ash	Silica	P	Ca
Moras (*Suaeda nudiflora*, Mcg.)	W(1)	13.58	1.95	11.93	38.22	34.32	0.43	0.07	0.58
Sangatro (*Fagonia hetica*)	M(2)	9.41	2.20	41.22	40.46	6.71	0.66	0.12	1.31
	(W(6)	7.50	2.73	47.53	36.62	5.62	0.56	0.11	1.13
		±0.25	±0.11	±1.60	±1.47	±0.16	±0.09	±0.01	±0.07
	S(3)	6.73	4.54	44.60	37.96	6.17	0.33	0.15	1.30
		±0.18	±0.06	±2.49	±2.29	±0.44	±0.58	±0.03	±0.19
G.Av. (11)		6.63	3.13	45.59	37.68	5.97	0.51	0.12	1.21
		±0.32	±0.300	±1.27	±1.04	±0.19	±0.05	±0.01	±0.06
Shrubs and Tree Leaves									
Ankda leaves (*Calotropis gigantea*)	W(2)	8.60	7.84	10.44	55.07	18.05	2.84	0.18	3.31
	S(6)	7.29	9.45	12.75	46.47	24.04	2.49	0.20	4.25
		±0.52	±0.74	±1.18	±2.17	±1.37	±0.83	±0.06	±0.38
G.Av. (8)		7.61	9.05	12.17	48.62	22.55	2.49	0.20	4.01
		±0.75	±0.62	±1.06	±2.21	±1.54	±0.46	±0.05	±0.34
Aval leaves (*Cassia auraculata*)	S(1)	10.93	6.06	13.38	57.92	11.71	3.91	0.15	1.99
Arajia leaves (*Acacia leucopholea*)	S(1)	15.77	5.90	25.88	41.08	11.37	1.00	0.13	3.15
Bamboo leaves (*Bambusa arundinacea*)	S(1)	4.02	3.04	25.16	48.63	19.15	15.35	0.05	1.06
Bore leaves (*Zizyphus nummularia*, Burmf) W & A.	W(3)	12.68	6.21	15.97	55.24	9.90	1.37	0.16	2.82
		±0.14	±0.82	±3.00	±2.60	±0.17	±0.98	±0.00	±0.27
	S(1)	6.74	2.16	34.72	46.18	10.20	2.51	0.18	0.31
G.Av. (4)		11.19	5.20	20.66	52.97	9.98	1.65	0.17	2.70
		±1.49	±1.17	±5.14	±2.91	±0.14	±0.75	±0.005	±0.23
Gundi leaves (*Cordia perrottetii*)	W(1)	13.94	5.29	7.66	52.89	20.32	0.76	0.41	4.58
Kamboi leaves leaves (*Breynia retusa*)	W(2)	14.58	8.08	5.80	63.36	8.18	0.21	0.36	2.28
Kerdo (Stem and Leaves) (*Capparis decidua*)	S(4)	16.47	3.26	34.22	34.30	11.75	0.17	0.16	1.72
		±0.70	±0.17	±3.31	±2.22	±1.36	±0.05	±0.03	±0.028
Khijada leaves (*Prosopis cineraria*)	W(2)	15.00	5.25	15.84	53.55	10.36	1.15	0.28	3.09
Kothi leaves (*Limonia acidissima*)	W(1)	14.05	4.89	7.89	59.86	13.31	0.70	0.32	3.79

TABLE 2 (contd.)

