TOPIC 1. FOOD HABITS AND PREFERENCES

Food habits and preference lists of different forage species have been compiled for most species of wild ruminants in many areas of their ranges. The identification and listing of different species ingested is a useful aid when evaluating the biochemical aspects of nutrition. Such descriptive lists are the beginning, not the end, of nutritive analyses.

There are some interesting relationships between taxonomy and biochemistry to consider. Suppose, for example, that two species of plants were identified in the diet of an animal. The use of these species may have been described in the literature in many different ways, including number of twigs browsed, percent browsed, volume in the rumen, frequency of occurrence in the rumen, animal-minutes spent ingesting the species, and in other ways too. Statistical differences between the numerical quantities could be determined and conclusions made.

The data and their analyses in the above example may, however, be quite unrelated to the functional nutritive characteristics of the organism. If the nutrient compositions of two species were similar, then the animal's use of the species would be similar. Separate analyses of the nutritive data for the two species would not be relevant since the animal would "recognize" the forage from a biochemical standpoint rather than a taxonomic one.

There has been considerable work on both the food habits and preferences of wild ruminants. These two characteristics of a species seem straight-forward enough, but they are, in fact, very complex and interrelated. "Food habits" is a term applied to what an animal eats. "Preferences" is a term applied to the order in which foods are chosen. But to what extent are food habits affected by preference alone? Food habits are reflections not only of preference, but also of availability. Highly preferred foods that are unavailable can hardly show up in the "food habits." Some foods may be very low on a preference list, but still eaten in small quantities. As the quantities of the more preferred foods are depleted, the very low preference food may appear to be higher on the preference list.

The ranking of frequencies of different foods on food habits lists may give some indication of preference. If, however, the abundances of different foods in the stomach matches the abundances of the foods on the range, then one must conclude that no preference has been shown. If a frequently-occurring food in the stomach is infrequently found on the range, then a preference is being shown for that food. Conversely, if a very abundant food on the range is found in small quantities in the stomach, then an avoidance (negative preference) is being shown for that food. Statistical tests, such as the Chi-square test or rank-order non-parametric tests may be used to test for departures from expected frequencies of different foods in the stomach based on the abundances of the foods on the range.

The use of relative frequencies and rank-orders provides a basis for numerical indexes that may be used to quantify food preferences. These indexes, while relative and somewhat arbitrary, may provide ways to quantify ideas for use in simulating foraging relationships. Their use may be very helpful as long as index values continue to be treated as relative rather than absolute numbers.

Two units (UNIT 1.1: FOOD HABITS and UNIT 1.2: PREFERENCES) follow, with the literature separated into those references which contain information simply on what is eaten in UNIT 1.1, and those references containing information on the preferences in UNIT 1.2. Sorting of the literature into these two categories cannot be done perfectly, so students interestd in either UNIT should consult the references listed after both UNITS.

UNIT 1.1: FOOD HABITS

There is a large amount of literature on the food habits of different wild ruminants. Surveys of forages ingested without consideration of the relative abundance of different forage species or the preferences of different ruminants for different forages, fall in the "food habits" category, since they only provide information on what was ingested. Foods on the lists reflect foods present on the range, of course. They also reflect seasonal differences in the presence of different forage species. These natural variations in the range contribute to long food habits lists. White-tailed deer, for example, have been observed to eat several hundred different species; the actual list of species eaten very likely exceeds a thousand.

Food habits lists are usually compiled from stomach or rumen analyses. There are several problems associated with this approach, including differences in the recognizability of different plant fragments, differences in the rates of mechanical and chemical breakdown of different plant materials, and differences in the abilities of different persons to recognize the plant species from the fragments. Stomach analyses are very tedious; the work is not particularly exciting to most people.

Food habits lists are important to the range and wildlife ecologist, however, as reasonable estimates of diet composition are needed to evaluate both nutrients ingested and the impact of herbivores on range composition. They are used in calculating intakes for animals on different diets as discussed in TOPICS 3, 4, and 5.

The references that follow provide information on food habits of wild ruminants. The next UNIT (1.2: PREFERENCES) includes lists of foods eaten when additional information on selection by the animal is given.

REFERENCES, UNIT 1.1

FOOD HABITS

SERIALS

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	4---4	404	428	cerv	utili oaks, birds, mammals	van dersal,wr	1940
TNKKA	11...	41	50	cerv	grazing area require, deer	makhaeva,lv	1963

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AZATA	75---	1	39	od--	experimentl feeding of dee	nichol,aa	1938
CAFGA	37--1	43	52	od--	deer range survey methods	dasmann,up	1951

od-- continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JFUSA	33-11	940	942	od--	use, truck trails, firebre	robinson,cs	1935
JFUSA	48--6	410	415	od--	doca, rnge relations, utah	julander,o; robin	1950
JOMAA	25--2	130	130	od--	a deer brwse survey method	aldous,se	1944
JRMGA	11--1	18	21	od--	livest, tech study competn	julander,o	1958
JWMAA	13--3	314	315	od--	deer forage observat, utah	smith,jg	1949
JWMAA	19--3	358	364	od--	range appraisal, missouri	dunkeson,rl	1955
JWMAA	25--3	342	342	od--	atlan white-ced, wint brow	gould,wp; brown j	1961
JWMAA	30--1	204	206	od--	brws utiliz, percent twigs	stickney,pf	1966
NAWTA	17---	448	458	od--	rumen content, doca compet	davis,rb	1952

