

APPENDIX TABLE 14 Daily Nutrient Requirements of Lactating and Pregnant Cows (from 1989 NRC on dairy cows)

Live Weight, kg	Energy				Total Crude Protein, g	Minerals		Vitamins	
	NE ℓ , Mcal	ME, Mcal	DE, Mcal	TDN, kg		Ca, g	P, g	A, 1000 IU	D, 1000 IU
Maintenance of mature lactating cows ^a									
400	7.16	12.01	13.80	3.13	318	16	11	30	12
450	7.82	13.12	15.08	3.42	341	18	13	34	14
500	8.46	14.20	16.32	3.70	364	20	14	38	15
550	9.09	15.25	17.53	3.97	386	22	16	42	17
600	9.70	16.28	18.71	4.24	406	24	17	46	18
650	10.30	17.29	19.86	4.51	428	26	19	49	20
700	10.89	18.28	21.00	4.76	449	28	20	53	21
750	11.47	19.25	22.12	5.02	468	30	21	57	23
800	12.03	20.20	23.21	5.26	486	32	23	61	24
Maintenance plus last 2 months of gestation of mature dry cows ^b									
400	9.30	15.26	18.23	4.15	890	26	16	30	12
450	10.16	16.66	19.91	4.53	973	30	18	34	14
500	11.00	18.04	21.55	4.90	1,053	33	20	38	15
550	11.81	19.37	23.14	5.27	1,131	36	22	42	17
600	12.61	20.68	24.71	5.62	1,207	39	24	46	18
650	13.39	21.96	26.23	5.97	1,281	43	26	49	20
700	14.15	23.21	27.73	6.31	1,355	46	28	53	21
750	14.90	24.44	29.21	6.65	1,427	49	30	57	23
800	15.64	25.66	30.65	6.98	1,497	53	32	61	24
Milk production—nutrients/kg of milk of different fat percentages (Fat %)									
3.0	0.64	1.07	1.23	0.280	78	2.73	1.68	—	—
3.5	0.69	1.15	1.33	0.301	84	2.97	1.83	—	—
4.0	0.74	1.24	1.42	0.322	90	3.21	1.98	—	—
4.5	0.78	1.32	1.51	0.343	96	3.45	2.13	—	—
5.0	0.83	1.40	1.61	0.364	101	3.69	2.28	—	—
5.5	0.88	1.48	1.70	0.385	107	3.93	2.43	—	—
Liveweight change during lactation—nutrients/kg of weight change ^c									
Weight loss	-4.92	-8.25	-9.55	-2.17	-320	—	—	—	—
Weight gain	5.12	8.55	9.96	2.26	320	—	—	—	—

Note: The following abbreviations were used: NE ℓ , net energy for lactation; ME, metabolizable energy; DE, digestible energy; TDN, total digestible nutrients.

^aTo allow for growth of young lactating cows, increase the maintenance allowances for all nutrients except vitamins A and D by 20% during the first lactation and 10% during the second lactation.

^bValues for calcium assume that the cow is in calcium balance at the beginning of the last 2 months of gestation. If the cow is not in balance, then the calcium requirement can be increased from 25 to 33%.

^cNo allowance is made for mobilized calcium and phosphorus associated with liveweight loss or with liveweight gain. The maximum daily nitrogen available from weight loss is assumed to be 30 g or 234 g of crude protein.

TABLE 14-12 Daily Nutrient Requirements (DM basis) of Small Breed (mature weight = 450 kg) Non-Bred Heifers

BW kg	ADG kg/d	DMI kg/d	TDN %	NE _m Mcal/d	NE _c Mcal/d	ME Mcal/d	RDP g/d	RUP g/d	RDP %	RUP %	CP ^a %	Ca g/d	P g/d
100	0.3	3.0	56.5	2.64	0.47	6.0	255	110	8.6	3.7	12.4	14	7
	0.4	3.0	58.6	2.64	0.64	6.4	270	143	9.0	4.7	13.7	18	8
	0.5	3.1	60.7	2.64	0.82	6.7	284	175	9.3	5.7	15.0	21	10
	0.6	3.1	62.9	2.64	1.00	7.0	298	207	9.6	6.7	16.3	25	11
	0.7	3.1	65.2	2.64	1.19	7.3	310	239	10.0	7.7	17.7	28	12
	0.8	3.1	67.7	2.64	1.37	7.6	323	270	10.4	8.7	19.0	31	13
150	0.3	4.0	56.5	3.57	0.63	8.2	346	95	8.6	2.4	11.0	15	8
	0.4	4.1	58.6	3.57	0.87	8.7	366	124	9.0	3.0	12.0	19	10
	0.5	4.1	60.7	3.57	1.11	9.1	385	152	9.3	3.7	12.9	22	11
	0.6	4.2	62.9	3.57	1.36	9.5	403	180	9.6	4.3	13.9	25	12
	0.7	4.2	65.3	3.57	1.61	9.9	421	207	10.0	4.9	14.9	28	13
	0.8	4.2	67.7	3.57	1.86	10.3	437	234	10.4	5.5	15.9	31	14
200	0.3	5.0	56.5	4.44	0.79	10.2	429	81	8.6	1.6	10.3	17	10
	0.4	5.1	58.6	4.44	1.08	10.7	454	106	9.0	2.1	11.1	20	11
	0.5	5.1	60.7	4.44	1.38	11.3	478	131	9.3	2.6	11.8	23	12
	0.6	5.2	62.9	4.44	1.68	11.8	500	156	9.6	3.0	12.6	26	13
	0.7	5.2	65.3	4.44	1.99	12.3	522	179	10.0	3.4	13.4	29	14
	0.8	5.2	67.7	4.44	2.31	12.8	543	202	10.4	3.9	14.2	32	15
250	0.3	5.9	56.5	5.24	0.93	12.0	508	69	8.6	1.2	9.8	19	11
	0.4	6.0	58.6	5.24	1.28	12.7	537	91	9.0	1.5	10.5	21	12
	0.5	6.1	60.7	5.24	1.63	13.4	565	113	9.3	1.9	11.1	24	13
	0.6	6.1	62.9	5.24	1.99	14.0	592	135	9.6	2.2	11.8	27	14
	0.7	6.2	65.3	5.24	2.36	14.6	617	155	10.0	2.5	12.5	30	15
	0.8	6.2	67.7	5.24	2.73	15.2	642	175	10.4	2.8	13.2	32	16
300	0.3	6.7	56.5	6.01	1.07	13.8	582	58	8.6	0.9	9.5	20	12
	0.4	6.9	58.6	6.01	1.46	14.6	616	79	9.0	1.1	10.1	23	13
	0.5	7.0	60.7	6.01	1.87	15.3	648	98	9.3	1.4	10.7	26	14
	0.6	7.0	62.9	6.01	2.28	16.0	678	117	9.6	1.7	11.3	28	15
	0.7	7.1	65.3	6.01	2.70	16.7	707	135	10.0	1.9	11.9	31	16
	0.8	7.1	67.7	6.01	3.13	17.4	736	151	10.4	2.1	12.5	34	17

^aCrude protein required only if ration is perfectly balanced for RDP and RUP.

TABLE 14-13 Daily Nutrient Requirements (DM basis) of Large Breed (mature weight = 650 kg) Non-Bred Heifers

BW kg	ADG kg/d	DMI kg/d	TDN %	NE _m Mcal/d	NE _c Mcal/d	ME Mcal/d	RDP g/d	RUP g/d	RDP %	RUP %	CP ^a %	Ca g/d	P g/d
150	0.5	4.1	58.4	3.57	0.84	8.6	364	167	8.9	4.1	13.0	23	11
	0.6	4.1	60.0	3.57	1.03	9.0	379	199	9.2	4.8	14.0	26	12
	0.7	4.2	61.7	3.57	1.22	9.3	393	230	9.4	5.5	14.9	30	13
	0.8	4.2	63.4	3.57	1.41	9.6	407	261	9.7	6.2	15.9	33	15
	0.9	4.2	65.3	3.57	1.61	9.9	421	292	10.0	6.9	16.9	37	16
	1.0	4.2	67.2	3.57	1.80	10.3	434	322	10.3	7.6	17.9	40	17
	1.1	4.2	69.2	3.57	2.00	10.6	446	352	10.6	8.3	18.9	43	18
200	0.5	5.1	58.4	4.44	1.05	10.7	452	148	8.9	2.9	11.9	24	12
	0.6	5.1	60.0	4.44	1.28	11.1	470	177	9.2	3.4	12.6	27	13
	0.7	5.2	61.7	4.44	1.51	11.5	488	205	9.4	4.0	13.4	30	14
	0.8	5.2	63.4	4.44	1.75	11.9	505	233	9.7	4.5	14.2	34	15
	0.9	5.2	65.3	4.44	1.99	12.3	522	260	10.0	5.0	15.0	37	17
	1.0	5.2	67.2	4.44	2.24	12.7	538	287	10.3	5.5	15.8	40	18
	1.1	5.2	69.2	4.44	2.49	13.1	554	314	10.6	6.0	16.6	43	19
250	0.5	6.0	58.4	5.24	1.24	12.6	534	131	8.9	2.2	11.1	25	13
	0.6	6.1	60.0	5.24	1.51	13.1	556	156	9.2	2.6	11.8	28	14
	0.7	6.1	61.7	5.24	1.79	13.6	577	182	9.4	3.0	12.4	31	15
	0.8	6.2	63.4	5.24	2.07	14.1	597	207	9.7	3.4	13.1	34	16
	0.9	6.2	65.3	5.24	2.36	14.6	617	232	10.0	3.7	13.7	37	17
	1.0	6.2	67.2	5.24	2.65	15.0	636	256	10.3	4.1	14.4	40	18
	1.1	6.2	69.2	5.24	2.94	15.5	655	280	10.6	4.5	15.1	43	19
300	0.5	6.9	58.4	6.01	1.42	14.5	612	114	8.9	1.7	10.6	27	14
	0.6	6.9	60.0	6.01	1.73	15.1	637	138	9.2	2.0	11.2	30	15
	0.7	7.0	61.7	6.01	2.05	15.6	661	161	9.4	2.3	11.7	33	16
	0.8	7.1	63.4	6.01	2.38	16.2	685	183	9.7	2.6	12.3	35	17
	0.9	7.1	65.3	6.01	2.70	16.7	707	205	10.0	2.9	12.9	38	18
	1.0	7.1	67.2	6.01	3.03	17.2	729	227	10.3	3.2	13.5	41	19
	1.1	7.1	69.2	6.01	3.37	17.7	751	248	10.6	3.5	14.1	44	20
350	0.5	7.7	58.4	6.75	1.59	16.2	687	99	8.9	1.3	10.2	28	15
	0.6	7.8	60.0	6.75	1.94	16.9	715	121	9.2	1.5	10.7	31	16
	0.7	7.9	61.7	6.75	2.30	17.6	742	141	9.4	1.8	11.2	34	17
	0.8	7.9	63.4	6.75	2.67	18.2	769	162	9.7	2.0	11.7	37	18
	0.9	8.0	65.3	6.75	3.03	18.8	794	181	10.0	2.3	12.3	40	19
	1.0	8.0	67.2	6.75	3.41	19.4	819	200	10.3	2.5	12.8	42	20
	1.1	8.0	69.2	6.75	3.78	19.9	843	218	10.6	2.7	13.3	45	21
400	0.5	8.5	58.4	7.46	1.76	18.0	760	86	8.9	1.0	9.9	30	16
	0.6	8.6	60.0	7.46	2.15	18.7	791	105	9.2	1.2	10.4	33	17
	0.7	8.7	61.7	7.46	2.55	19.4	821	124	9.4	1.4	10.9	35	18
	0.8	8.8	63.4	7.46	2.95	20.1	850	142	9.7	1.6	11.3	38	19
	0.9	8.8	65.3	7.46	3.35	20.7	878	159	10.0	1.8	11.8	41	20
	1.0	8.8	67.2	7.46	3.76	21.4	905	176	10.3	2.0	12.3	44	21
	1.1	8.8	69.2	7.46	4.18	22.0	931	192	10.6	2.2	12.8	46	22

^aCrude protein required only if ration is perfectly balanced for RDP and RUP.

TABLE 14-14 Daily Nutrient Requirements (DM basis) of Small Breed (mature weight = 450 kg) Bred Heifers

BW kg	ADG kg/d	DMI kg/d	TDN %	NE _m Mcal/d	NE _c Mcal/d	ME Mcal/d	RDP g/d	RUP g/d	RDP %	RUP %	CP ^a %	Ca g/d	P g/d
240 days pregnant (Conceptus weight of 39 kg and ADG of 0.4 kg/day)													
300	0.3 (0.7) ^b	7.7	56.5	5.42	0.96	15.7	663	291	8.6	3.8	12.4	36	19
	0.4 (0.8)	7.7	58.6	5.42	1.32	16.4	693	310	9.0	4.0	13.0	39	20
	0.5 (0.9)	7.7	60.8	5.42	1.68	17.0	721	329	9.3	4.2	13.5	41	21
	0.6 (1.0)	7.7	63.1	5.42	2.06	17.7	748	346	9.7	4.5	14.1	44	22
	0.7 (1.1)	7.7	65.5	5.42	2.44	18.3	774	364	10.0	4.7	14.7	47	23
	0.8 (1.2)	7.7	68.1	5.42	2.82	18.9	798	380	10.4	5.0	15.4	49	24
	0.9 (1.3)	7.6	70.9	5.42	3.21	19.4	822	395	10.8	5.2	16.1	52	24
350	0.3 (0.7)	8.6	56.2	6.18	1.10	17.5	739	282	8.6	3.3	11.9	38	20
	0.4 (0.8)	8.7	58.3	6.18	1.50	18.3	773	299	8.9	3.4	12.4	40	21
	0.5 (0.9)	8.7	60.5	6.18	1.92	19.0	805	315	9.3	3.6	12.9	43	22
	0.6 (1.0)	8.7	62.8	6.18	2.35	19.8	836	330	9.6	3.8	13.4	46	23
	0.7 (1.1)	8.7	65.3	6.18	2.78	20.4	865	345	10.0	4.0	14.0	48	24
	0.8 (1.2)	8.6	67.8	6.18	3.22	21.1	893	358	10.4	4.2	14.5	51	25
	0.9 (1.3)	8.5	70.6	6.18	3.66	21.8	921	371	10.8	4.3	15.1	53	25
400	0.3 (0.7)	9.5	56.0	6.91	1.23	19.2	813	275	8.6	2.9	11.5	40	21
	0.4 (0.8)	9.6	58.1	6.91	1.68	20.1	851	291	8.9	3.0	11.9	42	22
	0.5 (0.9)	9.6	60.3	6.91	2.15	21.0	887	305	9.2	3.2	12.4	45	23
	0.6 (1.0)	9.6	62.6	6.91	2.62	21.8	921	319	9.6	3.3	12.9	47	24
	0.7 (1.1)	9.6	65.0	6.91	3.11	22.5	953	331	9.9	3.5	13.4	50	25
	0.8 (1.2)	9.5	67.6	6.91	3.60	23.3	985	342	10.3	3.6	13.9	52	26
	0.9 (1.3)	9.4	70.3	6.91	4.09	24.0	1015	352	10.8	3.7	14.5	55	26
450	0.3 (0.7)	10.4	55.8	7.62	1.35	20.9	884	273	8.5	2.6	11.2	41	22
	0.4 (0.8)	10.5	57.9	7.62	1.85	21.9	926	288	8.9	2.8	11.6	44	23
	0.5 (0.9)	10.5	60.1	7.62	2.37	22.8	965	301	9.2	2.9	12.1	46	24
	0.6 (1.0)	10.5	62.4	7.62	2.89	23.7	1003	313	9.5	3.0	12.5	49	25
	0.7 (1.1)	10.5	64.8	7.62	3.42	24.5	1038	324	9.9	3.1	13.0	51	26
	0.8 (1.2)	10.4	67.4	7.62	3.96	25.4	1073	333	10.3	3.2	13.5	54	27
	0.9 (1.3)	10.3	70.1	7.62	4.51	26.1	1106	341	10.7	3.3	14.0	56	28

^aCrude protein required only if ration is perfectly balanced for RDP and RUP.