Name of sample	*Season*	*Crude Protein*	*Ether Ext.*	*Crude fibre*	*N.F.E.*	*Ash*	*Silica*	*P*	*Ca*
	S(1)	20.48	2.19	12.77	54.58	9.98	0.18	0.18	2.62
G.Av: (2)		17.26	3.54	10.33	57.22	11.65	0.44	0.25	3.21
Neem leaves (*Azadirachta indica*, A Juss.)	S(1)	17.81	7.53	15.44	47.90	11.32	0.68	0.16	1.18
Pilludi leaves (*Perotri indica*, O.Koze)	S(5)	14.62 ± 8.84	2.80 ± 0.27	8.57 ± 0.41	35.14 ± 1.36	38.87 ± 0.57	0.53 ± 0.14	0.10 ± 0.02	10.45 ± 0.64
			Flowers & Pods						
Ankada flower (*Calotropis gigantea*)	W(2)	15.62	6.02	13.80	53.26	11.30	1.01	0.45	0.83
	S(1)	15.68	4.08	16.38	49.07	14.79	1.66	0.36	1.48
G.Av. (3)		15.64 ± 1.24	5.37 ± 0.69	14.66 ± 1.21	51.86 ± 1.42	12.47 ± 1.17	1.22 ± 0.25	0.42 ± 0.03	1.04 ± 0.25
Babul pods (*Deshi*) (*Acacia nilotica*)	M(1)	13.84	7.62	10.89	60.23	7.42	0.21	0.19	1.41
	S(1)	10.99	3.23	14.72	64.83	6.23	0.52	0.15	1.08
G.Av. (2)		12.41	5.43	12.80	62.53	6.83	0.37	0.17	1.25
Prosopis julifora pods	M(3)	15.77 ± 0.98	3.43 ± 0.50	23.19 ± 2.82	50.59 ± 2.99	7.12 ± 0.54	0.36 ± 0.13	0.24 ± 0.02	0.65 0.12
	W(5)	13.99 ± 0.28	4.18 ± 0.38	19.22 ± 0.78	57.27 ± 1.19	5.34 ± 0.22	0.24 ± 0.04	0.21 ± 0.02	0.47 0.05
	S(5)	13.29 ± 0.95	3.25 ± 0.19	23.63 ± 1.38	53.76 ± 1.67	6.07 ± 0.23	0.29 ± 0.05	0.16 ± 0.02	0.46 0.06
G.Av. (13)		14.04 ± 0.49	3.65 ± 0.22	21.83 ± 0.99	54.45 ± 1.22	6.03 ± 0.25	0.29 ± 0.04	0.20 ± 0.01	0.51 ± 0.04

M = Monsoon W = Winter S = Summer

( ) Figure in the parenthesis indicates number of samples analysed.

perrottetii), *khijada* (*Prosopis cineraria*), *neem* (*Azadirachta indica*) etc. are lopped and fed to sheep during summer season. These leaves had usual range of composition. They are enough in protein and calcium except bamboo leaves which are deficient in protein.

The pods of *Prosopis juliflora* and *Acacia nilotica* are also eaten by sheep and have usual composition. The flowers of *Ankada* (*Calotropis gigantea*) shrubs which are also eaten during critical period of summer are having enough of protein, phosphorus and calcium.

Trace element contents in feeds and fodders:

The average values of zinc, manganese, copper and iron in feeds and fodders are given in Table 3.

The grasses and vegetations of waste land (pasture grasses) are adequate in manganese, copper and iron content. However, they are deficient in zinc considering the requirement value of 40 ppm given by N.R.C. (1975). The other vegetations and shrubs are also deficient in zinc but they have enough of other trace minerals.

TABLE 3

Trace element content in feed and fodder samples.

Name of sample	*Seasons*	*Zn ppm*	*Mn ppm*	*Cu ppm*	*Fe mg/100 g*
		Pasture Grasses and Shrubs			
Pasture grasses	M(25)	28.89 ± 1.41	109.89 ± 8.66	14.53 ± 1.04	140.29 ± 14.90
	W(7)	29.98 ± 4.69	93.48 ± 11.22	14.02 ± 1.64	117.74 ± 13.49
	S(4)	26.40 ± 4.50	81.11 ± 19.29	16.91 ± 1.69	78.76 ± 13.69
G.Av.	(36)	26.74 ± 1.40	103.25 ± 6.76	14.70 ± 0.80	129.01 ± 11.52
Bant grass (*Cenchrus catharticus*)	M(2)	16.96	79.54	11.27	88.07
Budo (flower and stem) (*Aerva javanica* (Burm.) f) Juss..	W(4)	10.20 ± 0.73	65.05 ± 6.99	10.86 ± 0.34	80.34 ± 14.32
Budo (Stem and leaves) (*Aerva javanica* (Burm.) f) Juss.	S(3)	9.80 ± 1.40	165.40 ± 13.03	15.17 ± 1.47	129.65 ± 14.51
Dabhado (*Demostachva bipinnata*, (Linn)Stapf.)	S(4)	6.60 ± 0.65	55.09 ± 13.71	11.17 ± 2.96	33.02 ± 3.19
Dharo (*Cynodon dactylon*, (L)Pers.)	M(1)	14.08	71.76	12.94	62.56
	S(1)	20.40	121.45	11.69	28.08
G.Av.	(2)	17.24	96.61	12.32	45.32
Kharhania plant (*Taphrosia pumila*, (Lam.) Pers.)	M(3)	11.95 ±0.77	82.06 ±3.34	11.97 ±0.85	39.14 ±5.45
	W(1)	11.40	128.29	13.78	27.04
	S(1)	12.72	117.98	5.85	72.15
G.Av.	(5)	11.99 ±0.47	98.51 ±10.37	11.11 ±1.44	43.32 ±8.15
Kanjaro (*Digera muricata* (L) Mert.)	M(3)	13.97 ±0.85	122.46 ±15.51	13.64 ±0.28	86.62 ±6.83
Kanti (*Achyranthes aspera* L.)	M(1)	11.52	30.30	11.69	57.75
Manso (*Dactyloctenium aegyptium*)	M(3)	13.01 ±3.49	117.42 ±20.86	10.29 ±0.91	60.32 ±21.73
Moras (*Suaeda mudiflora*, Meg.)	W(1)	8.40	78.08	12.11	39.52
Sangataro (*Fagonia hetice*)	M(2)	7.68	30.30	7.10	28.40