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AMFOA	68--8	24	48	odvi	dinnerbell for the whiteta	hurd,es	1962
AMNAA	89--2	281	286	odvi	foods, martin county, indi	sotala,dj; kirkpa	1973
BIBAA	49--2	184	184	odvi	eating birds in mist nets	allan,ta	1978
CJFRA	4---4	491	498	odvi	use brows in encl, n bruns	drolet,ca	1974
ECOLA	12--2	323	333	odvi	mount laurel, rhododendron	forbes,eb; bechde	1931
ECOLA	16--4	535	553	odvi	wint reln to forests, mass	hosley,nw; ziebar	1935
JAASA	38...			odvi	food habits, telemetry obs	marchinton,rl; ba	1967
JFUSA	37--3	265	267	odvi	pine in the diet, minnesot	aldous,se	1939
JFUSA	41--6	471	475	odvi	seas brows woody pl, oak f	bramble,wc; godda	1943
JFUSA	48-10	684	684	odvi	samp yiel, brow util, wint	morton,ad	1950
JFUSA	51-11	815	819	odvi	seas brows woody plt, penn	bramble,wc; godda	1953
JOMAA	18--1	77	80	odvi	notes on winte foods, mich	howard,wj	1937
JOMAA	44--2	284	284	odvi	insectivorous white-t deer	shaw,h	1963
JRMGA	21--3	158	164	odvi	food habits, south texas	chamrad,ad; box,t	1968
JRMGA	21--3	164	166	odvi	mid-sum diet, welder refug	drawe,dl	1968
JRMGA	26--5	372	375	odvi	intake, obser mastic, tame	crawford,hs; whel	1973
JRMGA	32--2	93	97	odvi	infl brush control on diet	quinton,da; hore/	1979
JWMAA	5---3	314	332	odvi	foods of the united states	atwood,el	1941
JWMAA	6---4	287	291	odvi	winter habits, central ny	cook,db; hamilton	1942
JWMAA	7---2	203	216	odvi	on aransas refuge, texas	halloran,af	1943
JWMAA	9---4	319	322	odvi	odhe, symptoms of malnutri	harris,d	1945
JWMAA	10--1	60	63	odvi	summer brow, cutov hardwoo	cook,db	1946
JWMAA	11--3	263	266	odvi	huron mountain deer herd	manville,rh	1947
JWMAA	13--1	135	141	odvi	avail wint forage, browsin	hough,af	1949

odvi continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	17--2	166	176	odvi	irruption, necedah refuge	martin,fr; krefti	1953
JWMAA	18--4	482	495	odvi	deer management study: mud	hunt,rw; mangus,l	1954
JWMAA	19--3	358	364	odvi	deer range appraisl, misso	dunkeson,rl	1955
JWMAA	21--1	75	80	odvi	effect brows, hardw-hemloc	stoeckeler,jh; s/	1957
JWMAA	21--1	101	103	odvi	interp overbrows ne forest	webb,wl	1957
JWMAA	24--1	68	80	odvi	influence on vegetation, w	beals,ew; cottam/	1960
JWMAA	24--4	387	395	odvi	deer-forest hab relationsh	halls,lk; crawfor	1960
JWMAA	25--1	77	81	odvi	nutri, accept value, slash	alkon,pu	1961
JWMAA	25--4	404	409	odvi	some foods, souther arizon	white,rw	1961
JWMAA	26--2	164	172	odvi	foods, manage impl, missou	korschgen,lj	1962
JWMAA	26--4	371	379	odvi	value, acorns, diet, michi	duvendeck,jp	1962
JWMAA	28--3	473	477	odvi	point frame, samp rum cont	chamrad,ad; box,t	1964
JWMAA	28--4	798	808	odvi	compar food habits, livest	mcmahan,ca	1964
JWMAA	29--2	370	375	odvi	fruit use, southern forest	lay,dw	1965
JWMAA	30--1	151	162	odvi	graz enclosur, tex, livest	mcmahan,ca	1966
JWMAA	31--2	351	353	odvi	brows, hardw seedli, sprou	moore,wh; johnson	1967
JWMAA	31--2	354	356	odvi	elm as deer browse	pogge,fl	1967
JWMAA	32--1	130	141	odvi	rang use, food, cons, prod	allen,eo	1968
JWMAA	32--3	558	565	odvi	habitat rela, odhe, montan	martinka,cj	1968
JWMAA	32--3	623	626	odvi	browse, ouachita for, okla	segelquist,ca; pe	1968
JWMAA	33--3	506	510	odvi	odhe, qual id forag, feces	zyznar,e; urness,	1969
JWMAA	33--3	511	520	odvi	habitat relat, ozark enclo	segelquist,ca; w/	1969
JWMAA	34--1	210	213	odvi	compar volumet, point-anal	robel,rj; watt,pg	1970
JWMAA	34--3	535	540	odvi	food habit, george reserve	coblentz,be	1970
JWMAA	34--4	870	886	odvi	food hab, range char, ohio	nixon,cm; mcclai/	1970
JWMAA	35--3	476	487	odvi	summer habitat, n cent min	kohn,be; mooty,jj	1971
JWMAA	35--4	698	706	odvi	for diges, diet, s upl ran	short,hl	1971
JWMAA	36--3	906	912	odvi	esophageal cannula for w-t	veteto,g; davis,/	1972
JWMAA	37--2	195	201	odvi	dry mat, energ intak, dige	ammann,ap; cowan/	1973
JWMAA	38--2	210	214	odvi	seas foods, n brunswick, c	skinner,wr; telfe	1974
JWMAA	38--2	215	219	odvi	summer foods, no wisconsin	mccaffery,kr; tr/	1974
JWMAA	38--3	535	540	odvi	odhe rumen, fecal anal, de	anthony,rg; smith	1974
JWMAA	39--2	321	329	odvi	nutrition south deer, seas	short,hl	1975
JWMAA	39--2	330	336	odvi	food, mast abundan, scarci	harlow,rf; whela/	1975
JWMAA	39--4	699	704	odvi	consum artif browse, penne	ullrey,de; youat/	1975
JWMAA	40--1	140	144	odvi	odhe, infl droug diet numb	anthony,rg	1976
JWMAA	40--4	645	657	odvi	alal, habitat use, sympatr	kearney,sr; gilbe	1976
JWMAA	42--2	397	403	odvi	impro meth rumen cont anal	puglisi,mj; lisc/	1978
JWMAA	44--1	89	97	odvi	spr sum food, missou ozark	korschgen,lj; po/	1980
JWMAA	44--1	98	106	odvi	tame, sum forg use, n mich	stormer fa; bauer	1980
MOCOA	8---9	4	5	odvi	deer foods, missouri ozark	dalke,pd	1947
MRLTA	54--2	23	23	odvi	white-t deer eating salmon	shea,ds	1973
NAWTA	2----	438	445	odvi	food study, north carolina	stegeman,lc	1937
NAWTA	3----	756	767	odvi	food habi, minn, stom anal	aldous,se; smith,	1938
NAWTA	6----	155	160	odvi	use, avail win brow, misso	dalke,pd	1941