^bValues in parentheses are ADG (lbs/d).

TABLE 14-15 Daily Nutrient Requirements (DM basis) of Large Breed (mature weight = 650 kg) Bred Heifers

BW kg	ADG kg/d	DMI kg/d	TDN %	NEm Mcal/d	NE _c Mcal/d	ME Mcal/d	RDP g/d	RUP g/d	RDP %	RUP %	CP ^a %	Ca g/d	P g/d
240 days pregnant (Conceptus weight of 48 kg and ADG of 0.6 kg/day)													
450	0.5 (1.1) ^b	10.5	59.3	7.49	1.77	22.5	951	402	9.1	3.8	12.9	47	25
	0.6 (1.2)	10.5	61.1	7.49	2.16	23.2	981	418	9.3	4.0	13.3	50	25
	0.7 (1.3)	10.5	62.9	7.49	2.55	23.9	1010	433	9.6	4.1	13.7	53	26
	0.8 (1.4)	10.5	64.8	7.49	2.96	24.5	1038	448	9.9	4.3	14.2	55	27
	0.9 (1.5)	10.4	66.8	7.49	3.37	25.2	1066	462	10.2	4.4	14.7	58	28
	1.0 (1.6)	10.4	68.9	7.49	3.78	25.8	1092	475	10.5	4.6	15.1	61	29
	1.1 (1.7)	10.3	71.2	7.49	4.19	26.4	1118	488	10.9	4.8	15.6	63	30
500	0.5 (1.1)	11.3	59.0	8.17	1.93	24.2	1024	391	9.0	3.4	12.5	49	26
	0.6 (1.2)	11.4	60.8	8.17	2.36	25.0	1057	405	9.3	3.6	12.9	52	27
	0.7 (1.3)	11.4	62.6	8.17	2.79	25.7	1088	419	9.6	3.7	13.3	54	27
	0.8 (1.4)	11.3	64.5	8.17	3.23	26.4	1119	432	9.9	3.8	13.7	57	28
	0.9 (1.5)	11.3	66.5	8.17	3.67	27.2	1149	444	10.2	3.9	14.1	59	29
	1.0 (1.6)	11.2	68.6	8.17	4.13	27.8	1177	455	10.5	4.1	14.5	62	30
	1.1 (1.7)	11.1	70.8	8.17	4.58	28.5	1206	465	10.8	4.2	15.0	65	31
550	0.5 (1.1)	12.2	58.8	8.84	2.09	25.9	1094	382	9.0	3.1	12.1	51	27
	0.6 (1.2)	12.2	60.5	8.84	2.55	26.7	1130	395	9.3	3.2	12.5	53	28
	0.7 (1.3)	12.2	62.3	8.84	3.02	27.5	1164	407	9.5	3.3	12.9	56	29
	0.8 (1.4)	12.2	64.2	8.84	3.49	28.3	1197	418	9.8	3.4	13.3	58	29
	0.9 (1.5)	12.1	66.2	8.84	3.98	29.1	1229	428	10.1	3.5	13.7	61	30
	1.0 (1.6)	12.1	68.3	8.84	4.46	29.8	1260	437	10.4	3.6	14.1	64	31
	1.1 (1.7)	12.0	70.5	8.84	4.95	30.5	1291	445	10.8	3.7	14.5	66	32
600	0.5 (1.1)	13.0	58.6	9.50	2.24	27.5	1163	375	9.0	2.9	11.8	53	28
	0.6 (1.2)	13.0	60.3	9.50	2.74	28.4	1202	387	9.2	3.0	12.2	55	29
	0.7 (1.3)	13.0	62.1	9.50	3.24	29.3	1238	397	9.5	3.0	12.5	58	30
	0.8 (1.4)	13.0	64.0	9.50	3.75	30.1	1274	407	9.8	3.1	12.9	60	30
	0.9 (1.5)	13.0	66.0	9.50	4.27	30.9	1308	416	10.1	3.2	13.3	63	31
	1.0 (1.6)	12.9	68.0	9.50	4.79	31.7	1342	423	10.4	3.3	13.7	65	32
	1.1 (1.7)	12.8	70.2	9.50	5.32	32.5	1374	430	10.7	3.4	14.1	68	33
650	0.5 (1.1)	13.8	58.4	10.14	2.39	29.1	1231	371	8.9	2.7	11.6	54	29
	0.6 (1.2)	13.8	60.1	10.14	2.92	30.1	1272	382	9.2	2.8	12.0	57	30
	0.7 (1.3)	13.8	61.9	10.14	3.46	31.0	1311	392	9.5	2.8	12.3	59	31
	0.8 (1.4)	13.8	63.8	10.14	4.00	31.9	1349	400	9.8	2.9	12.7	62	31
	0.9 (1.5)	13.8	65.8	10.14	4.56	32.7	1385	408	10.1	3.0	13.0	64	32
	1.0 (1.6)	13.7	67.8	10.14	5.11	33.6	1421	414	10.4	3.0	13.4	67	33
	1.1 (1.7)	13.6	70.0	10.14	5.68	34.4	1456	418	10.7	3.1	13.8	69	34

^aCrude protein required only if ration is perfectly balanced for RDP and RUP.

^bValues in parentheses are ADG (lbs/d).

APPENDIX TABLE 17 Diet Nutrient Densities for Growing and Finishing Cattle

1,200 @ finishing (28% body fat—for feedlot steers and heifers) or maturity (replacement heifers).

Body Weight (lb)	TDN % DM	NE _m Mcal/lb	NE _g Mcal/lb	DMI lb/day	ADG lb/day	CP % DM	Ca % DM	P % DM
660	50	0.45	0.20	17.5	0.72	7.3%	0.22%	0.13%
	60	0.61	0.35	18.4	2.00	10.2%	0.36%	0.19%
	70	0.76	0.48	18.0	3.04	13.0%	0.49%	0.24%
	80	0.90	0.61	17.0	3.78	15.8%	0.61%	0.29%
	90	1.04	0.72	15.7	4.25	18.4%	0.72%	0.34%
720	50	0.45	0.20	18.6	0.72	7.1%	0.21%	0.13%
	60	0.61	0.35	19.7	2.00	9.7%	0.34%	0.18%
	70	0.76	0.48	19.2	3.04	12.2%	0.45%	0.23%
	80	0.90	0.61	18.2	3.78	14.6%	0.56%	0.27%
	90	1.04	0.72	16.8	4.25	17.0%	0.66%	0.32%
780	50	0.45	0.20	19.8	0.72	6.9%	0.20%	0.13%
	60	0.61	0.35	20.9	2.00	9.2%	0.32%	0.17%
	70	0.76	0.48	20.4	3.04	11.4%	0.42%	0.21%
	80	0.90	0.61	19.3	3.78	13.6%	0.52%	0.26%
	90	1.04	0.72	17.8	4.25	15.8%	0.61%	0.30%
840	50	0.45	0.20	20.9	0.72	6.8%	0.20%	0.13%
	60	0.61	0.35	22.1	2.00	8.8%	0.30%	0.16%
	70	0.76	0.48	21.6	3.04	10.8%	0.39%	0.20%
	80	0.90	0.61	20.4	3.78	12.8%	0.48%	0.24%
	90	1.04	0.72	18.8	4.25	14.7%	0.56%	0.28%
900	50	0.45	0.20	22.0	0.72	6.6%	0.19%	0.12%
	60	0.61	0.35	23.3	2.00	8.4%	0.28%	0.16%
	70	0.76	0.48	22.7	3.04	10.2%	0.37%	0.19%
	80	0.90	0.61	21.5	3.78	12.0%	0.44%	0.23%
	90	1.04	0.72	19.8	4.25	13.8%	0.52%	0.26%
960	50	0.45	0.20	23.1	0.72	6.5%	0.19%	0.12%
	60	0.61	0.35	24.4	2.00	8.1%	0.27%	0.15%
	70	0.76	0.48	23.9	3.04	9.7%	0.34%	0.19%
	80	0.90	0.61	22.5	3.78	11.3%	0.41%	0.22%
	90	1.04	0.72	20.8	4.25	13.0%	0.48%	0.25%

APPENDIX TABLE 18 Diet Nutrient Densities for Growing and Finishing Cattle

1,300 @ finishing (28% body fat—for feedlot steers and heifers) or maturity (replacement heifers).								
Body Weight (lb)	TDN % DM	NE _m Mcal/lb	NE _g Mcal/lb	DMI lb/day	ADG lb/day	CP % DM	Ca % DM	P % DM
715	50	0.45	0.20	18.5	0.76	7.3%	0.22%	0.13%
	60	0.61	0.35	19.6	2.11	10.2%	0.36%	0.19%
	70	0.76	0.48	19.1	3.21	13.0%	0.49%	0.24%
	80	0.90	0.61	18.1	3.99	15.7%	0.61%	0.29%
	90	1.04	0.72	16.7	4.48	18.3%	0.72%	0.34%
780	50	0.45	0.20	19.8	0.76	7.1%	0.21%	0.13%
	60	0.61	0.35	20.9	2.11	9.6%	0.34%	0.18%
	70	0.76	0.48	20.4	3.21	12.1%	0.45%	0.23%
	80	0.90	0.61	19.3	3.99	14.5%	0.56%	0.27%
	90	1.04	0.72	17.8	4.48	16.9%	0.66%	0.32%
845	50	0.45	0.20	21.0	0.76	6.9%	0.21%	0.13%
	60	0.61	0.35	22.2	2.11	9.1%	0.32%	0.17%
	70	0.76	0.48	21.7	3.21	11.4%	0.42%	0.22%
	80	0.90	0.61	20.5	3.99	13.6%	0.51%	0.26%
	90	1.04	0.72	18.9	4.48	15.7%	0.60%	0.30%
910	50	0.45	0.20	22.2	0.76	6.7%	0.20%	0.13%
	60	0.61	0.35	23.5	2.11	8.7%	0.30%	0.17%
	70	0.76	0.48	22.9	3.21	10.7%	0.39%	0.20%
	80	0.90	0.61	21.6	3.99	12.7%	0.48%	0.24%
	90	1.04	0.72	20.0	4.48	14.6%	0.56%	0.28%
975	50	0.45	0.20	23.4	0.76	6.6%	0.20%	0.13%
	60	0.61	0.35	24.7	2.11	8.3%	0.28%	0.16%
	70	0.76	0.48	24.1	3.21	10.2%	0.37%	0.19%
	80	0.90	0.61	22.8	3.99	11.9%	0.44%	0.23%
	90	1.04	0.72	21.0	4.48	13.7%	0.52%	0.26%
1,040	50	0.45	0.20	24.5	0.76	6.5%	0.19%	0.13%
	60	0.61	0.35	25.9	2.11	8.0%	0.27%	0.15%
	70	0.76	0.48	25.3	3.21	9.6%	0.34%	0.19%
	80	0.90	0.61	23.9	3.99	11.3%	0.41%	0.22%
	90	1.04	0.72	22.1	4.48	12.9%	0.48%	0.25%

APPENDIX TABLE 19 Diet Nutrient Densities for Growing and Finishing Cattle

1,400 @ finishing (28% body fat—for feedlot steers and heifers) or maturity (replacement heifers).								
Body Weight (lb)	TDN % DM	NE _m Mcal/lb	NE _g Mcal/lb	DMI lb/day	ADC lb/day	CP % DM	Ca % DM	P % DM
770	50	0.45	0.20	19.6	0.80	7.3%	0.22%	0.13%
	60	0.61	0.35	20.7	2.22	10.1%	0.36%	0.19%
	70	0.76	0.48	20.2	3.38	12.9%	0.49%	0.24%
	80	0.90	0.61	19.1	4.20	15.6%	0.61%	0.29%
	90	1.04	0.72	17.6	4.72	18.1%	0.72%	0.34%
840	50	0.45	0.20	20.9	0.80	7.1%	0.21%	0.13%
	60	0.61	0.35	22.1	2.22	9.6%	0.34%	0.18%
	70	0.76	0.48	21.6	3.38	12.1%	0.45%	0.23%
	80	0.90	0.61	20.4	4.20	14.5%	0.56%	0.27%
	90	1.04	0.72	18.8	4.72	16.8%	0.65%	0.32%
910	50	0.45	0.20	22.2	0.80	6.9%	.21%	0.13%
	60	0.61	0.35	23.5	2.22	9.1%	0.32%	0.17%
	70	0.76	0.48	22.9	3.38	11.3%	0.42%	0.22%
	80	0.90	0.61	21.6	4.20	13.5%	0.51%	0.26%
	90	1.04	0.72	20.0	4.72	15.6%	0.60%	0.30%
980	50	0.45	0.20	23.5	0.80	6.7%	0.20%	0.13%
	60	0.61	0.35	24.8	2.22	8.7%	0.30%	0.17%
	70	0.76	0.48	24.2	3.38	10.7%	0.39%	0.20%
	80	0.90	0.61	22.9	4.20	12.6%	0.47%	0.24%
	90	1.04	0.72	21.1	4.72	14.5%	0.56%	0.28%
1,050	50	0.45	0.20	24.7	0.80	6.6%	0.20%	0.13%
	60	0.61	0.35	26.1	2.22	8.3%	0.28%	0.16%
	70	0.76	0.48	25.5	3.38	10.1%	0.37%	0.20%
	80	0.90	0.61	24.1	4.20	11.9%	0.44%	0.23%
	90	1.04	0.72	22.2	4.72	13.6%	0.51%	0.26%
1,120	50	0.45	0.20	25.9	0.80	6.5%	0.19%	0.13%
	60	0.61	0.35	27.4	2.22	8.0%	0.27%	0.16%
	70	0.76	0.48	26.8	3.38	9.6%	0.34%	0.19%
	80	0.90	0.61	25.3	4.20	11.2%	0.41%	0.22%
	90	1.04	0.72	23.3	4.72	12.8%	0.48%	0.25%