TABLE 3 (contd.)

Name of sample	*Season*	*Zn* ppm	*Mn* ppm	*Cu* ppm	*Fe* mg/100 g
	W(5)	8.40	18.74	9.27	23.30
		±0.50	±3.78	±0.40	±1.28
	S(3)	7.60	27.18	9.19	31.89
		±0.20	±6.04	±0.58	±7.62
G.Av.	(10)	8.02	23.58	8.81	26.90
		±0.27	±2.89	±0.40	±2.54
Shrubs and Tree Leaves					
***Ankada* leaves** (*Calotropis gigantea*)	W(2)	20.70	242.90	9.61	67.60
	S(7)	11.92	370.30	10.20	90.96
		±2.01	±47.02	±0.71	±70.01
G.Av.	(9)	13.87	341.98	10.07	85.77
		±2.11	±40.65	±0.56	±9.14
Arajia leaves (*Acacia leucopholea*)	S(1)	11.66	93.69	6.68	86.95
Bamboo leaves (*Bambusa arundinacea*)	S(1)	19.08	48.58	10.02	66.60
Bore leaves (*Zizyphus nummularia* (Burm.f) W & A)	W(4)	12.75	117.11	9.81	52.78
		±1.08	±17.71	±0.36	±4.27
	S(1)	9.01	62.42	10.42	52.73
G.Av.	(5)	11.94	106.17	9.85	52.77
		±1.09	±16.02	±0.28	±3.31
Gundi leaves (*Cordia perrottetii*)	W(1)	22.20	22.56	20.88	31.20
Kamboi leaves (*Breynia retusa*)	W(2)	26.10	293.22	15.45	40.56
Kerdo (stem and leaves) (*Capparis decidua*)	S(4)	14.23	46.84	11.38	21.84
		±3.73	±0.24	±0.69	±1.85
Khijda leaves (*Prosopis cineraria*)	W(3)	14.40	72.29	13.06	59.97
		±0.35	±30.72	±0.97	±14.88
Kothi leaves (*Limonia acidissima*)	W(1)	10.60	86.75	10.02	47.84
	S(1)	14.84	34.70	5.43	48.10
G. Av.	(2)	12.82	60.73	7.73	47.97
Neem leaves (*Azadirachta indica*, A. Juss.)	S(1)	10.60	34.70	8.35	71.23
Pilludi leaves (*Perotri indica*, O. Keze)	S(5)	9.31	60.72	9.19	39.14
		± 1.11	± 9.02	± 1.45	± 3.68

TABLE 3 (contd.)