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CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
NAWTA	24---	201	215	odvi	food habits, everglades de	loveless,cm; liga	1959
NAWTA	31---	205	212	odvi	use woody brows, nort east	stiteler,wm,jr; s	1966
NAWTA	34---	229	238	odvi	seas chng rmen chem compos	kirkpatrick,rl; /	1969
NFGJA	11--2	115	118	odvi	use, commercial clear-cut	krull,jn	1964
NFGJA	17--1	63	63	odvi	bird ingested by whit-tail	stone,wb; palmat/	1970
PCGFA	8----	83	85	odvi	deer vs livest, gulf coast	goodrum,pd; reid,	1954
PCGFA	13---	54	61	odvi	acorns in diet of wildlife	goodrum,pd	1959
PCGFA	18---	57	62	odvi	imprtn variety, souther d	lay,dw	1964
PCGFA	25---	18	46	odvi	forages eaten southea deer	harlow,rf; hooper	1971
PMASA	7,8--	65	68	odvi	brwsing, ponder pine, mont	adams,l	1948
POASA	46---	220	221	odvi	stomach contents, w-t fawn	clark,tw	1966
PSAFA	58---	139	143	odvi	browsin, longleaf pin belt	goodrum,pd; reid,	1958
SWNAA	24--2	297	310	odvi	botan comp, nutr cont diet	everitt,jh; gonza	1979
TISAA	70--1	47	56	odvi	milo in diet of, illinois	ward,wc; hardin,j	1977
TSASA	70--2	223	240	odvi	food habits, nrtheast kans	watt,pg; miller,/	1967
XANEA	33---	1	37	odvi	browsing hardwds, northeas	shafer,el,jr	1965
XASEA	67---	1	12	odvi	import woody twig ends, se	cushwa,ct; downi/	1970
XFWLA	310--	1	10	odvi	fall, wint food habs, minn	aldous,se; smith,	1948

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CAFGA	36--3	235	240	odhe	food habits, californ herd	ferrel,cm; leach,	1950
CAFGA	38--2	211	224	odhe	food hab, prod, cond, cali	lassen,rw; ferre/	1952
CAFGA	39--2	163	175	odhe	nutrtnl value forag plants	hagen,hl	1953
CAFGA	40--3	215	234	odhe	de fora relat lassen-washo	dasmann,w; blaisd	1954
CAFGA	42--4	243	308	odhe	foo hab great basin, calif	leach,hr	1956
CAFGA	43--3	161	178	odhe	foo habi, tehama deer herd	leach,hr; hiehle,	1957
CAFGA	65--2	68	79	odhe	die comp, ener resrv, preg	holl,sa salwass/	1979
CJFRA	2---3	250	255	odhe	doug fir genot, brows pref	radwan,ma	1972
CNJNA	56--3	531	542	odhe	foo hab fll, win, spri, bc	willms,w; mclean/	1976
ECMOA	15--2	109	139	odhe	eco relat, food, coast, bc	cowan,im	1945

odhe continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JFUSA	35--3	285	292	odhe	plants eaten, california	robinson,cs	1937
JOMAA	25--2	198	199	odhe	some unusual foods, oregon	sooter,ca	1944
JRMGA	2---4	206	212	odhe	de-livesto fora stu, calif	dasmann,wp	1949
JRMGA	4---4	249	253	odhe	ceel, status of brws, oreg	mitchell,ge	1951
JRMGA	6---1	30	37	odhe	captv, cnsmp natv forg sum	smith,ad	1953
JRMGA	30--2	116	118	odhe	wild horse, doca, foods of	hansen,rm; clark/	1977
JRMGA	30--3	206	209	odhe	food hab, sem-des gras-shr	short,hl	1977
JWMAA	6---3	210	220	odhe	survey, winter range, oreg	edwards,ot	1942
JWMAA	7---1	119	122	odhe	chaparral crown spr, brows	reynolds,hg; samp	1943
JWMAA	8---4	317	338	odhe	supplemnt winter fee, utah	doman,er; rasmuss	1944
JWMAA	9---2	145	151	odhe	wint study, mule d, nevada	aldous,cm	1945
JWMAA	10--1	54	59	odhe	managemnt, black-tailed de	einarsen,as	1946
JWMAA	13--3	314	315	odhe	forag observations in utah	smith,jg	1949
JWMAA	14--3	285	289	odhe	sagebrush as a winter feed	smith,ad	1950
JWMAA	15--2	129	157	odhe	in nebraska national fores	mohler,ll; wampo/	1951
JWMAA	15--4	352	357	odhe	odvi, comp some plants eat	gastler,gf; moxo/	1951
JWMAA	16--2	148	155	odhe	food habits of odhe, utah	smith,jg	1952
JWMAA	17--2	101	112	odhe	competitio, sheep, in utah	smith,jg; julande	1953
JWMAA	19--2	215	225	odhe	ceel, winter browse, idaho	hoskins,lw; dalke	1955
JWMAA	21--2	159	169	odhe	fo hab, rang use, agr rela	wilkins,bt	1957
JWMAA	21--2	189	193	odhe	ceel, fo hab, nat bis rang	morris,ms; schwar	1957
JWMAA	22--3	r75	283	odhe	food hab, rang use, montan	lovaas,al	1958
JWMAA	26--3	321	323	odhe	tech, cost brows coll, nut	yeager,le; woloch	1962
JWMAA	29--1	27	33	odhe	mont for wint habi, montan	klebenow,da	1965
JWMAA	29--2	352	366	odhe	stom content anal, new mex	anderson,ae; sny/	1965
JWMAA	32--1	142	148	odhe	obser use, forage, pl comm	miller,fl	1968
JWMAA	32--3	542	553	odhe	forag avail, brows doug-fi	crouch,gl	1968
JWMAA	33--1	191	195	odhe	chang food hab, herd reduc	nellis,ch; ross,r	1969
JWMAA	33--3	506	510	odhe	odvi, identi forage, feces	zyznar,e; urness,	1969
JWMAA	36--4	1025	1033	odhe	forag use, logging, colora	wallmo,oc; regel/	1972
JWMAA	36--4	1336	1340	odhe	ceel, new meth rumen sampl	follis,tb; spille	1972
JWMAA	37--4	556	562	odhe	accur field est, food habs	wallmo,oc;gill,/	1973
JWMAA	38--3	508	516	odhe	forag intak est, cesiu-137	alldredge,aw; li/	1974
JWMAA	43--1	154	161	odhe	summ diet, ldgepl pne hab	deschamp,ja; urn/	1979
NAWTA	4----	560	569	odhe	ceel relationships, oregon	cliff,ep	1939
NAWTA	21---	159	172	odhe	nutri, popu dynam, n calif	taber,rd	1956
NAWTA	35---	35	47	odhe	eval wint use orchar, colo	harder,jd	1970
SWNAA	13--2	159	166	odhe	food plants, habitat, okla	clark,tw	1968
XFPNA	112--	1	12	odhe	ceel, season forg use, ore	edgerton,pj; smit	1971
XPNWA	84---	1	8	odhe	spring browsng of doug-fir	crouch,gl	1968