APPENDIX TABLE 20 Diet Nutrient Density Requirements of Pregnant Replacement Heifers

	Months Since Conception								
	1	2	3	4	5	6	7	8	9
1,000 lb Mature Weight									
TDN, % DM	50.1	50.2	50.4	50.7	51.3	52.3	54.0	56.8	61.3
ME, mcal/lb	0.46	0.46	0.46	0.46	0.47	0.49	0.52	0.56	0.63
NE _m , mcal/lb	0.21	0.21	0.21	0.21	0.22	0.24	0.26	0.30	0.37
DMI, lb	16.7	17.2	17.7	18.2	18.7	19.4	20.0	20.7	21.3
Target ADG	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Shrunk Body Wt.	622	644	667	689	711	733	756	778	800
CP % DM	7.18	7.16	7.16	7.21	7.32	7.56	7.99	8.74	10.02
Ca % DM	0.22	0.22	0.22	0.21	0.21	0.20	0.32	0.31	0.31
P % DM	0.17	0.17	0.17	0.17	0.17	0.16	0.23	0.23	0.22
1,100 lb Mature Weight									
TDN, % DM	50.3	50.4	50.5	50.8	51.3	52.3	53.9	56.5	60.6
ME, mcal/lb	0.46	0.46	0.46	0.47	0.48	0.49	0.52	0.56	0.62
NE _m , mcal/lb	0.21	0.21	0.21	0.22	0.22	0.24	0.26	0.30	0.36
DMI, lb	18.0	18.5	19.0	19.5	20.1	20.8	21.5	22.3	22.9
Target ADG	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Shrunk Body Wt.	684	709	733	758	782	807	831	856	880
CP % DM	7.20	7.17	7.17	7.21	7.32	7.54	7.93	8.63	9.80
Ca % DM	0.23	0.22	0.22	0.22	0.21	0.21	0.32	0.31	0.30
P % DM	0.18	0.17	0.17	0.17	0.17	0.17	0.23	0.22	0.22
1,200 lb Mature Weight									
TDN, % DM	50.5	50.5	50.7	50.9	51.4	52.3	53.8	56.2	59.9
ME, mcal/lb	0.46	0.46	0.46	0.47	0.48	0.49	0.51	0.55	0.61
NE _m , mcal/lb	0.21	0.21	0.21	0.22	0.23	0.24	0.26	0.30	0.35
DMI, lb	19.3	19.8	20.3	20.9	21.5	22.2	23.0	23.7	24.4
Target ADG	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shrunk Body Wt.	747	773	800	827	853	880	907	933	960
CP % DM	7.21	7.19	7.18	7.22	7.31	7.52	7.89	8.53	9.62
Ca % DM	0.23	0.23	0.22	0.22	0.22	0.21	0.31	0.31	0.30
P % DM	0.18	0.18	0.18	0.17	0.17	0.17	0.23	0.22	0.22
1,300 lb Mature Weight									
TDN, % DM	50.6	50.7	50.8	51.0	51.5	52.4	53.7	56.0	59.5
ME, mcal/lb	0.46	0.46	0.47	0.47	0.48	0.49	0.51	0.55	0.60
NE _m , mcal/lb	0.21	0.21	0.22	0.22	0.23	0.24	0.26	0.29	0.34
DMI, lb	20.5	21.0	21.6	22.2	22.9	23.6	24.4	25.2	25.9
Target ADG	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Shrunk Body Wt.	809	838	867	896	924	953	982	1011	1040
CP % DM	7.23	7.20	7.20	7.22	7.31	7.50	7.85	8.45	9.46
Ca % DM	0.24	0.23	0.23	0.22	0.22	0.22	0.31	0.30	0.30
P % DM	0.18	0.18	0.18	0.18	0.18	0.17	0.23	0.22	0.22
1,400 lb Mature Weight									
TDN, % DM	50.7	50.8	50.9	51.2	51.6	52.4	53.7	55.8	59.0
ME, mcal/lb	0.47	0.47	0.47	0.47	0.48	0.49	0.51	0.55	0.60
NE _m , mcal/lb	0.22	0.22	0.22	0.22	0.23	0.24	0.26	0.29	0.34
DMI, lb	21.7	22.3	22.9	23.5	24.2	24.9	25.8	26.6	27.4
Target ADG	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Shrunk Body Wt.	871	902	933	964	996	1027	1058	1089	1120
CP % DM	7.25	7.22	7.21	7.23	7.31	7.48	7.81	8.38	9.33
Ca % DM	0.24	0.24	0.23	0.23	0.22	0.22	0.31	0.30	0.30
P % DM	0.18	0.18	0.18	0.18	0.18	0.18	0.23	0.22	0.22

APPENDIX TABLE 21 Diet Nutrient Density Requirements of Beef Cows

	Months since Calving											
	1	2	3	4	5	6	7	8	9	10	11	12
1,000 lb Mature Weight, 10 lb Peak Milk												
TDN, % DM	55.8	56.6	54.3	53.4	52.5	51.8	44.9	45.7	47.0	49.1	52.0	55.7
ME, mcal/lb	0.93	0.95	0.91	0.89	0.88	0.86	0.75	0.76	0.79	0.82	0.87	0.93
NE _m , mcal/lb	0.55	0.56	0.52	0.51	0.49	0.48	0.37	0.38	0.40	0.44	0.49	0.54
DM, lb	21.6	22.1	23.0	22.5	22.1	21.7	21.1	21.0	20.9	20.8	21.0	21.4
Milk, lb/day	8.3	10.0	9.0	7.2	5.4	3.9	0.0	0.0	0.0	0.0	0.0	0.0
CP %DM	8.70	9.10	8.41	7.97	7.51	7.14	5.98	6.16	6.47	6.95	7.66	8.67
Ca % DM	0.24	0.25	0.23	0.22	0.20	0.19	0.15	0.15	0.15	0.24	0.24	0.24
P % DM	0.17	0.17	0.16	0.15	0.14	0.14	0.11	0.11	0.11	0.15	0.15	0.15
1,000 lb Mature Weight, 20 lb Peak Milk												
TDN, % DM	59.6	60.9	58.6	57.0	55.4	54.0	44.9	45.7	47.0	49.1	52.0	55.7
ME, mcal/lb	1.00	1.02	0.98	0.95	0.92	0.90	0.75	0.76	0.79	0.82	0.87	0.93
NE _m , mcal/lb	0.60	0.62	0.59	0.56	0.54	0.52	0.37	0.38	0.40	0.44	0.49	0.54
DM, lb	24.0	25.0	25.4	24.4	23.5	22.7	21.1	21.0	20.9	20.8	21.0	21.4
Milk, lb/day	16.7	20.0	18.0	14.4	10.8	7.8	0.0	0.0	0.0	0.0	0.0	0.0
CP %DM	10.54	11.18	10.38	9.65	8.86	8.17	5.98	6.16	6.47	6.95	7.66	8.67
Ca % DM	0.30	0.32	0.30	0.27	0.24	0.22	0.15	0.15	0.15	0.24	0.24	0.24
P % DM	0.20	0.21	0.19	0.18	0.17	0.15	0.11	0.11	0.11	0.15	0.15	0.15
1,000 lb Mature Weight, 30 lb Peak Milk												
TDN, % DM	62.8	64.5	62.1	60.1	57.9	55.9	44.9	45.7	47.0	49.1	52.0	55.7
ME, mcal/lb	1.05	1.08	1.04	1.00	0.97	0.93	0.75	0.76	0.79	0.82	0.87	0.93
NE _m , mcal/lb	0.65	0.68	0.64	0.61	0.58	0.55	0.37	0.38	0.40	0.44	0.49	0.54
DM, lb	26.4	27.8	27.8	26.4	24.9	23.7	21.1	21.0	20.9	20.8	21.0	21.4
Milk, lb/day	25.0	30.0	27.0	21.6	16.2	11.7	0.0	0.0	0.0	0.0	0.0	0.0
CP %DM	12.06	12.86	12.00	11.07	10.04	9.09	5.98	6.16	6.47	6.95	7.66	8.67
Ca % DM	0.35	0.38	0.35	0.32	0.28	0.25	0.15	0.15	0.15	0.24	0.24	0.24
P % DM	0.22	0.24	0.22	0.21	0.19	0.17	0.11	0.11	0.11	0.15	0.15	0.15

APPENDIX TABLE 22 Diet Nutrient Density Requirements of Beef Cows

	Months since Calving											
	1	2	3	4	5	6	7	8	9	10	11	12
1,200 lb Mature Weight, 10 lb Peak Milk												
TDN, % DM	55.3	56.0	53.7	52.9	52.1	51.5	44.9	45.8	47.1	49.3	52.3	56.2
ME, mcal/lb	0.92	0.94	0.90	0.88	0.87	0.86	0.75	0.76	0.79	0.82	0.87	0.94
NE _m , mcal/lb	0.54	0.55	0.51	0.50	0.49	0.48	0.37	0.38	0.41	0.44	0.49	0.55
DM, lb	24.4	24.9	26.0	25.6	25.1	24.8	24.2	24.1	24.0	23.9	24.1	24.6
Milk, lb/day	8.3	10.0	9.0	7.2	5.4	3.9	0.0	0.0	0.0	0.0	0.0	0.0
CP % DM	8.43	8.79	8.13	7.73	7.33	7.00	5.99	6.18	6.50	7.00	7.73	8.78
Ca % DM	0.24	0.25	0.23	0.21	0.20	0.19	0.15	0.15	0.15	0.26	0.25	0.25
P % DM	0.17	0.17	0.16	0.15	0.14	0.14	0.12	0.12	0.12	0.16	0.16	0.16
1,200 lb Mature Weight, 20 lb Peak Milk												
TDN, % DM	58.7	59.9	57.6	56.2	54.7	53.4	44.9	45.8	47.1	49.3	52.3	56.2
ME, mcal/lb	0.98	1.00	0.96	0.94	0.91	0.89	0.75	0.76	0.79	0.82	0.87	0.94
NE _m , mcal/lb	0.59	0.61	0.57	0.55	0.53	0.51	0.37	0.38	0.41	0.44	0.49	0.55
DM, lb	26.8	27.8	28.4	27.4	26.5	25.7	24.2	24.1	24.0	23.9	24.1	24.6
Milk, lb/day	16.7	20.0	18.0	14.4	10.8	7.8	0.0	0.0	0.0	0.0	0.0	0.0
CP % DM	10.10	10.69	9.92	9.25	8.54	7.92	5.99	6.18	6.50	7.00	7.73	8.78
Ca % DM	0.29	0.31	0.29	0.26	0.24	0.22	0.15	0.15	0.15	0.26	0.25	0.25
P % DM	0.19	0.21	0.19	0.18	0.17	0.15	0.12	0.12	0.12	0.16	0.16	0.16
1,200 lb Mature Weight, 30 lb Peak Milk												
TDN, % DM	61.6	63.2	60.8	59.0	57.0	55.2	44.9	45.8	47.1	49.3	52.3	56.2
ME, mcal/lb	1.03	1.06	1.02	0.99	0.95	0.92	0.75	0.76	0.79	0.82	0.87	0.94
NE _m , mcal/lb	0.64	0.66	0.62	0.59	0.56	0.54	0.37	0.38	0.41	0.44	0.49	0.55
DM, lb	29.2	30.6	30.8	29.4	27.9	26.7	24.2	24.1	24.0	23.9	24.1	24.6
Milk, lb/day	25.0	30.0	27.0	21.6	16.2	11.7	0.0	0.0	0.0	0.0	0.0	0.0
CP % DM	11.51	12.25	11.41	10.55	9.61	8.75	5.99	6.18	6.50	7.00	7.73	8.78
Ca % DM	0.34	0.36	0.34	0.31	0.27	0.25	0.15	0.15	0.15	0.26	0.25	0.25
P % DM	0.22	0.23	0.22	0.20	0.18	0.17	0.12	0.12	0.12	0.16	0.16	0.16