Name of sample		Season	Zn ppm	Mn ppm	Cu ppm	Fe mg/100 g.
		Flowers and Pods				
Ankada flower		W(2)	27.00	81.55	9.81	63.52
(*Calotropis gigantea*)		S(1)	20.14	116.56	6.26	101.75
	G. Av.	(3)	24.71	93.22	8.63	77.60
			± 2.31	± 12.70	± 1.45	± 12.79
Babul pods (*Desi*)		M(1)	20.40	20.82	14.61	20.80
		S(1)	10.34	13.88	8.35	13.88
	G.Av.	(2)	15.37	17.35	11.48	17.34
Prosopis juliflora pods		M(4)	14.85	24.29	14.93	31.20
			± 0.51	± 1.23	± 0.62	± 4.55
		W(5)	11.52	13.88	7.93	16.64
			± 1.16	± 0.00	± 0.23	± 2.16
		S(5)	14.89	21.17	10.19	16.65
			± 0.90	± 2.35	±0.41	± 1.94
	G. Av.	(14)	13.68	19.46	10.74	20.80
			± 0.67	± 1.47	± 0.81	± 2.37

( ) Figure in the parenthesis indicates number of samples analysed.

The range and the percentage of samples deficient or adequate in particular mineral in different class of grasses and vegetations are summarized in Table 4.

Most of the samples were found deficient in zinc. Recently zinc deficiency has been reported in many parts of our country by different workers (Sawhney and Bedi, 1972; Sawhney *et al.* 1973, 1977; Shukla *et al.* 1980, 1982; Desai *et al.* 1983). The results are quite comparable with their findings. Deficiency of copper was noted only in shrubs and tree leaves and of manganese in case of shrubs, flowers and pods. Iron content was adequate in all the samples.

Trace elements in soils:

Average and range of zinc, manganese, copper and iron content in soil samples are given in Table 5.

As with feeds and fodders, deficiency of zinc in soils in all the three seasons was encountered. Rest of the elements were found to be adequate in soil samples collected in all the seasons except 54% of samples were deficient in iron during monsoon. Even average zinc content was found below the threshold level in winter and summer. Zinc deficiency in soils of different parts of country have been reported by other authors, (Anonymous, 1976-77, Dangarwala *et al.*, 1983). It is suggested that zinc supplementations through feeds rich in zinc like rice polish, groundnut cake or through mineral mixture should be done to ration of sheep of this region.

TABLE 4

Range of trace elements and percentage of samples adequate or deficient during different seasons.

	Pasture grasses		*Other grasses*		*Shrubs*		*Tree leaves*		*Flower & pods*	
	Min.	*Max.*	*Min.*	*Max.*	*Min.*	*Max.*	*Min.*	*Max.*	*Min.*	*Max.*
					Zn (ppm)					
	9.6	49.2	4.80	22.48	6.60	24.60	6.60	22.20	8.40	27.60
Adequate (%)	14		—		—		—		—	
Deficient (%)	86		100		100		100		100	
					Mn (ppm)					
	41.66	227.27	29.49	115.29	10.41	537.85	20.82	131.86	5.50	116.56
Adequate (%)	100		100		91		100		61	
Deficient (%)	—		—		9		—		39	
					Cu (ppm)					
	7.10	28.39	7.93	20.04	6.68	17.95	5.43	20.88	6.26	16.28
Adequate (%)	100		100		93		82		96	
Deficient (%)	—		—		7		18		4	
					Fe mg/100 g					
	29.76	265.55	19.25	115.50	16.64	152.88	20.08	98.44	10.40	101.75
Adequate (%)	100		100		100		100		100	
Deficient (%)	—		—		—		—		—	

TABLE 5

Range of trace elements in soils in Banaskantha district.

Season	*No. of sample analysed*	*Contents (ppm)*			
		Zn	*Mn*	*Cu*	*Fe*
		Min Max	*Min Max*	*Min Max*	*Min Max*
Monsoon	(37)	0.23—4.23	4.4 —18.0	0.2— 1.9	3.0 —18.8
		(0.75±0.13)	(8.87 ± 0.54)	(0.53±0.05)	(6.50 ± 0.79)
Winter	(17)	0.05—0.85	4.6 — 19.4	0.31—0.78	7.3 —25.5
		(0.23±0.04)	(9.76 ± 0.99)	(0.55± 0.05)	(11.19 ± 1.05)
Summer	(15)	0.10—2.15	6.2 —19.2	0.29—2.47	6.9 —25.2
		(0.55±0.15)	(10.68 ± 1.07)	(0.80 ± 0.16)	(11.15 ± 1.26)

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