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
ATRLA	15--6	89	110	ceel	foods, rumen content analy	dzieciolowski,r	1970
CAFNA	93--3	282	287	ceel	summ, aut, wint diet, sask	hunt,hm	1979
ELPLB	15-11	285	305	ceel	winter food deter by track	dzieciolowski,r	1967
ELPLB	18-32	635	645	ceel	variat, food select, envir	dzieciolowski,r	1970
JOMAA	17--3	253	256	ceel	browsing, early wint, wash	skinner,mp	1936
JRMGA	5---2	76	80	ceel	odhe, wint-rang util, wash	buechner,hk	1952
JRMGA	9---1	11	14	ceel	elk, livestock competition	morris,ms	1956
JRMGA	26--2	106	113	ceel	foods eaten, litera review	kufeld,rc	1973
JWMAA	2---3	131	134	ceel	carrying capacity of range	young,va	1938
JWMAA	5---4	427	453	ceel	effect wint brwsng, montan	gaffney,ws	1941
JWMAA	7---3	328	332	ceel	livesto compet. summ range	pickford,gd; reid	1943
JWMAA	9---4	295	319	ceel	roosevlt elk, olym pen, wa	schwartz,je; mitc	1945
JWMAA	26--1	97	100	ceel	day feed hab roosvlt, cal	harper,ja	1962
JWMAA	27--3	412	414	ceel	captiv elk herd in missour	murphy,da	1963
JWMAA	30--2	349	363	ceel	range relat, livestc, mont	stevens,dr	1966
JWMAA	40--2	371	373	ceel	rumen-cannul, evalua rumen	staines,bw	1976
JWMAA	42--4	799	810	ceel	diet, activ, ldgpl pne hab	collins,wb; urne/	1978
JWMAA	43--2	568	570	ceel	rear, train calv, food hab	hobbs,nt; baker,d	1979
NAWTA	3----	421	427	ceel	deer, foods, feedng habits	denio,rm	1938
NAWTA	3----	747	755	ceel	food habits, virginia	baldwin,wp; patto	1938
NAWTA	26---	436	447	ceel	habitat, jackson hole, man	casebeer,rl	1961
NCANA	101--	505	516	ceel	alal rang reltns, rcky mts	stevens,dr	1974
SFORA	26--1	43	50	ceel	bark stripping phenomenon	mcintyre,eb	1972

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AMNAA	96--1	229	232	alal	clv learn eat by fllw moth	edwards,j	1976
ATRLA	21--5	101	116	alal	food habits, poland	morow,k	1976
CAFNA	83--4	339	343	alal	observ, feed on aquatc, bc	ritcey,rw; verbee	1969
CAFNA	90--1	11	16	alal	food hab, alask, rumen con	cushwa,ct: coady,	1976
CJZOA	54-10	1765	1770	alal	wintr foods, evalu methods	joyal,r	1976
ECOLA	34--1	102	110	alal	feedin habits, yellowst pa	mcmillan,jf	1953
JWMAA	21--1	53	57	alal	wint food hab, jackson hol	harry,gb	1957

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CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	24--1	52	60	alal	snows hare, foo & rng comp	dodds,dg	1960
JWMAA	24--1	162	170	alal	food habs, mvmt, pops, mon	knowlton,ff	1960
JWMAA	31--3	418	425	alal	odvi, comp wint rng nov sc	telfer,es	1967
JWMAA	34--3	559	564	alal	food habi, sw mont, cattle	dorn,rd	1970
JWMAA	37--3	279	287	alal	impnc nonbrows food, alask	leresche,re; davi	1973
NCANA	95---	1159	1164	alal	use of bark, quebec	desmeules,p	1968
NCANA	101--	195	215	alal	review food habits studies	peek,jm	1974
TLPBA	14--1	105	134	alal	diet optimizatn, genl herb	belovsky,ge	1978
WLMOA	48---	1	65	alal	habitat select, forest mgt	peek,jm; urich,d/	1976

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
ABSZA	30--4	1	44	rata	lichen stands, newfoundlan	ahti,t	1959
ATICA	31--2	125	132	rata	diet, peary carib nw terri	shank,cc; wilkin/	1978
ATYBA	55---	22	25	rata	birch consump, fin lapland	haukioja,e; heino	1974
CAFNA	74--1	3	7	rata	foods, wells gray park, bc	edwards,ry; ritce	1960
CAFNA	80--4	238	241	rata	sieve mesh size, rume anal	scotter,gw	1966
CAFNA	81--1	33	39	rata	winter diet, northn canada	scotter,gw	1967
IUCSB	16...	155	159	rata	grazing in northern sweden	eriksson,o	1970
JWMAA	28--4	809	814	rata	eval rumen food anal, newf	bergerud,at; russ	1964
JWMAA	36--3	913	923	rata	food habits, newfoundland	bergerud,at	1972
LCHNB	6....	165	167	rata	reindeer grazing in britai	gilbert,ol	1975
NAWTA	22---	485	501	rata	hist, food hab, rang requi	cringan,at	1957
NCANA	96--3	333	336	rata	daily consmptio of lichens	desmeules,p; heyl	1969
NPOAA	1973-	113	123	rata	studies of reindee, norway	hjeljord,o	1975
OIKSA	21--2	348	350	rata	food hab, hand-reared, new	bergerud,at; nola	1970
SZSLA	21---	109	115	rata	winter nutr, reind, norway	gaare,e	1968

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
BMAEA	516--	1	63	anam	rang use, food habs, alfal	cole,gf	1956