APPENDIX TABLE 23 Diet Nutrient Density Requirements of Beef Cows

	Months since Calving											
	1	2	3	4	5	6	7	8	9	10	11	12
1,400 lb Mature Weight, 10 lb Peak Milk												
TDN, % DM	54.9	55.5	53.3	52.5	51.8	51.2	45.0	45.8	47.3	49.5	52.6	56.6
ME, mcal/lb	0.92	0.93	0.89	0.88	0.86	0.86	0.75	0.77	0.79	0.83	0.88	0.95
NE _m , mcal/lb	0.53	0.54	0.51	0.49	0.48	0.47	0.37	0.39	0.41	0.44	0.49	0.56
DM, lb	27.1	27.6	28.9	28.5	28.0	27.7	27.2	27.0	26.9	26.8	27.0	27.6
Milk, lb/day	8.3	10.0	9.0	7.2	5.4	3.9	0.0	0.0	0.0	0.0	0.0	0.0
CP %DM	8.23	8.56	7.91	7.55	7.19	6.90	6.00	6.20	6.53	7.04	7.80	8.88
Ca % DM	0.23	0.25	0.23	0.21	0.20	0.19	0.16	0.16	0.16	0.27	0.26	0.26
P % DM	0.17	0.17	0.16	0.15	0.15	0.14	0.12	0.12	0.12	0.17	0.17	0.16
1,400 lb Mature Weight, 20 lb Peak Milk												
TDN, % DM	58.0	59.1	56.8	55.5	54.1	53.0	45.0	45.8	47.3	49.5	52.6	56.6
ME, mcal/lb	0.97	0.99	0.95	0.93	0.90	0.89	0.75	0.77	0.79	0.83	0.88	0.95
NE _m , mcal/lb	0.58	0.60	0.56	0.54	0.52	0.50	0.37	0.39	0.41	0.44	0.49	0.56
DM, lb	29.5	30.5	31.3	30.3	29.4	28.6	27.2	27.0	26.9	26.8	27.0	27.6
Milk, lb/day	16.7	20.0	18.0	14.4	10.8	7.8	0.0	0.0	0.0	0.0	0.0	0.0
CP %DM	9.76	10.31	9.56	8.94	8.29	7.73	6.00	6.20	6.53	7.04	7.80	8.88
Ca % DM	0.28	0.30	0.28	0.26	0.24	0.22	0.16	0.16	0.16	0.27	0.26	0.26
P % DM	0.19	0.20	0.19	0.18	0.17	0.16	0.12	0.12	0.12	0.17	0.17	0.16
1,400 lb Mature Weight, 30 lb Peak Milk												
TDN, % DM	60.7	62.2	59.8	58.1	56.2	54.7	45.0	45.8	47.3	49.5	52.6	56.6
ME, mcal/lb	1.01	1.04	1.00	0.97	0.94	0.91	0.75	0.77	0.79	0.83	0.88	0.95
NE _m , mcal/lb	0.62	0.64	0.61	0.58	0.55	0.53	0.37	0.39	0.41	0.44	0.49	0.56
DM, lb	31.9	33.3	33.7	32.3	30.8	29.6	27.2	27.0	26.9	26.8	27.0	27.6
Milk, lb/day	25.0	30.0	27.0	21.6	16.2	11.7	0.0	0.0	0.0	0.0	0.0	0.0
CP %DM	11.07	11.77	10.95	10.15	9.27	8.49	6.00	6.20	6.53	7.04	7.80	8.88
Ca % DM	0.33	0.35	0.32	0.30	0.27	0.24	0.16	0.16	0.16	0.27	0.26	0.26
P % DM	0.22	0.23	0.21	0.20	0.18	0.17	0.12	0.12	0.12	0.17	0.17	0.16

APPENDIX TABLE 18 Daily Nutrient Requirements of Sheep (100% dry matter basis) (from 1985 NRC on sheep)

Body Weight		Dry Matter ^e				Nutrients per Animal													
		Gain or Loss		Per Animal		% Live		Energy			Total Protein, g	DP ^c , g	Grams DP per Mcal DE	Ca, g	P, g	Carotene, mg	Vitamin A, IU	Vitamin D, IU	
		g	lb	kg	lb	kg	Wt	TDN, kg	DE ^b , Mcal	ME, Mcal									
kg	lb	g	lb	kg	lb	kg	Wt	TDN, kg	DE ^b , Mcal	ME, Mcal	Total Protein, g	DP ^c , g	Grams DP per Mcal DE	Ca, g	P, g	Carotene, mg	Vitamin A, IU	Vitamin D, IU	
Ewes^d																			
Maintenance																			
50	110	10	0.02	1.0	2.2	2.0	0.55	2.42	1.98	48	89	20	3.0	2.8	1.9	1275	278		
60	132	10	0.02	1.1	2.4	1.8	0.61	2.68	2.20	53	98	20	3.1	2.9	2.2	1530	333		
70	154	10	0.02	1.2	2.6	1.7	0.66	2.90	2.38	58	107	20	3.2	3.0	2.6	1785	388		
80	176	10	0.02	1.3	2.9	1.6	0.72	3.17	2.60	63	116	20	3.3	3.1	3.0	2040	444		
Nonlactating and first 15 weeks of gestation																			
50	110	30	0.07	1.1	2.4	2.2	0.60	2.64	2.16	54	99	20	3.0	2.8	1.9	1275	278		
60	132	30	0.07	1.3	2.9	2.1	0.72	3.17	2.60	64	117	20	3.1	2.9	2.2	1530	333		
70	154	30	0.07	1.4	3.1	2.0	0.77	3.39	2.78	69	126	20	3.2	3.0	2.6	1785	388		
80	176	30	0.07	1.5	3.3	1.9	0.82	3.61	2.96	74	135	20	3.3	3.1	3.0	2040	444		
Last 6 weeks of gestation or last 8 weeks of lactation suckling singles^e																			
50	110	175(+45)	0.39	1.7	3.7	3.3	0.99	4.36	3.58	88	158	20	4.1	3.9	6.2	4250	278		
60	132	180(+45)	0.40	1.9	4.2	3.2	1.10	4.84	3.97	99	177	20	4.4	4.1	7.5	5100	333		
70	154	185(+45)	0.41	2.1	4.6	3.0	1.22	5.37	4.40	109	195	20	4.5	4.3	8.8	5950	388		
80	176	190(+45)	0.42	2.2	4.8	2.8	1.28	5.63	4.62	114	205	20	4.8	4.5	10.0	6800	444		
First 8 weeks of lactation suckling singles or last 8 weeks of lactation suckling twins^f																			
50	110	-25(+80)	-0.06	2.1	4.6	4.2	1.36	5.98	4.90	130	218	22	10.9	7.8	6.2	4250	278		
60	132	-25(+80)	-0.06	2.3	5.1	3.9	1.50	6.60	5.41	143	239	22	11.5	8.2	7.5	5100	333		
70	154	-25(+80)	-0.06	2.5	5.5	3.6	1.63	7.17	5.88	155	260	22	12.0	8.6	8.8	5950	388		
80	176	-25(+80)	-0.06	2.6	5.7	3.2	1.69	7.44	6.10	161	270	22	12.6	9.0	10.0	6800	444		
First 8 weeks of lactation suckling twins																			
50	110	-60	-0.13	2.4	5.3	4.8	1.56	6.86	5.63	173	276	25	12.5	8.9	6.2	4250	278		
60	132	-60	-0.13	2.6	5.7	4.3	1.69	7.44	6.10	187	299	25	13.0	9.4	7.5	5100	333		
70	154	-60	-0.13	2.8	6.2	4.0	1.82	8.01	6.57	202	322	25	13.4	9.5	8.8	5950	388		
80	176	-60	-0.13	3.0	6.6	3.7	1.95	8.58	7.04	216	345	25	14.4	10.2	10.0	6800	444		
Replacement lambs and yearlings^g																			
30	66	180	0.40	1.3	2.9	4.3	0.81	3.56	2.92	75	130	21	5.9	3.3	1.9	1275	166		
40	88	120	0.26	1.4	3.1	3.5	0.82	3.61	2.96	74	133	20	6.1	3.4	2.5	1700	222		
50	110	80	0.18	1.5	3.3	3.0	0.83	3.65	2.99	73	133	20	6.3	3.5	3.1	2125	278		
60	132	40	0.09	1.5	3.3	2.5	0.82	3.61	2.96	72	133	20	6.5	3.6	3.8	2550	333		

Body Weight	Dry Matter ^a				Nutrients per Animal												
	Gain or Loss		Per Animal		%		Energy			Total Protein, g	DE ^c , g	Grams DP per Mcal DE	Ca, g	P, g	Carotene, mg	Vitamin A, IU	Vitamin D, IU
	kg	lb	g	lb	kg	lb	Live Wt	TDN, kg	DE, Mcal								
Rams																	
Replacement lambs and yearlings ^e																	
40	88	250	0.55	1.8	4.0	4.5	1.17	5.15	4.22	184	108	21	6.3	3.5	2.5	1700	222
60	132	200	0.44	2.3	5.1	3.8	1.38	6.07	4.98	219	122	20	7.2	4.0	3.8	2550	333
80	176	150	0.33	2.8	6.2	3.5	1.54	6.78	5.56	249	134	20	7.9	4.4	5.0	3400	444
100	220	100	0.22	2.8	6.2	2.8	1.54	6.78	5.56	249	134	20	8.3	4.6	6.2	4250	555
120	265	50	0.11	2.6	5.7	2.2	1.43	6.29	5.16	231	125	20	8.5	4.7	7.5	5100	666
Lambs																	
Finishing ^h																	
30	66	200	0.44	1.3	2.9	4.3	0.83	3.65	2.99	143	87	24	4.8	3.0	1.1	765	166
35	77	220	0.48	1.4	3.1	4.0	0.94	4.14	3.39	154	94	23	4.8	3.0	1.3	892	194
40	88	250	0.55	1.6	3.5	4.0	1.12	4.93	4.04	176	107	22	5.0	3.1	1.5	1020	222
45	99	250	0.55	1.7	3.7	3.8	1.19	5.24	4.30	187	114	22	5.0	3.1	1.7	1148	250
50	110	220	0.48	1.8	4.0	3.6	1.26	5.54	4.54	198	121	22	5.0	3.1	1.9	1275	278
55	121	200	0.44	1.9	4.2	3.5	1.33	5.85	4.80	209	127	22	5.0	3.1	2.1	1402	305
Early-weanedⁱ																	
10	22	250	0.55	0.6	1.3	6.0	0.44	1.94	1.59	96	69	36	2.4	1.6	1.2	850	67
20	44	275	0.60	1.0	2.2	5.0	0.73	3.21	2.63	160	115	36	3.6	2.4	2.5	1700	133
30	66	300	0.66	1.4	3.1	4.7	1.02	4.49	3.68	196	133	30	5.0	3.3	3.8	2550	200

^aTo convert dry matter to an as-fed basis, divide dry matter by percentage of dry matter.

^b1 kg TDN = 4.4 Mcal DE (digestible energy), DE may be converted to ME (metabolizable energy) by multiplying by 82%.

^cDP = digestible protein.

^dValues are for ewes in moderate condition, not excessively fat or thin. Fat ewes should be fed at the next higher weight. Once maintenance weight is established, such weight would follow through all production phases.

^eValues in parentheses are for ewes suckling singles last 8 weeks of lactation.

^fValues in parentheses are for ewes suckling twins last 8 weeks of lactation.

^gRequirements for replacement lambs (ewe and ram) start when the lambs are weaned.

^hMaximum gains expected. If lambs are held for later market, they should be fed as replacement ewe lambs are fed. Lambs capable of gaining faster than indicated should be fed at a higher level. Lambs finish at the maximum rate if they are self-fed.

ⁱA 40-kg early-weaned lamb should be fed the same as a finishing lamb of the same weight.

APPENDIX TABLE 19 Nutrient Content of Diets for Sheep (nutrient concentration in diet dry matter) (from 1985 NRC on sheep)

Body Weight		Daily Gain or Loss		Daily Dry Matter ^a		Nutrients per Animal										
		g	lb	Per Animal	% Live Wt	TDN, kg	DE, ^b Mcal/kg	ME, Mcal/kg	Total Protein, %	DP, ^c %	Ca, %	P, %	Carotene, mg/kg	Vita-min A, IU/kg	Vita-min D, IU/kg	
kg	lb			kg	lb											
Ewes^d																
Maintenance																
50	110	10	0.02	1.0	2.2	2.0	2.4	2.0	8.9	4.8	0.30	0.28	1.9	1275	278	
60	132	10	0.02	1.1	2.4	1.8	2.4	2.0	8.9	4.8	0.28	0.26	2.0	1391	303	
70	154	10	0.02	1.2	2.6	1.7	2.4	2.0	8.9	4.8	0.27	0.25	2.2	1488	323	
80	176	10	0.02	1.3	2.9	1.6	2.4	2.0	8.9	4.8	0.25	0.24	2.3	1569	342	
Nonlactating and first 15 weeks of gestation																
50	110	30	0.07	1.1	2.4	2.2	2.4	2.0	9.0	4.9	0.27	0.25	1.7	1159	253	
60	132	30	0.07	1.3	2.9	2.1	2.4	2.0	9.0	4.9	0.24	0.22	1.7	1177	256	
70	154	30	0.07	1.4	3.1	2.0	2.4	2.0	9.0	4.9	0.23	0.21	1.9	1275	277	
80	176	30	0.07	1.5	3.3	1.9	2.4	2.0	9.0	4.9	0.22	0.21	2.0	1369	296	
Last 6 weeks of gestation or last 8 weeks of lactation suckling singles^e																
50	110	175(+45)	0.39	1.7	3.7	3.3	2.6	2.1	9.3	5.2	0.24	0.23	3.6	2500	164	
60	132	180(+45)	0.40	1.9	4.2	3.2	2.6	2.1	9.3	5.2	0.23	0.22	3.9	2684	175	
70	154	185(+45)	0.41	2.1	4.6	3.0	2.6	2.1	9.3	5.2	0.21	0.20	4.2	2833	185	
80	176	190(+45)	0.42	2.2	4.8	2.8	2.6	2.1	9.3	5.2	0.21	0.20	4.5	3091	202	
First 8 weeks of lactation suckling singles or last 8 weeks of lactation suckling twins^f																
50	110	-25(+80)	-0.06	2.1	4.6	4.2	2.9	2.4	10.4	6.2	0.52	0.37	3.0	2024	132	
60	132	-25(+80)	-0.06	2.3	5.1	3.9	2.9	2.4	10.4	6.2	0.50	0.36	3.3	2217	145	
70	154	-25(+80)	-0.06	2.5	5.5	3.6	2.9	2.4	10.4	6.2	0.48	0.34	3.5	2380	155	
80	176	-25(+80)	-0.06	2.6	5.7	3.2	2.9	2.4	10.4	6.2	0.48	0.34	3.8	2615	171	
First 8 weeks of lactation suckling twins																
50	110	-60	-0.13	2.4	5.3	4.8	2.9	2.4	11.5	7.2	0.52	0.37	2.6	1771	116	
60	132	-60	-0.13	2.6	5.7	4.3	2.9	2.4	11.5	7.2	0.50	0.36	2.9	1962	128	
70	154	-60	-0.13	2.8	6.2	4.0	2.9	2.4	11.5	7.2	0.48	0.34	3.1	2125	139	
80	176	-60	-0.13	3.0	6.6	3.7	2.9	2.4	11.5	7.2	0.48	0.34	3.3	2267	148	
Replacement lambs and yearlings^g																
30	66	180	0.40	1.3	2.9	4.3	2.7	2.2	10.0	5.8	0.45	0.25	1.5	981	128	
40	88	120	0.26	1.4	3.1	3.5	2.6	2.1	9.5	5.3	0.44	0.24	1.8	1214	159	
50	110	80	0.18	1.5	3.3	3.0	2.4	2.0	8.9	4.8	0.42	0.23	2.1	1417	185	
60	132	40	0.09	1.5	3.3	2.5	2.4	2.0	8.9	4.8	0.43	0.24	2.5	1700	222	