anam continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CAFGA	36--1	21	26	anam	food habits, of california	ferrel,cm; leach,	1950
CAFGA	38--3	285	293	anam	spec refer, food hab, cali	ferrel,cm; leach,	1952
CAFNA	91--3	282	285	anam	prairie fires, cactus use	stelfox,jg; vrien	1977
JOMAA	22--1	57	60	anam	winter forag habits, oklah	rouse,ch	1941
JRMGA	20--1	21	25	anam	dosh, food pref, wyo deser	severson,ke; may,	1967
JRMGA	32--5	365	368	anam	livest, foods, dese steppe	johnson,mk	1979
JWMAA	10--4	367	367	anam	foods, southeastern montan	couey,fm	1946
JWMAA	16--3	387	389	anam	food habits, measurements	mason,e	1952
JWMAA	26--3	327	328	anam	rumen contents, sieve mesh	dirschl,hj	1962
JWMAA	27--1	81	93	anam	food habits, saskatchewan	dirschl,hj	1963
JWMAA	32--2	399	401	anam	foods, kansas, stock sites	hlavachick,bd	1968
JWMAA	33--3	538	551	anam	winter food hab, rang, mon	bayless,sr	1969
JWMAA	34--3	570	582	anam	forag use, prod, water con	beale,dm; smith,a	1970
JWMAA	35--2	238	250	anam	food hab, range char, albe	mitchell,gj; smol	1971
JWMAA	40--3	469	478	anam	diets, forag avail, coloro	schwartz,cc; nagy	1976
NAWTA	12---	185	192	anam	range use in western texas	buechner,hk	1947
NAWTA	15---	627	644	anam	rang ecol, wichita mt, kan	buechner,hk	1950
UTSCB	29--1	3	6	anam	season forage use, wes uta	beale,dm; scotter	1968
WGFBA	12---	1	61	anam	food hab, abund, distribut	sundstrom,c; hep/	1973

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AMNAA	96--1	225	229	bibi	botan comp, diets, shortgr	peden,dg	1976
JAPEA	11--2	489	497	bibi	trphic ecol, shrtgras plai	peden,dg; van dy/	1974
JRMGA	27--4	323	325	bibi	doubl samp tech, diet comp	peden ag; hansen/	1974
JWMAA	42--3	581	590	bibi	diet, slv rvr herd, nw ter	reynolds,hw; han/	1978
OFBIA	27---	29	32	bibi	plains bison, north ontari	young,cm	1973

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CAFNA	81--1	23	29	ovca	food habs, ashnola hrd, bc	blood,da	1967
CGFPA	27...	1	21	ovca	food hab, literatur review	todd,jw	1972

ovca continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	13--4	417	419	ovca	od food relation, so n mex	halloran,af; kenn	1949
JWMAA	17--3	318	320	ovca	notes on food, sonoran zon	halloran,af; cran	1953
JWMAA	37--3	363	366	ovca	food hab, plant frag, fece	todd,jw; hansen,r	1973
JWMAA	39--1	108	111	ovca	food of, southern colorado	todd,jw	1975

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CWOPA	35---	1	19	obmo	rata, diets, canadi arctic	parker,gr	1978
JWMAA	40--1	151	162	obmo	rata, sum rang relns, nw t	wilkinson,pf; sh/	1976

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JOMAA	48--2	242	248	oram	food habits, mt goat, colo	hibbs,ld	1967
JWMAA	19--4	429	437	oram	food hab, rang use, montan	saunders,jk,jr	1955
JWMAA	37--3	353	362	oram	forage, habitat pref, alas	hjeljord,o	1973

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JOMAA	25--1	49	54	many	food req alaskan game mamm	palmer,lj	1944
JOMAA	57--1	167	172	herb	prob estim herb diets stom	westoby,m; rost,/	1976
JRMGA	22--1	51	52	herb	tech iden fecal plnt frags	williams,ob	1969
JRMGA	24--5	346	351	ungu	use of maj plant comms, bc	mclean,a; lord,t/	1971
JTBIA	60---	93	108		concep modl of diet select	ellis,je; wiens,/	1976
JWMAA	19--2	206	215	many	util wint brow, bi gam ran	mcculloch,cy,jr	1955
JWMAA	36--4	1068	1076	many	wint food, range use, mont	constan,kj	1972
JWMAA	41--1	76	80	many	foods of ungulates, colora	hansen,rm; clark,	1977
NAWTA	2----	276	287	many	utilizat of browse, kaibab	julander,o	1937
NAWTA	3----	421	427	many	elk & deer food, feed habs	denio,rm	1938
NAWTA	12---	223	227	many	range competition, alberta	cowan,im	1947
NAWTA	22---	152	159	herb	way to anal food hab, feca	adams,l	1957
PECTD	1---2	33	50	many	diets of larg herb mammals	dzieciolowski,r;/	1975
QRBIA	52--2	137	154		optimal foraging theory	pyke,gh; pulliam/	1977

OTHER PUBLICATIONS

Halls, L. K., and T. H. Ripley. 1961. Deer browse plants of southern states. U. S. Forest Service, Southern and Southeastern Forest Expt. Sta. 78 p.

Heintzleman, B. F. 1936. Reindeer grazing. The western range. 74th Cong., 2nd Session, Senate Doc. 199:581-598.

McCulloch, C. Y. 1973. Seasonal diets of mule and white-tailed deer. pp. 1-37 In: Deer nutrition in Arizona chaparral and desert habitats. Arizona Game and Fish Dept. Special Rep. #3. 68 pp.

UNIT 1.2: PREFERENCES

Wild ruminants select some forages more often than others. This can be determined by noting a higher frequency of occurrence in the rumen than is found on the range. A lower frequency of occurrence in the rumen than on the range indicates that the species is avoided. Preferences may also be noted by direct observation. Selective grazing on dandelion flowers by white-tailed deer is easily observed when they appear on a pasture or lawn in the Northeast.

How do the preferences exhibited by wild ruminants relate to the digestibility of the forage chosen? The illustration below provides some indication of a positive relationships between the preferences of white-tailed deer and the digestibilities of dormant woody browse. The following preference list of winter deer foods includes tree and shrub species chosen by deer with the preferred or best liked foods at the beginning, second choice foods next, those readily eaten third, and starvation or poor food fourth. This arrangement is based on thousands of observations in hundreds of wintering areas over many years in all parts of New York (Severinghaus 1974).

Preferred or best liked (1)

Cedar, white or arbor-vitae	Dogwood, alternate leaved
Yew	Dogwood, flowering
Apple	Sumac, staghorn
Sassafras	Maple, red
Maple, mountain	Witch hobble
Wintergreen	Basswood
Maple, striped	

Second choice (2)

Elderberry	Honeysuckle
Elder, red berried	Hemlock
Ash, mountain	Wild raisin
Cucumber tree	Blueberry, highbush
Cranberry, highbush	Dogwood, silky
Nannyberry	Dogwood, red osier
Arbutus	Dogwood, round-leaved
Honeysuckle, fly	Willow*

Readily eaten (3)

Greenbrier	Cherry, choke	Hazelnut
Ash, white	Cherry, wild black	Juneberry or shadbush
Maple, sugar	Witch hazel	Holly, mountain
Arrow wood, maple leaved	Spice bush	Holly or winterberry*
Oaks*	Elm	Ash, black
Grape, wild	Choke berry, black	Blueberry, low sweet
Birch, yellow	Arrow wood	Blueberry, sour top
Birch, black	Honeysuckle, bush	Blueberry, low bush
Chestnut	Walnut, black	Leatherwood
Hickory	Butternut	

Starvation or poor food (4)

Pine, scots**	Birch, gray
Pine, pitch**	Ironwood, or hop hornbeam
Beech	Blue beech, or muscle wood
Sweet fern	Meadowsweet
Aspen or poplar	Cedar, red**
Gooseberry and currant*	Juniper, pasture**
Buckthorn	Cherry, fire or pin
Raspberry and blackberry	Hawthorn
Steeplebush	Laurel, sheep
Laurel, mountain**	Dogwood, grey-steemed
Rhododendron**	Locust, black
Pine, white**	Huckleberry, black
Pine, red or Norway**	Tamarack
Balsam**	Alder
Birch, paper	Spruces

Footnotes

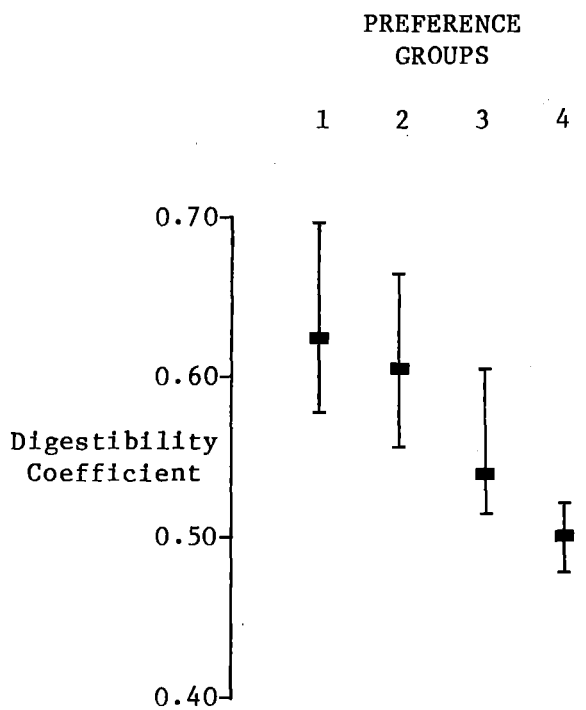
* There are considerable differences in the preferences for different species in this genus. They vary from rapidly eaten to very low.
**These species are often browsed heavily enough to appear to be second choice food in areas where food is inadequate.

Digestibility coefficients for 16 species in these four preference groups have been determined at Cornell's Wildlife Ecology Laboratory. The results are given in the table below.

Species	Average Digestible Energy Coefficient November - March	Range
PREFERRED:		
Apple, Basswood, Red maple, Sumac, White cedar	0.62	0.578 - 0.694
SECOND CHOICE:		
Hemlock, Willow, Red osier dogwood	0.60	0.556 - 0.662
READILY EATEN:		
Black birch, Hickory, Red oak, Sugar maple, White ash, Yellow birch	0.54	0.513 - 0.602
POOR FOOD:*		
Beech, Hawthorn	0.50	0.474 - 0.518

*Aspen and white pine are sometimes listed as poor food but are readily eaten in some areas. Calculated digestible energy coefficients are 0.60 and 0.62 respectively.

The relationship between preference groups and digestibility coefficients is illustrated below.



The average digestibility coefficient (heavy bar) decreases as the preference category goes down. The maximum and minimum digestibility coefficient within each category also goes down. Thus, the data indicate that digestibility coefficients are generally related to the preference group of the forage. Many of the plant species have not been included in these averages, so the numerical values are subject to change as more data are included.

The lists of serials with references containing information on forage preferences is over five pages long. These references, plus further information that may be gleaned from the eight pages of references to food habits in UNIT 1.1, may be used to compile a list of preference groups and digestibiliites. The derivation of an equation for this relationship is discussed in WORKSHEET 1.2a.

LITERATURE CITED

Severinghaus, C. W. 1974. Deer population - a wildlife roller coaster (Winter deer food preference). N.Y. Conservationist 28(5):36-38.

REFERENCES, UNIT 1.2

PREFERENCES

SERIALS

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AZATA	75---	1	39	od--	experimentl feedng of deer	nichol,aa	1938
FOSCA	24--1	57	64	od--	hare, model feed preferenc	silen,rr; dimock,	1978
JRMGA	11--1	18	21	od--	livest, tech study competn	julander,o	1958
JWMAA	7---2	233	235	od--	food pref, black hills dee	hill,r harris,d	1943
NAWTA	3----	256	260	od--	meth stud browse pref, dee	deen,jl	1938
NAWTA	34---	146	154	od--	effect qualit food, intake	nagy,jg; hakonso/	1969
NMWIA	13--6	4	5	od--	food preferenc; dept study	lamb,sh	1968
PAABA	553--	suppl	3	od--	dee notions, where to feed	tarr,ja	1953
TNWSD	1964.	1	16	od--	forag pref, capt deer, oak	watts,cr	1964
TNWSD	35---	16	26	od--	util, cutting, prescr burn	philleo,b; cavan/	1978

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
BLRPA	1---5	24	27	odvi	diff brows, fertiliz plots	mitchell,hl; hosl	1936
CJFRA	4---4	491	498	odvi	use brows in encl, n bruns	drolet,ca	1974
ECOLA	12--2	323	333	odvi	mount laurel, rhododendron	forbes,eb; bechde	1931
ECOLA	16--4	535	553	odvi	wint reln to forests, mass	hosley,nw; ziebar	1935
JANSA	36--6	1201	1202	odvi	forage preferences, texas	mccollum,j,; kot/	1973
JFUSA	51-11	815	819	odvi	seas brows woody plt, penn	bramble,wc; godda	1953
JFUSA	62--7	497	499	odvi	deer prefer jack pine	horton,kw	1964
JOMAA	18--1	77	80	odvi	notes on winte foods, mich	howard,wj	1937
JRMGA	21--3	164	166	odvi	mid-sum diet, welder refug	drawe,dl	1968
JRMGA	21--4	225	228	odvi	doca, forage ratings texa	drawe,dl; box,tw	1968
JRMGA	23--2	146	147	odvi	relative browsing, 16 spec	halls,lk; mccart/	1970
JRMGA	32--2	93	97	odvi	infl brush control on diet	quinton,da; hore/	1979