Body Weight				Daily Gain or Loss				Daily Dry Matter ^a				Nutrients per Animal																																																																																				
kg		lb		g		lb		kg		%		Per Animal		%		Live Wt		TDN, kg		DE ^b , Mcal/kg		ME, Mcal/kg		Total Protein, %		DP ^c , %		Ca, %		P, %		Carotene, mg/kg		Vitamin A, IU/kg		Vitamin D, IU/kg																																																												
Rams																																																																																																
Replacement lambs and yearlings ^g																																																																																																
40	88	250	0.55	1.8	4.0	4.5	65	2.9	2.4	10.2	6.0	0.35	0.19	1.4	944	123	60	132	200	0.44	2.3	5.1	3.8	2.6	2.1	9.5	5.3	0.31	0.17	1.7	1109	145	80	176	150	0.33	2.8	6.2	3.5	2.4	2.0	8.9	4.8	0.28	0.16	1.8	1214	159	100	220	100	0.22	2.8	6.2	2.8	2.4	2.0	8.9	4.8	0.30	0.17	2.2	1518	198	120	265	50	0.11	2.6	5.7	2.2	2.4	2.0	8.9	4.8	0.33	0.18	2.9	1962	256																
Lambs																																																																																																
Finishing ^h																																																																																																
30	66	200	0.44	1.3	2.9	4.3	64	2.8	2.3	11.0	6.7	0.37	0.23	0.8	588	128	35	77	220	0.48	1.4	3.1	4.0	3.0	2.4	11.0	6.7	0.34	0.21	0.9	637	139	40	88	250	0.55	1.6	3.5	4.0	3.1	2.5	11.0	6.7	0.31	0.19	0.9	638	139	45	99	250	0.55	1.7	3.7	3.8	3.1	2.5	11.0	6.7	0.29	0.18	1.0	675	147	50	110	220	0.48	1.8	4.0	3.6	3.1	2.5	11.0	6.7	0.28	0.17	1.1	708	154	55	121	200	0.44	1.9	4.2	3.5	3.1	2.5	11.0	6.7	0.26	0.16	1.1	738	161
Early-weanedⁱ																																																																																																
10	22	250	0.55	0.6	1.3	6.0	73	3.2	2.6	16.0	11.5	0.40	0.27	2.0	1417	112	20	44	275	0.60	1.0	2.2	5.0	3.2	2.6	16.0	11.5	0.36	0.24	2.5	1700	133	30	66	300	0.66	1.4	3.1	4.7	3.2	2.6	14.0	9.5	0.36	0.24	2.7	1821	143																																																

^aTo convert dry matter to an as-fed basis, divide dry matter by percentage of dry matter.

^b1 kg TDN = 4.4 Mcal DE (digestible energy), DE may be converted to ME (metabolizable energy) by multiplying by 82%. Because of rounding errors, calculations between Appendix Table 18 and 19 may not give the same values.

^cDP = digestible protein.

^dValues are for ewes in moderate condition, not excessively fat or thin. Fat ewes should be fed at the next higher weight, thin ewes at the next lower weight. Once maintenance weight is established, such weight would follow through all production phases.

^eValues in parentheses are for ewes suckling singles last 8 weeks of lactation.

^fValues in parentheses are for ewes suckling twins last 8 weeks of lactation.

^gRequirements for replacement lambs (ewe and ram) start when the lambs are weaned.

^hMaximum gains expected. If lambs are held for later market, they should be fed as replacement ewe lambs are fed. Lambs capable of gaining faster than indicated should be fed at a higher level. Lambs finish at the maximum rate if they are self-fed.

ⁱA 40-kg early-weaned lamb should be fed the same as a finishing lamb of the same weight.

APPENDIX TABLE 22 Dietary Mineral, Vitamin, and Fatty Acid Requirements of Growing Pigs Allowed Feed Ad Libitum (90% dry matter)^a (from 1998 NRC on swine)

	Body Weight (kg)					
	3-5	5-10	10-20	20-50	50-80	80-120
Average weight in range (kg)	4	7.5	15	35	65	100
DE content of diet (kcal/kg)	3,400	3,400	3,400	3,400	3,400	3,400
ME content of diet (kcal/kg) ^b	3,265	3,265	3,265	3,265	3,265	3,265
Estimated DE intake (kcal/day)	855	1,690	3,400	6,305	8,760	10,450
Estimated ME intake (kcal/day) ^b	820	1,620	3,265	6,050	8,410	10,030
Estimated feed intake (g/day)	250	500	1,000	1,855	2,575	3,075
	Requirements (% or amount/kg of diet)					
Mineral elements						
Calcium (%) ^c	0.90	0.80	0.70	0.60	0.50	0.45
Phosphorus, total (%) ^c	0.70	0.65	0.60	0.50	0.45	0.40
Phosphorus, available (%) ^c	0.55	0.40	0.32	0.23	0.19	0.15
Sodium (%)	0.25	0.20	0.15	0.10	0.10	0.10
Chlorine (%)	0.25	0.20	0.15	0.08	0.08	0.08
Magnesium (%)	0.04	0.04	0.04	0.04	0.04	0.04
Potassium (%)	0.30	0.28	0.26	0.23	0.19	0.17
Copper (mg)	6.00	6.00	5.00	4.00	3.50	3.00
Iodine (mg)	0.14	0.14	0.14	0.14	0.14	0.14
Iron (mg)	100	100	80	60	50	40
Manganese (mg)	4.00	4.00	3.00	2.00	2.00	2.00
Selenium (mg)	0.30	0.30	0.25	0.15	0.15	0.15
Zinc (mg)	100	100	80	60	50	50
Vitamins						
Vitamin A (IU) ^d	2,200	2,200	1,750	1,300	1,300	1,300
Vitamin D ₃ (IU) ^d	220	220	200	150	150	150
Vitamin E (IU) ^d	16	16	11	11	11	11
Vitamin K (menadione) (mg)	0.50	0.50	0.50	0.50	0.50	0.50
Biotin (mg)	0.08	0.05	0.05	0.05	0.05	0.05
Choline (g)	0.60	0.50	0.40	0.30	0.30	0.30
Folacin (mg)	0.30	0.30	0.30	0.30	0.30	0.30
Niacin, available (mg) ^e	20.00	15.00	12.50	10.00	7.00	7.00
Pantothenic acid (mg)	12.00	10.00	9.00	8.00	7.00	7.00
Riboflavin (mg)	4.00	3.50	3.00	2.50	2.00	2.00
Thiamin (mg)	1.50	1.00	1.00	1.00	1.00	1.00
Vitamin B ₆ (mg)	2.00	1.50	1.50	1.00	1.00	1.00
Vitamin B ₁₂ (μg)	20.00	17.50	15.00	10.00	5.00	5.00
Linoleic acid (%)	0.10	0.10	0.10	0.10	0.10	0.10

^aPigs of mixed gender (1:1 ratio of barrows to gilts). The requirements of certain minerals and vitamins may be slightly higher for pigs having high lean growth rates (>325 g/day of carcass fat-free lean), but no distinction is made.

^bAssumes that ME is 96% of DE. In corn-soybean meal diets, ME is 94-96% of DE, depending on crude protein level of the diet.

^cThe percentages of calcium, phosphorus, and available phosphorus should be increased by 0.05 to 0.1 percentage points for developing boars and replacement gilts from 50 to 120 kg body weight.

^dConversions: 1 IU vitamin A = 0.344 μg (g retinyl acetate); 1 IU vitamin D₃ = 0.025 μg cholecalciferol; 1 IU vitamin E = 0.67 mg of D-α-tocopherol or 1 mg of DL-α-tocopheryl acetate.)

^eThe niacin in corn, grain sorghum, wheat, and barley is unavailable. Similarly, the niacin in by-products made from these cereal grains is poorly available unless the by-products have undergone a fermentation or wet-milling process.

APPENDIX TABLE 23 Daily Amino Acid Requirements of Growing Pigs Allowed Feed Ad Libitum (90% dry matter)^a (from 1998 NRC on swine)

	<i>Body Weight (kg)</i>					
	<i>3-5</i>	<i>5-10</i>	<i>10-20</i>	<i>20-50</i>	<i>50-80</i>	<i>80-120</i>
Average weight in range (kg)	4	7.5	15	35	65	100
DE content of diet (kcal/kg)	3,400	3,400	3,400	3,400	3,400	3,400
ME content of diet (kcal/kg) ^b	3,265	3,265	3,265	3,265	3,265	3,265
Estimated DE intake (kcal/day)	855	1,690	3,400	6,305	8,760	10,450
Estimated ME intake (kcal/day) ^b	820	1,620	3,265	6,050	8,410	10,030
Estimated feed intake (g/day)	250	500	1,000	1,855	2,575	3,075
Crude protein (%) ^c	26.0	23.7	20.9	18.0	15.5	13.2
Amino acid requirements^d						
<i>True ileal digestible basis (g/day)</i>						
Arginine	1.4	2.4	4.2	6.1	6.2	4.8
Histidine	1.1	1.9	3.2	4.9	5.5	5.1
Isoleucine	1.8	3.2	5.5	8.4	9.4	8.8
Leucine	3.4	6.0	10.3	15.5	7.2	15.8
Lysine	3.4	5.9	10.1	15.3	17.1	15.8
Methionine	0.9	1.6	2.7	4.1	4.6	4.3
Methionine + cystine	1.9	3.4	5.8	8.8	10.0	9.5
Phenylalanine	2.0	3.5	6.1	9.1	10.2	9.4
Phenylalanine + tyrosine	3.2	5.5	9.5	14.4	16.1	15.1
Threonine	2.1	3.7	6.3	9.7	11.0	10.5
Tryptophan	0.6	1.1	1.9	2.8	3.1	2.9
Valine	2.3	4.0	6.9	10.4	11.6	10.8
<i>Apparent ileal digestible basis (g/day)</i>						
Arginine	1.3	2.3	3.9	5.7	5.7	4.3
Histidine	1.0	1.8	3.1	4.6	5.2	4.8
Isoleucine	1.7	3.0	5.2	7.8	8.7	8.0
Leucine	3.2	5.7	9.8	14.8	16.5	15.3
Lysine	3.2	5.5	9.4	14.2	15.8	14.4
Methionine	0.9	1.5	2.6	3.9	4.4	4.1
Methionine + cystine	1.8	3.1	5.3	8.2	9.3	8.8
Phenylalanine	1.9	3.3	5.7	8.5	9.4	8.6
Phenylalanine + tyrosine	3.0	5.2	8.9	13.4	15.0	13.9
Threonine	1.9	3.3	5.6	8.5	9.6	9.1
Tryptophan	0.5	1.0	1.6	2.4	2.7	2.5
Valine	2.1	3.7	6.3	9.5	10.6	9.8

(continued)

APPENDIX TABLE 23 Continued

	<i>Body Weight (kg)</i>					
	<i>3-5</i>	<i>5-10</i>	<i>10-20</i>	<i>20-50</i>	<i>50-80</i>	<i>80-120</i>
	<i>Total basis (g/day)^e</i>					
Arginine	1.5	2.7	4.6	6.8	7.1	5.7
Histidine	1.2	2.1	3.7	5.6	6.3	5.9
Isoleucine	2.1	3.7	6.3	9.5	10.7	10.1
Leucine	3.8	6.6	11.2	16.8	18.4	16.6
Lysine	3.8	6.7	11.5	17.5	19.7	18.5
Methionine	1.0	1.8	3.0	4.6	5.1	4.8
Methionine + cystine	2.2	3.8	6.5	9.9	11.3	10.8
Phenylalanine	2.3	4.0	6.8	10.2	11.3	10.4
Phenylalanine + tyrosine	3.5	6.2	10.6	16.1	18.0	16.8
Threonine	2.5	4.3	7.4	11.3	13.0	12.6
Tryptophan	0.7	1.2	2.1	3.2	3.6	3.4
Valine	2.6	4.6	7.9	11.9	13.3	12.4

^aMixed gender (1:1 ratio of barrows to gilts) of pigs with high-medium lean growth rate (325 g/day of carcass fat-free lean) from 20 to 120 kg body weight.

^bAssumes that ME is 96% of DE. In corn-soybean meal diets of these crude protein levels, ME is 94-96% of DE.

^cCrude protein levels apply to corn-soybean meal diets. In 3-10 kg pigs fed diets with dried plasma and/or dried milk products, protein levels will be 2-3% less than shown.

^dTotal amino acid requirements are based on the following types of diets: 3-5 kg pigs, corn-soybean meal diet that includes 5% dried plasma and 25-50% dried milk products; 5-10 kg pigs, corn-soybean meal diet that includes 5 to 25% dried milk products; 10-120 kg pigs, corn-soybean meal diet.

^eThe total lysine estimates for 3-20 kg pigs are calculated by multiplying the percentages in Table 10-1 (estimated from empirical data) by the estimated feed intake. The other amino acids for 3-20 kg pigs are based on the ratios of amino acids to lysine (true digestible basis); however, there are very few empirical data to support these ratios. The estimates for 20-120 kg pigs are from the growth model.