odvi continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	5---1	90	94	odvi	mgt sugges for wh-cedr typ	aldous,se	1941
JWMAA	5---3	314	342	odvi	w-t d foods, united states	atwood,el	1941
JWMAA	5---4	416	422	odvi	rela import wint brow, n y	petrides,ga	1941
JWMAA	10--1	47	54	odvi	palat ratings, black hills	hill,r	1946
JWMAA	12--1	109	110	odvi	select nutritious forages	swift,rw	1948
JWMAA	23--4	455	457	odvi	summer browse pref, adiron	webb,wl	1959
JWMAA	25--1	77	81	odvi	nutr, accep val, hardw sla	alkon,pu	1961
JWMAA	35--4	717	723	odvi	fora pref, tame deer, penn	healy,wm	1971
JWMAA	36--4	1344	1349	odvi	brws selec, nov sc, n brun	telfer,es	1972
JWMAA	39--2	330	336	odvi	food dur oak mast abun, sc	harlow,rf; whela/	1975
JWMAA	39--4	699	704	odvi	consum artif browse, penne	ullrey,de; youat/	1975
JWMAA	44--1	79	88	odvi	seas brws sel, s pine habi	blair,rm; brunett	1980
JWMAA	44--1	264	265	odvi	use of cottonwood monocult	wigley,tb; wesle/	1980
NAWTA	2----	438	445	odvi	food study, north carolina	stegeman,lc	1937
NAWTA	31---	205	212	odvi	use woody brows, nort east	stiteler,wm,jr; s	1966
NFGJA	16--2	145	157	odvi	herbaceous food preference	sauer,pr; tanck,/	1969
PCGFA	8----	83	85	odvi	deer vs livest, gulf coast	goodrum; reid,vh	1954
PCGFA	10---	53	58	odvi	nutri probl, sou pine type	lay,dw	1956
PCGFA	13---	54	61	odvi	acorns in diet of wildlife	goodrum,pd	1959
PPASA	51--2	105	108	odvi	select brow spe, strip min	brenner,fj; musau	1977
SWNAA	22--4	505	509	odvi	diets, rolling plains, tex	quinton,da: horej	1977
SWNAA	24--2	297	310	odvi	botan comp, nutr cont diet	everitt,jh; gonza	1979
TAXNA	26--2	203	207	odvi	evo impl sesqui terpene la	burnett,wc; jone/	1977
TNWSD	25---	35	39	odvi	tame dee, fora pref determ	healy,wm	1968
VIWIA	3---3	3	3	odvi	on refuge pref peach twigs	lewis,mg	1939
VIWIA	3--10	5	5	odvi	feeding habits	ward,hb	1940
WLSBA	7---1	21	24	odvi	dangers of ranking forage	harlow,rf	1979
XFNNA	111--	1	4	odvi	pref pne seedl near locust	davidson,wh	1970

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AMFOA	50--8	383	385	odhe	food - species, seas, pref	carhart,ah	1944
CAFGA	36--3	235	240	odhe	food habits, californ herd	ferrel,cm; leach,	1950
CAFGA	38--2	211	224	odhe	food hab, prod, cond, cali	lassen,rw ferre/	1952

odhe continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CNJNA	56--3	531	542	odhe	foo hab fll, win, spri, bc	willms,w; mclean/	1976
CNJNA	57--2	375	378	odhe	rel pref, 6 shrubs, bri co	tucker,r; mclean/	1977
ECMOA	15--2	109	139	odhe	eco relat, food, coast, bc	cowan,im	1945
JRMGA	3----	130	132	odhe	feedin deer brows sp, wint	smith,ad	1950
JRMGA	4---4	249	253	odhe	ceel, status of brws, oreg	mitchell,ge	1951
JRMGA	6---1	30	37	odhe	captv, cnsmp natv forg sum	smith,ad	1953
JRMGA	7---6	262	265	odhe	pref, wint forag, nor utah	smith,ad; hubbard	1954
JRMGA	29--6	486	489	odhe	palat, dg-fir, chem, spaci	tucker,re; majak/	1976
JRMGA	30--2	116	118	odhe	food, wld hors, doca, colo	hansen,rm; clark/	1977
JRMGA	30--3	206	209	odhe	fo hab, semi-des grass-shr	short.hl	1977
JRMGA	31--3	192	199	odhe	sprng for selec, sageb, bc	williams,w; mclea	1978
JRMGA	32--1	40	45	odhe	fora selec, wint ran, dosh	smith,ma malech/	1979
JRMGA	32--3	226	229	odhe	fora diver, diet sel, wint	carpenter,lh; wa/	1979
JWMAA	29--2	352	366	odhe	stom content anal, new mex	anderson,ae; sny/	1965
JWMAA	30--3	471	475	odhe	prefer, nativ for, doug-fi	crouch,gl	1966
JWMAA	38--1	32	41	odhe	plant char rel to feed pre	radwan,ma; crouch	1974
JWMAA	38--4	830	836	odhe	taste respons, brws extrc,	rice,pr; church,d	1974
NAWTA	4----	560	569	odhe	ceel relationships, oregon	cliff,ep	1939
NAWTA	15---	512	517	odhe	movable paddocks, for pref	smith,ad; gaufin,	1950
NAWTA	33---	181	192	odhe	basis for palatabil, calif	longhurst,wm· oh/	1968
SWNAA	13--2	159	166	odhe	food plants, habitat, okla	clark,tw	1968

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
ATRLA	15--6	89	110	ceel	foods, rumen content analy	dzieciolowski,r	1970
ATRLA	15-23	361	365	ceel	food selectivi towrd twigs	dzieciolowski,r	1970
CAFNA	93--3	282	287	ceel	summ, aut, wint diet, sask	hunt,hm	1979
DRGBA	5---3	1	44	ceel	food selection, rumen cont	jensen,pv	1968
ELPLB	15-11	285	305	ceel	winter food deter by track	dzieciolowski,r	1967
ELPLB	18-32	635	645	ceel	variat, food select, envir	dzieciolowski,r	1970
JOMAA	17--3	253	256	ceel	browsing, early wint, wash	skinner,mp	1936
JRMGA	26--2	106	113	ceel	foods eaten, litera review	kufeld,rc	1973
JWMAA	2---3	131	134	ceel	carrying capacity of range	young,va	1938
JWMAA	5---4	427	453	ceel	effect wint brwsng, montan	gaffney,ws	1941
JWMAA	24--1	15	21	ceel	on afognak island, alaska	troyer,wa	1960
JWMAA	42--4	799	810	ceel	diet, activ, ldgpl pne hab	collins,wb; urne/	1978

ceel continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
NAWTA	3----	747	755	ceel	food habits, virginia	baldwin,wp; patto	1938
XFPNA	112--	1	12	ceel	odhe, seasonal forage use	edgerton,pj; smit	1971