APPENDIX TABLE 24 Dietary Mineral, Vitamin, and Fatty Acid Requirements of Gestating and Lactating Sows (90% dry matter)^a (from 1998 NRC on swine)

	<i>Gestation</i>	<i>Lactation</i>
DE content of diet (kcal/kg)	3,400	3,400
ME content of diet (kcal/kg) ^b	3,265	3,265
DE intake (kcal/day)	6,290	17,850
ME intake (kcal/day) ^b	6,040	17,135
Feed intake (kg/day)	1.85	5.25
	Requirements (% or amount/kg of diet)	
Mineral elements		
Calcium (%)	0.75	0.75
Phosphorus, total (%)	0.60	0.60
Phosphorus, available (%)	0.35	0.35
Sodium (%)	0.15	0.20
Chlorine (%)	0.12	0.16
Magnesium (%)	0.04	0.04
Potassium (%)	0.20	0.20
Copper (mg)	5.00	5.00
Iodine (mg)	0.14	0.14
Iron (mg)	80	80
Manganese (mg)	20	20
Selenium (mg)	0.15	0.15
Zinc (mg)	50	50
Vitamins		
Vitamin A (IU) ^c	4,000	2,000
Vitamin D ₃ (IU) ^c	200	200
Vitamin E (IU) ^c	44	44
Vitamin K (menadione) (mg)	0.50	0.50
Biotin (mg)	0.20	0.20
Choline (g)	1.25	1.00
Folacin (mg)	1.30	1.30
Niacin, available (mg) ^d	10	10
Pantothenic acid (mg)	12	12
Riboflavin (mg)	3.75	3.75
Thiamin (mg)	1.00	1.00
Vitamin B ₆ (mg)	1.00	1.00
Vitamin B ₁₂ (μg)	15	15
Linoleic acid (%)	0.10	0.10

^aThe requirements are based on the daily consumption of 1.85 and 5.25 kg of feed, respectively. If lower amounts of feed are consumed, the dietary percentage may need to be increased.

^bAssumes that ME is 96% of DE.

^cConversions: 1 IU vitamin A = 0.344 μg retinyl acetate; 1 IU vitamin D₃ = 0.025 μg cholecalciferol; 1 IU vitamin E = 0.67 mg of D-α-tocopherol or 1 mg of DL-α-tocopheryl acetate.

^dThe niacin in corn, grain sorghum, wheat, and barley is unavailable. Similarly, the niacin in by-products made from these cereal grains is poorly available unless the by-products have undergone a fermentation or wet-milling process.

APPENDIX TABLE 45 Daily Nutrient Requirements of Horses (from 1989 NRC on horses)

Item	Weight		DE, Mcal	C. Protein, g	Lysine, g	Calcium, g	Phos., g	Mg, g	K, g	Na, g
	kg	lb								
Maintenance	400	880	13.4	536	18.8	16.0	11.2	6.0	20	6.7
	500	1100	16.4	656	23.0	20.0	14.0	7.5	25	8.2
	600	1320	19.4	776	27.2	24.0	16.8	9.0	30	9.7
Preg. mare										
9th mo.	400	880	14.9	654	22.9	28.3	21.4	7.1	24	6.6
	500	1100	18.2	801	28.0	34.6	26.2	8.7	29	8.1
	600	1320	21.5	947	33.2	40.9	31.0	10.3	34	9.6
10th mo.	400	880	15.1	666	23.3	28.8	21.8	7.3	24	6.7
	500	1100	18.5	815	28.5	35.2	26.7	8.9	30	8.2
	600	1320	21.9	965	33.8	41.7	31.6	10.5	35	9.7
11th mo.	400	880	16.1	708	24.8	30.6	23.2	7.7	26	6.7
	500	1100	19.7	866	30.3	37.4	28.3	9.4	31	8.2
	600	1320	23.3	1024	35.9	44.2	33.5	11.2	37	9.7
Lact. mare										
Early lact.	400	880	22.9	1141	39.9	44.8	28.9	8.7	37	8.8
	500	1100	28.3	1427	49.9	56.0	36.1	10.9	46	10.9
	600	1320	33.7	1712	59.9	67.2	43.3	13.0	55	12.9
Late lact.	400	880	19.7	839	29.4	28.8	17.8	6.9	26	8.1
	500	1100	24.3	1049	36.7	36.0	22.2	8.6	33	9.9
	600	1320	28.9	1259	44.1	43.2	26.7	10.3	40	11.8
Working horse										
Light work	400	880	16.7	670	23.4	20.4	14.6	7.7	25	20.5
	500	1100	20.5	820	28.7	25.0	17.8	9.4	31	25.1
	600	1320	24.2	970	33.9	29.6	21.1	11.2	37	29.7
Moderate work	400	880	20.1	804	28.1	24.5	17.5	9.2	31	22.8
	500	1100	24.6	984	34.4	30.0	21.4	11.3	37	27.8
	600	1320	29.1	1164	40.7	35.5	25.3	13.4	44	32.9
Intense work	400	880	26.8	1072	37.5	32.7	23.3	12.3	41	28.2
	500	1100	32.8	1312	45.9	40.0	28.5	15.1	50	34.5
	600	1320	38.8	1552	54.3	47.3	33.8	17.8	59	40.8

APPENDIX TABLE 46 Daily Nutrient Requirements of Horses (from 1989 NRC on horses)

<i>Item</i>	<i>Weight</i>		<i>Fe,</i> <i>mg</i>	<i>Mn,</i> <i>mg</i>	<i>Zn,</i> <i>mg</i>	<i>Cu,</i> <i>mg</i>	<i>Co,</i> <i>mg</i>	<i>I,</i> <i>mg</i>	<i>Se,</i> <i>mg</i>	<i>Vit A,</i> <i>IU</i>	<i>Vit D,</i> <i>IU</i>	<i>Vit E,</i> <i>IU</i>
	<i>kg</i>	<i>lb</i>										
Maintenance	400	880	268	268	268	67	0.7	0.7	0.7	12,000	2010	335
	500	1100	328	328	328	82	0.8	0.8	0.8	15,000	2460	410
	600	1320	388	388	388	97	1.0	1.0	1.0	18,000	2910	485
Preg. mare												
9th mo.	400	880	331	264	264	66	0.7	0.7	0.7	24,000	3966	529
	500	1100	405	324	324	81	0.8	0.8	0.8	30,000	4854	647
	600	1320	479	383	383	96	1.0	1.0	1.0	36,000	5742	766
10th mo.	400	880	336	269	269	67	0.7	0.7	0.7	24,000	4038	538
	500	1100	412	329	329	82	0.8	0.8	0.8	30,000	4942	659
	600	1320	487	390	390	97	1.0	1.0	1.0	36,000	5846	779
11th mo.	400	880	335	268	268	67	0.7	0.7	0.7	24,000	4020	536
	500	1100	410	328	328	82	0.8	0.8	0.8	30,000	4920	656
	600	1320	485	388	388	97	1.0	1.0	1.0	36,000	5820	776
Lact. mare												
Early lact.	400	880	440	352	352	88	0.9	0.9	0.9	24,000	5286	705
	500	1100	544	435	435	109	1.1	1.1	1.1	30,000	6526	870
	600	1320	647	518	518	129	1.3	1.3	1.3	36,000	7767	1036
Late lact.	400	880	403	322	322	81	0.8	0.8	0.8	24,000	4833	644
	500	1100	496	397	397	99	1.0	1.0	1.0	30,000	5956	794
	600	1320	590	472	472	118	1.2	1.2	1.2	36,000	7079	944
Working horse												
Light work	400	880	273	273	273	68	0.7	0.7	0.7	12,000	2051	547
	500	1100	335	335	335	84	0.8	0.8	0.8	15,000	2510	669
	600	1320	396	396	396	99	1.0	1.0	1.0	18,000	2969	792
Moderate work	400	880	303	303	303	76	0.8	0.8	0.8	12,000	2275	607
	500	1100	371	371	371	93	0.9	0.9	0.9	15,000	2785	743
	600	1320	439	439	439	110	1.1	1.1	1.1	18,000	3294	878
Intense work	400	880	376	376	376	94	0.9	0.9	0.9	12,000	2821	752
	500	1100	460	460	460	136	1.4	1.4	1.4	18,000	4084	1089
	600	1320	545	545	545	136	1.4	1.4	1.4	18,000	4084	1089

**APPENDIX TABLE 47 Daily Nutrient Requirements of Growing Horses
(from 1989 NRC on horses)**

<i>Age, Mo.</i>	<i>Weight, kg</i>	<i>D. Gain, kg</i>	<i>DE, Mcal</i>	<i>C. Pro, g</i>	<i>Lysine, g</i>	<i>Calcium, g</i>	<i>Phos., g</i>	<i>Mg, g</i>	<i>K, g</i>	<i>Na, g</i>
4	145 ^a	0.75	12.6	630	26.4	29.8	16.5	3.1	9	4.3
6	180 ^a	0.55	12.9	643	27.0	24.8	13.7	3.4	11	4.4
		0.70	14.5	725	30.5	29.6	16.4	3.6	11	5.0
12	265 ^a	0.40	15.6	700	29.6	23.4	12.9	4.5	14	5.6
		0.50	17.1	770	32.5	26.6	14.7	4.6	15	6.1
18	330 ^a	0.25	15.9	716	30.2	21.2	11.7	5.3	17	6.4
4	175 ^b	0.85	14.4	720	30.2	34.2	19.0	3.7	11	5.0
6	215 ^b	0.65	15.0	750	31.5	29.4	16.3	4.0	13	5.2
		0.85	17.2	860	36.1	35.8	19.9	4.3	13	5.9
12	325 ^b	0.50	18.9	851	35.9	29.0	16.0	5.5	18	6.8
		0.65	21.2	956	40.4	33.8	18.7	5.7	18	7.6
18	400 ^b	0.35	19.8	893	37.7	27.2	15.0	6.4	21	7.9
4	200 ^c	1.00	16.5	826	34.7	40.0	22.2	4.2	13	5.7
6	245 ^c	0.75	17.0	850	35.7	33.8	18.7	4.6	14	5.9
		0.95	19.2	960	40.3	40.2	22.3	4.9	15	6.6
12	375 ^c	0.65	22.7	1024	43.2	35.8	19.8	6.4	21	8.1
		0.80	25.1	1129	47.7	40.6	22.5	6.6	21	9.0
18	475 ^c	0.45	23.9	1077	45.5	33.4	18.5	7.7	25	9.6

^aExpected mature weight 400 kg.

^bExpected mature weight 500 kg.

^cExpected mature weight 600 kg.

APPENDIX TABLE 1 Composition of Feedstuffs Commonly Fed to Cattle, Sheep, and Horses (data from NRC publications)

Feed Name and Description	Intl. Feed Number	Typical DM, %	Composition, Dry Basis, %						Energy Utilization, Dry Basis, Mcal/kg				TDN, ^a %
			CP	CF	NDF	ADF	Ca	P	Beef Cattle				
									DE	ME	NE _m	NE _g	
1. Alfalfa, fresh, late veg.	2-00-181	21	20.0	23	38	29	2.19	0.33	2.78	2.28	1.41	0.83	63
2. Alfalfa, fresh	2-00-196	24	20.0	26	—	—	1.96	0.30	2.69	2.27	1.31	0.61	61
3. Alfalfa, hay, S-C, early bloom	1-00-059	90	18.0	23	42	31	1.41	0.22	2.43	1.99	1.14	0.58	60
4. Alfalfa, hay, S-C, mature	1-00-071	91	13.0	38	58	44	1.13	0.18	2.21	1.81	0.97	0.42	50
5. Alfalfa, meal, dehy. 17%	1-00-023	92	18.9	26	45	35	1.52	0.25	2.69	2.21	1.34	0.77	61
6. Alfalfa, silage, wilted, midbloom	3-00-217	38	15.5	30	47	35	—	—	2.56	2.10	1.24	0.68	58
7. Alfalfa, silage, 30-50% dry matter	3-08-150	43	9.8	19	—	—	1.39	0.27	—	—	—	—	—
8. Bakery waste, dried	4-00-466	92	10.7	1	18	13	0.14	0.26	3.92	3.22	2.21	1.52	89
9. Barley grain	4-00-549	88	13.5	6	19	7	0.05	0.38	3.70	3.04	2.06	1.40	84
10. Barley grain, Pacific Coast	4-07-939	89	10.8	7	21	9	0.06	0.39	3.79	3.11	2.12	1.45	86
11. Barley straw	1-00-498	91	4.3	42	80	49	0.30	0.07	1.76	1.45	0.60	0.08	40
12. Bean, Navy, seeds	5-00-623	89	25.3	5	—	—	0.18	0.59	3.70	3.04	2.06	1.40	84
13. Beet, Sugar, pulp, dehy.	4-00-669	91	9.7	20	54	33	0.69	0.10	3.26	2.68	1.76	1.14	74
14. Bermuda grass, fresh	2-00-712	34	12.0	26	—	—	0.53	0.21	2.65	2.17	1.31	0.74	60
15. Bermuda grass hay, SC	1-00-703	90	6.0	31	78	38	0.43	0.20	2.16	1.77	0.93	0.39	49
16. Bluegrass, Kentucky fresh, early veg.	2-00-777	31	17.4	25	55	29	0.50	0.44	3.17	2.60	1.70	1.08	72
17. Bluestem, fresh, early veg.	2-00-821	27	12.8	25	—	—	0.63	0.20	3.00	2.46	1.57	0.97	68
18. Brewer's grains, dehy.	5-02-141	92	29.4	14	46	24	0.33	0.55	2.91	2.39	1.51	0.91	66
19. Brome, fresh, early veg.	2-00-892	34	18.0	24	56	31	0.50	0.30	3.26	2.68	1.76	1.14	74
20. Brome hay, late bloom, S-C	1-00-888	89	10.0	37	68	43	0.30	0.35	2.43	1.99	1.14	0.58	55
21. Citrus pulp, dehy.	4-01-237	91	6.7	13	23	22	1.84	0.12	3.62	2.97	2.00	1.35	77
22. Clover, Crimson, hay, S-C	1-01-328	87	18.4	30	—	—	1.40	0.22	2.51	2.06	1.21	0.64	57
23. Clover, Ladino, fresh, early veg.	2-01-380	19	27.2	14	—	—	1.93	0.35	3.00	2.46	1.57	0.97	68
24. Clover, Ladino, hay, S-C	1-01-378	90	22.0	21	36	32	1.35	0.31	2.65	2.17	1.31	0.74	65
25. Clover, Red, fresh, early bloom	2-01-428	20	19.4	23	40	31	2.26	0.38	3.04	2.50	1.60	1.00	69
26. Clover, Red, hay, S-C	1-01-415	89	16.0	29	56	36	1.53	0.25	2.43	1.99	1.14	0.58	55
27. Corn, Dent, fodder	1-28-231	81	8.9	25	55	33	0.50	0.25	2.87	2.35	1.47	0.88	65
28. Corn, Cobs, ground	1-28-234	90	3.2	36	89	35	0.57	0.10	2.21	1.81	0.97	0.42	50
29. Corn distillers grains, dehy.	5-28-235	94	23.0	12	43	17	0.11	0.43	3.79	3.11	2.12	1.45	86
30. Corn ears, ground	4-28-238	87	9.0	9	28	11	0.07	0.27	3.66	3.00	2.03	1.37	83
31. Corn gluten, meal	5-28-241	91	46.8	5	37	9	0.16	0.50	3.79	3.11	2.12	1.45	86
32. Corn gluten feed	5-28-243	90	25.6	10	45	12	0.36	0.82	3.66	3.00	2.03	1.37	83
33. Corn grain, #2	4-02-931	88	10.1	2	9	3	0.02	0.35	3.97	3.25	2.24	1.55	90
34. Corn grain, flaked	4-28-244	86	11.2	1	9	3	0.03	0.29	4.19	3.44	2.38	1.67	95
35. Corn grain, high moisture	4-20-770	72	10.7	3	9	3	0.02	0.32	4.10	3.36	2.33	1.62	93
36. Corn silage, well-eared	3-28-250	33	8.1	24	51	28	0.23	0.22	3.09	2.53	1.63	1.03	70
37. Cotton, seed hulls	1-01-599	91	4.1	48	90	64	0.15	0.09	1.85	1.52	0.68	0.15	42
38. Cottonseeds	5-01-614	92	23.9	21	39	29	0.16	0.75	4.23	3.47	2.41	1.69	96

^aTDN values apply to both beef and dairy cattle.