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
ATRLA	21--5	101	116	alal	food habits, poland	morow,k	1976
CAFNA	90--1	11	16	alal	food hab, alask, rumen con	cushwa,ct; coady,	1976
CJZOA	54-10	1765	1770	alal	wintr foods, evalu methods	joyal,r	1976
ECOLA	34--1	102	110	alal	feedin habits, yellowst pa	mcmillan,jf	1953
JWMAA	24--1	52	60	alal	snows hare, foo & rng comp	dodds,dg	1960
JWMAA	24--1	162	170	alal	food habs, mvmt, pops, mon	knowlton,ff	1960
JWMAA	37--3	279	287	alal	impnc nonbrows food, alask	leresche,re; davi	1973
NCANA	101--	195	215	alal	review food habits studies	peek,jm	1974
WLMOA	48---	1	65	alal	habitat select, forest mgt	peek,jm; urich,d/	1976

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CAFNA	81--1	33	39	rata	winter diet, northn canada	scotter,gw	1967
JWMAA	36--3	913	923	rata	food habits, newfoundland	bergerud,at	1972
NCANA	96---	317	331	rata	food hab, lichen preferenc	desmeules,p; heyl	1969

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JRMGA	20--1	21	25	anam	dosh, food pref, wyo deser	severson,ke; may,	1967
JRMGA	32--4	275	279	anam	comp fecal, rum, util meth	smith,ad; shandru	1979
JRMGA	32--5	365	368	anam	livest, foods, dese steppe	johnson,mk	1979
JWMAA	10--4	367	367	anam	foods, southeastern montan	couey,fm	1946
JWMAA	16--3	387	389	anam	food habits, measurements	mason,e	1952
JWMAA	27--1	81	93	anam	food habits, saskatchewan	dirschl,hj	1963
JWMAA	32--2	399	401	anam	foods, kansas, stock sites	hlavachick bd	1968
JWMAA	33--3	538	551	anam	winter food hab, rang, mon	bayless,sr	1969

anam continued on the next page

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	35--2	238	250	anam	food hab, range char, albe	mitchell,gj; smol	1971
JWMAA	40--3	469	478	anam	diets, forag avail, coloro	schwartz,cc; nagy	1976
NAWTA	15---	627	644	anam	rang ecol, wichita mt, kan	buechner,hk	1950
NAWTA	30---	136	141	anam	browse pref, sou west utah	smith,ad; beale,/	1965
UTSCB	29--1	3	6	anam	season forage use, wes uta	beale,dm; scotter	1968
WGFBA	12---	1	61	anam	food hab, abund, distribut	sundstrom,c; hep/	1973

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
AMNAA	96--1	225	229	bibi	botan comp, diets, shortgr	peden,dg	1976
JAPEA	11--2	489	497	bibi	trphic ecol, shrtgras plai	peden,dg: van dy/	1974
JWMAA	42--3	581	590	bibi	diet, slv rvr herd, nw ter	reynolds,hw; han/	1978

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JWMAA	39--1	108	111	ovca	food of, southern colorado	todd,jw	1975

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
				ovda			

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
CWOPA	35---	1	19	obmo	rata, diets, canadi arctic	parker,gr	1978
JWMAA	40--1	151	162	obmo	rata, sum rang relns, nw t	wilkinson,pf· sh/	1976

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JOMAA	48--2	242	248	oram	food habits, colorado	hibbs,ld	1967

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
JOMAA	25--1	49	54	many	food req alaskan game mamm	palmer,lj	1944
JWMAA	36--4	1068	1076	many	wint food, range use, mont	constan,kj	1972
JWMAA	41--1	76	80	many	foods of ungulates, colora	hansen,rm· clark,	1977
NAWTA	2----	276	287	many	utilizat of browse, kaibab	julander,o	1937
NAWTA	12---	223	227	many	range competition, alberta	cowan,im	1947
NAWTA	27---	150	164	rumi	rum cont anal, ran qual in	klein,dr	1962
XFIPA	101--	1	9		pap chrom, palat diff, sag	hanks,dl; brunne/	1971

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
ATRLA	14-18	247	262	caca	the food of the roe deer	siuda,a; zurowsk/	1969
JZOOA	185--	270	273	caca	dosh, comparison wint diet	henry,bam	1978
OIKSA	32--3	373	379	caca	dada, brws pressure, decid	bobek,b; perzano/	1979

CODEN	VO-NU	BEPA	ENPA	ANIM	KEY WORDS----------	AUTHORS----------	YEAR
ATRLA	12-25	367	376	bibo	food, for ecosyst, lit rev	borowski,s; kras/	1967
ATRLA	17-10	105	117	bibo	food pref, requir, eur bis	gebczyinska,z; kr	1972
ATRLA	17-13	151	169	bibo	food pref, snowfree seasns	borowski,s; koss/	1972

CHAPTER 12, WORKSHEET 1.2a

Estimations of digestibilities from preferences for the forage consumed

The general relationship between preference group and digestibilities illustrated in UNIT 1.2 may be expressed as a numerical relationship for use in simulating and computing animal-range relationships.

Suppose a simple linear regression was used to represent the relationship illustrated earlier. The x-y values are:

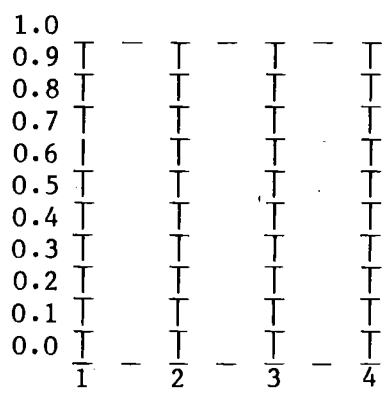
PRCT	AVDC
1	0.62
2	0.60
3	0.54
4	0.50

where PRCT = preference category and
AVDC = average digestibility coefficient.

The linear regression equation for these data is:

$$AVDC = 0.67 - 0.04\ (PRCT); \qquad R^2 = 0.97$$

Plot the points on the grid below and draw the regression line for comparison.



Please remember that these are sample data, and they should be considered subject to change. My suggestion is that the extensive list of references in this UNIT be used to compile a preference list and digestibilities determined from the extensive lists of references on nutritive characteristics given in CHAPTER 11. The best general relationship can then be determined for the species of interest in your area.