Energy Utilization, Dry Basis, Mcal/kg

	<i>Dairy Cattle</i>					<i>Sheep</i>					<i>Horses</i>		<i>Rabbits</i>	
	<i>DE</i>	<i>ME</i>	<i>NE_m</i>	<i>NE_g</i>	<i>NE_l</i>	<i>DE</i>	<i>ME</i>	<i>NE_m</i>	<i>NE_g</i>	<i>TDN, %</i>	<i>DE</i>	<i>TDN, %</i>	<i>DE</i>	<i>Dig. Protein (%)</i>
1.	—	—	—	—	—	—	—	—	—	—	2.94	—	—	—
2.	—	—	—	—	—	2.56	2.10	1.24	0.68	58	2.51	57	—	—
3.	2.65	2.22	1.31	0.74	1.35	2.47	2.03	1.18	0.61	56	2.48	55	2.05	64
4.	—	—	—	—	—	2.38	1.95	1.11	0.55	54	—	—	1.50	60
5.	2.69	2.27	1.34	0.77	1.38	2.65	2.17	1.34	0.77	60	2.36	—	2.10	64
6.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7.	—	—	—	—	—	2.56	2.10	1.24	0.68	58	—	—	—	—
8.	3.92	3.51	2.20	1.52	2.06	—	—	—	—	—	—	—	—	—
9.	3.70	3.29	2.06	1.40	1.94	3.79	3.11	2.12	1.45	86	3.60	82	3.41	67
10.	3.79	3.38	2.12	1.45	1.99	3.88	3.18	2.18	1.50	88	3.68	79	3.35	65
11.	2.16	1.73	0.93	0.53	1.08	2.12	1.74	0.90	0.35	48	1.62	37	0.75	20
12.	3.70	3.29	2.06	1.40	1.94	3.84	3.15	2.15	1.48	87	—	—	3.55	80
13.	3.44	3.02	1.88	1.24	1.79	2.96	2.43	1.60	1.04	67	2.56	65	2.72	50
14.	—	—	—	—	—	—	—	—	—	—	2.07	50	—	—
15.	—	—	—	—	—	1.97	1.62	0.85	0.35	45	—	—	—	—
16.	3.17	2.76	1.69	1.08	1.64	2.87	2.35	1.47	0.88	65	2.09	56	—	—
17.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18.	2.91	2.49	1.51	0.91	1.50	3.09	2.53	1.63	1.03	70	2.75	68	2.85	76
19.	3.26	2.85	1.75	1.13	1.69	3.53	2.89	1.94	1.30	80	3.00	68	—	—
20.	2.60	2.18	1.27	0.70	1.33	—	—	—	—	—	2.38	54	—	—
21.	3.40	2.98	1.86	1.22	1.77	3.70	3.04	2.06	1.40	84	2.99	68	3.15	60
22.	2.51	2.09	1.21	0.64	1.28	2.43	1.99	1.14	0.58	55	2.16	49	—	—
23.	3.00	2.58	1.57	0.97	1.55	—	—	—	—	—	2.50	—	—	—
24.	2.87	2.45	1.47	0.88	1.47	2.91	2.39	1.51	0.91	66	2.56	51	—	—
25.	3.04	2.62	1.60	1.00	1.57	3.00	2.46	1.57	0.47	68	2.01	57	—	—
26.	2.43	2.00	1.14	0.58	1.23	2.65	2.17	1.31	0.74	60	2.22	49	—	—
27.	—	—	—	—	—	2.78	2.28	1.41	0.83	63	2.06	—	—	—
28.	2.21	1.78	0.97	0.42	1.11	2.25	1.84	1.07	0.45	51	1.36	31	—	—
29.	3.79	3.38	2.12	1.45	1.99	3.84	3.15	2.12	1.48	87	3.08	70	—	—
30.	3.66	3.25	2.03	1.37	1.91	3.66	3.00	2.03	1.37	83	3.49	74	—	—
31.	3.79	3.38	2.12	1.45	1.99	3.88	3.18	2.18	1.50	88	3.29	—	—	—
32.	3.66	3.25	2.03	1.37	1.91	3.66	3.00	2.03	1.37	83	—	—	3.15	70
33.	3.53	3.12	1.94	1.30	1.84	3.84	3.15	2.15	1.48	87	3.84	88	3.56	65
34.	3.88	3.47	2.18	1.50	2.04	—	—	—	—	—	—	—	—	—
35.	3.88	3.47	2.18	1.50	2.06	—	—	—	—	—	—	—	—	—
36.	3.09	2.67	1.63	1.03	1.60	3.09	2.53	1.63	1.03	70	2.68	—	—	—
37.	1.98	1.55	0.78	0.25	0.98	2.16	1.77	0.93	0.39	49	1.89	33	1.90	25
38.	4.23	3.83	2.41	1.69	2.23	—	—	—	—	—	—	—	4.10	75

(continued)

APPENDIX TABLE 1 Continued

Feed Name and Description	Intl. Feed Number	Typical DM, %	Composition, Dry Basis, %						Energy Utilization, Dry Basis, Mcal/kg					TDN, ^a %
			CP	CF	NDF	ADF	Ca	P	Beef Cattle					
									DE	ME	NE _m	NE _g		
39. Cottonseed, meal, mech. extd., 41% protein	5-01-617	93	44.3	13	28	20	0.21	1.16	3.44	2.82	1.88	1.24	78	
40. Cottonseed, meal, solv. extd., 41% protein	5-01-621	91	45.2	13	26	19	0.18	1.21	3.35	2.75	1.82	1.19	76	
41. Fat, animal-poultry	4-00-409	99	—	—	—	—	—	—	7.80	6.40	4.75	3.51	177	
42. Fescue, Kentucky 31, fresh, early veg.	2-01-900	28	22.1	21	—	—	0.53	0.39	—	—	—	—	67	
43. Fescue hay, S-C, early bloom	1-09-186	91	20.2	25	59	32	0.35	0.24	—	—	—	—	64	
44. Fescue hay, S-C, late bloom	1-01-871	92	9.5	37	72	39	0.30	0.26	2.12	1.74	0.90	0.35	48	
45. Flax, seed, solvent extd. (linseed meal)	5-02-048	90	38.3	10	25	19	0.43	0.89	3.44	2.82	1.88	1.24	78	
46. Grass-legume silage	3-02-303	29	11.3	32	—	—	0.25	0.08	—	—	—	—	—	
47. Lespedeza, common fresh, late veg.	2-26-028	32	16.4	32	—	—	—	—	2.60	2.13	1.28	0.71	—	
48. Milk, cattle, fresh	5-01-168	12	26.7	—	—	—	0.95	0.76	5.60	5.43	3.80	3.80	129	
49. Milk, sheep, fresh	5-08-510	19	24.7	—	—	—	1.05	0.79	—	—	—	—	—	
50. Millet, Foxtail, fresh	2-03-101	28	9.5	32	—	—	0.32	0.19	2.78	2.28	1.41	0.83	63	
51. Molasses, beet	4-00-668	78	8.5	—	—	—	0.17	0.03	3.48	2.86	1.91	1.27	75	
52. Molasses, citrus	4-01-241	68	8.2	—	—	—	1.72	0.13	3.31	2.71	1.79	1.16	75	
53. Molasses, sugarcane	4-04-696	75	5.8	6	—	—	1.00	0.11	3.17	2.60	1.70	1.08	72	
54. Oats, grain	4-03-309	89	13.3	12	32	16	0.07	0.38	3.40	2.78	1.85	1.22	77	
55. Oats, grain, Pacific Coast	4-07-999	91	10.0	12	—	—	0.11	0.34	3.44	2.82	1.88	1.24	78	
56. Oat hay, S-C	1-03-280	91	9.3	30	66	42	0.24	0.22	2.43	1.99	1.14	0.58	55	
57. Oat silage, dough stage	3-03-296	35	10.0	33	—	—	0.47	0.33	2.51	2.06	1.21	0.64	—	
58. Oat straw	1-03-283	92	4.4	40	70	54	0.24	0.06	1.98	1.63	0.79	0.25	45	
59. Orchard grass, fresh, early, veg.	2-03-439	23	18.4	25	55	31	0.58	0.54	3.17	2.60	1.70	1.08	72	
60. Orchard grass, hay, late bloom	1-03-428	91	8.4	37	72	45	0.26	0.30	2.38	1.95	1.11	0.55	54	
61. Pea seeds	5-03-600	89	25.3	7	—	—	0.15	0.44	3.84	3.15	2.15	1.48	87	
62. Potato, tubers, fresh	4-03-787	23	9.5	2	—	—	0.04	0.24	3.57	2.93	1.97	1.32	81	
63. Potato, tubers, silage	4-03-768	25	7.6	4	—	—	0.04	0.23	3.62	2.97	2.00	1.35	82	
64. Poultry feathers, hydrolyzed	5-03-795	93	91.3	1	—	—	0.28	0.72	3.09	2.53	1.63	1.03	—	
65. Poultry manure, dehy.	5-14-015	90	28.2	13	38	15	9.31	2.52	2.29	1.88	1.04	0.49	—	
66. Prairie plants, midwest, hay, S-C	1-03-191	92	5.8	34	—	—	0.43	0.15	2.25	1.84	1.00	0.45	51	
67. Rape, fresh, early bloom	2-03-866	11	23.5	16	—	—	—	—	3.31	2.71	1.79	1.16	75	
68. Canola meal solvent extd.	5-03-871	91	40.6	13	—	—	0.67	1.04	3.04	2.50	1.60	1.00	69	
69. Redtop, fresh	2-03-897	29	11.6	27	64	—	0.46	0.29	2.78	2.28	1.41	0.83	63	
70. Redtop, hay, S-C, midbloom	1-03-886	94	11.7	31	—	—	0.63	0.35	2.51	2.06	1.21	0.64	57	
71. Rice, bran	4-03-928	91	14.1	13	33	18	0.08	1.70	3.09	2.53	1.63	1.03	70	
72. Rice, ground	4-03-938	89	8.9	10	—	—	0.07	0.32	3.48	2.86	1.91	1.27	79	
73. Rice, straw	1-03-925	91	4.3	35	71	55	0.21	0.08	1.81	1.48	0.64	0.11	41	
74. Rye, fresh	2-04-018	24	15.9	28	—	—	0.39	0.33	3.04	2.50	1.60	1.00	69	
75. Rye, grain	4-04-047	88	13.8	3	—	—	0.07	0.37	3.70	3.04	2.06	1.40	84	
76. Rye, straw	1-04-007	90	3.0	43	—	—	0.24	0.09	1.37	1.12	0.26	—	31	

^aTDN values apply to both beef and dairy cattle.

Energy Utilization, Dry Basis, Mcal/kg

	<i>Dairy Cattle</i>					<i>Sheep</i>					<i>Horses</i>		<i>Rabbits</i>	
	<i>DE</i>	<i>ME</i>	<i>NEm</i>	<i>NEg</i>	<i>NEc</i>	<i>DE</i>	<i>ME</i>	<i>NEm</i>	<i>NEg</i>	<i>TDN, %</i>	<i>DE</i>	<i>TDN, %</i>	<i>DE</i>	<i>Dig. Protein (%)</i>
39.	3.44	3.02	1.88	1.24	1.79	3.31	2.71	1.79	1.16	75	—	—	—	—
40.	3.35	2.93	1.82	1.19	1.74	3.13	2.57	1.67	1.06	71	3.01	—	—	—
41.	7.30	7.30	5.84	5.84	5.84	—	—	—	—	—	8.00	—	8.10	—
42.	2.91	2.49	1.51	0.92	1.50	3.22	2.64	1.73	1.11	73	2.22	—	—	—
43.	2.82	2.40	1.44	0.85	1.45	2.73	2.24	1.38	0.80	62	—	—	—	—
44.	2.12	1.69	0.90	0.36	1.06	—	—	—	—	—	—	—	—	—
45.	3.44	3.02	1.88	1.24	1.79	3.48	2.86	1.91	1.27	79	3.04	69	—	—
46.	—	—	—	—	—	2.73	2.24	1.38	0.80	62	—	—	—	—
47.	—	—	—	—	—	—	—	—	—	—	1.89	—	—	—
48.	5.69	5.29	3.34	2.16	3.04	—	—	—	—	—	—	—	—	—
49.	—	—	—	—	—	6.00	5.82	4.07	1.61	—	—	—	—	—
50.	2.78	2.36	1.41	0.83	1.42	—	—	—	—	—	—	—	—	—
51.	3.31	2.89	1.79	1.16	1.72	3.40	2.78	1.85	1.22	77	3.40	72	3.17	70
52.	3.31	2.89	1.79	1.16	1.72	—	—	—	—	—	3.40	—	—	—
53.	3.17	2.76	1.69	1.08	1.64	3.48	2.86	1.91	1.27	79	3.50	74	3.10	60
54.	3.40	2.98	1.86	1.22	1.77	3.40	2.78	1.85	1.22	77	3.36	76	2.95	75
55.	3.44	3.02	1.88	1.24	1.79	3.44	2.82	1.88	1.24	78	3.20	77	—	—
56.	2.43	2.00	1.14	0.58	1.23	2.34	1.92	1.14	0.58	53	1.92	47	—	—
57.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
58.	—	—	—	—	—	2.07	1.70	0.79	0.25	47	1.76	40	0.80	20
59.	3.17	2.76	1.69	1.08	1.64	2.95	2.42	1.54	0.94	67	2.42	55	—	—
60.	2.38	1.96	1.11	0.55	1.20	—	—	—	—	—	1.90	—	—	—
61.	3.84	3.42	2.16	1.48	2.01	—	—	—	—	—	3.45	—	—	—
62.	3.57	3.16	1.97	1.32	1.87	—	—	—	—	—	—	—	—	—
63.	3.62	3.20	2.01	1.35	1.89	—	—	—	—	—	—	—	—	—
64.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
65.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
66.	—	—	—	—	—	—	—	—	—	—	1.62	46	—	—
67.	—	—	—	—	—	3.31	2.71	1.79	1.16	75	—	—	—	—
68.	3.04	2.62	1.60	1.00	1.57	3.26	2.68	1.76	1.14	74	—	—	2.55	78
69.	2.78	2.36	1.41	0.83	1.42	—	—	—	—	—	—	—	—	—
70.	2.51	2.09	1.21	0.64	1.28	2.47	2.03	1.18	0.61	56	1.97	—	—	—
71.	3.09	2.67	1.63	1.03	1.60	3.26	2.68	1.76	1.14	74	—	—	3.20	65
72.	3.48	3.07	1.91	1.27	1.82	—	—	—	—	—	2.51	—	3.40	70
73.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
74.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
75.	3.70	3.29	2.06	1.40	1.94	3.75	3.07	2.09	1.43	85	3.84	80	—	—
76.	—	—	—	—	—	1.98	1.63	0.79	0.25	45	—	—	—	—

(continued)

APPENDIX TABLE 1 Continued

Feed Name and Description	Int'l. Feed Number	Typical DM, %	Composition, Dry Basis, %						Energy Utilization, Dry Basis, Mcal/kg					TDN, ^a %
			CP	CF	NDF	ADF	Ca	P	Beef Cattle					
									DE	ME	NE _m	NE _g		
77. Ryegrass, Italian, fresh	2-04-073	25	14.5	24	—	—	0.65	0.41	2.65	2.17	1.31	0.74	60	
78. Ryegrass, Italian, hay, S-C, early bloom	1-04-066	88	11.4	36	69	45	0.62	0.34	2.38	1.95	1.11	0.55	54	
79. Ryegrass, perennial, fresh	2-04-086	27	10.4	23	—	—	0.55	0.27	3.00	2.46	1.57	0.97	68	
80. Ryegrass, perennial, hay, S-C	1-04-077	86	8.6	30	41	30	0.65	0.32	2.65	2.17	1.31	0.74	60	
81. Safflower seeds, meal, solvent extd.	5-04-110	92	25.4	32	58	41	0.37	0.81	2.51	2.06	1.21	0.64	57	
82. Safflower seeds w/o hulls, meal, solvent extd.	5-07-959	92	46.9	15	—	—	0.38	1.40	3.22	2.64	1.73	1.11	73	
83. Sage, Black, browse, fresh	2-05-564	65	8.5	—	—	—	0.81	0.17	2.16	1.77	0.93	0.39	49	
84. Saltgrass, hay, S-C	1-04-168	89	8.9	32	—	—	—	—	2.25	1.84	1.00	0.45	51	
85. Sedge, hay, S-C	1-04-193	89	9.4	32	—	—	—	—	2.29	1.88	1.04	0.49	52	
86. Sorghum, fodder	1-07-960	89	7.5	27	—	—	0.52	0.13	2.56	2.10	1.24	0.68	58	
87. Sorghum, grain 8-10% protein	4-20-893	87	10.1	3	18	9	0.04	0.34	3.70	3.04	2.06	1.40	84	
88. Sorghum, grain, flaked	4-16-295	85	10.1	3	—	—	0.04	0.34	4.06	3.33	2.30	1.60	92	
89. Sorghum, grain, reconstituted	4-16-296	70	10.1	3	—	—	0.04	0.34	4.10	3.36	2.33	1.62	93	
90. Sorghum, milo, heads	4-04-446	90	10.0	9	—	—	0.13	0.25	—	—	—	—	—	
91. Sorghum, silage	3-04-323	30	7.5	28	—	38	0.35	0.21	2.65	2.17	1.31	0.74	60	
92. Sorghum, Sudan grass, fresh, early veg.	2-04-484	18	16.8	23	55	29	0.43	0.41	3.09	2.53	1.63	1.03	70	
93. Sorghum, Sudan grass, hay, S-C	1-04-480	91	8.0	36	68	42	0.55	0.30	2.47	2.03	1.18	0.61	56	
94. Sorghum, Sudan grass, silage	3-04-499	28	10.8	33	—	—	0.46	0.21	2.43	1.99	1.14	0.58	55	
95. Soybean, hay, S-C	1-04-538	94	17.8	30	—	40	1.26	0.27	—	—	—	—	53	
96. Soybean, hulls	1-04-560	91	12.1	40	67	50	0.49	0.21	2.34	1.92	1.07	0.52	57	
97. Soybean, seeds	5-04-610	92	42.8	6	—	10	0.27	0.65	4.01	3.29	2.27	1.57	91	
98. Soybean, meal, solvent extd., 44% protein	5-20-637	89	49.9	7	—	10	0.33	0.71	3.70	3.04	2.06	1.40	84	
99. Soybean, straw	1-04-567	88	5.2	44	70	54	1.59	0.06	1.85	1.52	0.68	0.15	42	
100. Sunflower, seeds, meal, solvent extd.	5-09-340	90	25.9	35	40	33	0.23	1.03	1.94	1.59	0.75	0.22	44	
101. Sunflower, seeds w/o hulls, solvent extd.	5-04-739	93	49.8	12	—	—	0.44	0.98	2.87	2.35	1.47	0.88	65	
102. Timothy, fresh, late veg.	2-04-903	26	18.0	32	—	—	0.39	0.32	3.17	2.60	1.70	1.08	72	
103. Timothy, hay, S-C, late veg.	1-04-881	89	17.0	27	55	29	0.66	0.34	2.73	2.24	1.38	0.80	62	
104. Timothy, hay, S-C, midbloom	1-04-883	89	9.1	31	67	36	0.48	0.22	2.51	2.06	1.21	0.64	57	
105. Trefoil, Birdsfoot, fresh	2-20-786	24	21.0	25	—	—	1.91	0.22	2.91	2.39	1.51	0.91	66	
106. Triticale, grain	4-20-362	90	17.6	4	—	8	0.06	0.33	3.70	3.04	2.06	1.40	84	
107. Turnip, roots, fresh	4-05-067	9	11.8	12	44	34	0.59	0.26	3.75	3.07	2.09	1.43	85	

^aTDN values apply to both beef and dairy cattle.

Energy Utilization, Dry Basis, Mcal/kg

	<i>Dairy Cattle</i>					<i>Sheep</i>					<i>Horses</i>		<i>Rabbits</i>	
	<i>DE</i>	<i>ME</i>	<i>NE_m</i>	<i>NE_g</i>	<i>NE_l</i>	<i>DE</i>	<i>ME</i>	<i>NE_m</i>	<i>NE_g</i>	<i>TDN, %</i>	<i>DE</i>	<i>TDN, %</i>	<i>DE</i>	<i>Dig. Protein (%)</i>
77.	—	—	—	—	—	—	—	—	—	—	1.73	—	—	—
78.	2.38	1.96	1.11	0.55	1.20	2.51	2.06	1.21	0.64	57	1.94	—	—	—
79.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80.	2.82	2.40	1.44	0.85	1.45	—	—	—	—	—	—	—	—	—
81.	2.51	2.09	1.21	0.64	1.28	2.47	2.03	1.18	0.61	56	—	—	—	—
82.	3.22	2.80	1.73	1.11	1.67	—	—	—	—	—	—	—	—	—
83.	—	—	—	—	—	2.16	1.77	0.93	0.39	49	—	—	—	—
84.	—	—	—	—	—	2.25	1.84	1.00	0.45	51	—	—	—	—
85.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
86.	2.56	2.13	1.25	0.68	1.30	2.56	2.10	1.24	0.68	58	—	—	—	—
87.	3.53	3.12	1.94	1.30	1.84	—	—	—	—	—	3.56	80	3.50	77
88.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
89.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
90.	—	—	—	—	—	3.70	3.04	2.06	1.40	84	—	—	—	—
91.	2.65	2.22	1.31	0.74	1.35	2.51	2.06	1.21	0.64	57	—	—	—	—
92.	3.09	2.67	1.63	1.03	1.60	2.78	2.28	1.41	0.83	68	—	—	—	—
93.	2.47	2.04	1.18	0.62	1.25	2.43	1.99	1.14	0.58	55	—	—	—	—
94.	2.43	2.00	1.14	0.58	1.23	2.34	1.92	1.07	0.52	53	—	—	—	—
95.	2.34	1.91	1.08	0.52	1.18	—	—	—	—	—	—	—	—	—
96.	—	—	—	—	—	2.51	2.06	1.21	0.64	57	1.88	48	1.95	50
97.	4.01	3.60	2.27	1.57	2.11	4.14	3.40	2.35	1.65	94	4.05	92	4.70	85
98.	3.70	3.29	2.06	1.40	1.94	3.88	3.18	2.18	1.50	88	3.52	82	3.55	83
99.	—	—	—	—	—	1.90	1.56	0.72	0.18	43	—	—	—	—
100.	1.94	1.51	0.75	0.22	0.96	1.98	1.63	0.75	0.25	45	—	—	1.95	70
101.	2.87	2.45	1.47	0.88	1.47	3.35	2.75	1.82	1.19	76	3.12	71	2.90	76
102.	—	—	—	—	—	2.69	2.21	1.34	0.77	61	1.70	—	—	—
103.	2.91	2.49	1.51	0.92	1.50	2.87	2.35	1.47	0.88	65	—	—	—	—
104.	2.56	2.13	1.25	0.68	1.30	2.65	2.17	1.31	0.74	60	1.99	45	—	—
105.	2.91	2.49	1.31	0.92	1.50	2.78	2.28	1.41	0.83	63	2.18	—	—	—
106.	3.70	3.29	2.06	1.40	1.94	—	—	—	—	—	—	—	3.50	75
107.	3.75	3.34	2.10	1.43	1.96	3.79	3.11	2.12	1.45	86	—	—	—	—

(continued)

APPENDIX TABLE 1 Continued

Feed Name and Description	Int'l. Feed Number	Typical DM, %	Composition, Dry Basis, %						Energy Utilization, Dry Basis, Mcal/kg					TDN, ^a %
			CP	CF	NDF	ADF	Ca	P	Beef Cattle					
									DE	ME	NEm	NEg		
108. Urea, 281% protein equivalent	5-05-070	99	280.0	—	—	—	—	—	—	—	—	—	—	—
109. Vetch, fresh, late veg.	2-05-108	22	20.8	28	—	—	—	—	—	—	—	—	—	—
110. Vetch, hay, S-C	1-05-106	89	20.8	31	48	33	1.18	0.32	2.51	2.06	1.21	0.64	57	
111. Wheat, bran	4-05-190	89	17.1	11	51	15	0.13	1.38	3.09	2.53	1.63	1.03	70	
112. Wheat, flour by-product (middlings)	4-05-205	89	18.4	8	37	10	0.13	0.99	3.04	2.50	1.60	1.00	69	
113. Wheat, fresh, early veg.	2-05-176	22	28.6	17	52	30	0.42	0.40	3.22	2.64	1.73	1.11	73	
114. Wheat, grain, hard red spring	4-05-258	88	17.2	3	—	—	0.04	0.43	3.92	3.22	2.21	1.52	89	
115. Wheat, grain, hard red winter	4-05-268	88	14.4	3	—	4	0.05	0.43	3.88	3.18	2.18	1.50	88	
116. Wheat, grain, soft red winter	4-05-294	88	13.0	2	—	—	0.05	0.43	3.92	3.22	2.21	1.52	89	
117. Wheat, grain, soft white winter	4-05-337	89	11.3	3	14	4	0.07	0.36	3.92	3.22	2.21	1.52	89	
118. Wheat, grain, soft white winter, Pacific Coast	4-08-555	89	11.2	3	—	—	0.10	0.34	3.88	3.18	2.18	1.50	88	
119. Wheat, mill run	4-05-206	90	17.2	9	—	—	0.11	0.13	3.48	2.86	1.91	1.27	79	
120. Wheat, silage, full bloom	3-05-185	25	8.1	31	—	—	—	—	2.60	2.13	1.28	0.71	59	
121. Wheat, straw	1-05-175	89	3.6	42	70	54	0.18	0.05	1.81	1.48	0.64	0.11	41	
122. Wheatgrass, Crested														
122a. fresh, early veg.	2-05-420	28	21.5	22	—	—	0.46	0.34	3.31	2.71	1.79	1.16	75	
122b. fresh, post ripe	2-05-428	80	3.1	40	—	—	0.27	0.07	2.16	1.77	0.93	0.39	49	
122c. hay, S-C	1-05-418	93	12.4	33	—	36	0.33	0.21	2.34	1.92	1.07	0.52	53	
123. Whey, cattle, dehy.	4-01-182	93	14.2	—	—	—	0.92	0.82	3.57	2.93	1.97	1.32	81	
124. Whey, cattle, fresh	4-08-134	7	13.0	—	—	—	0.73	0.65	4.14	3.40	2.35	1.65	94	
125. Yeast, Brewers, dehy.	7-05-527	93	46.9	3	—	—	0.13	1.49	3.48	2.86	1.91	1.27	79	

^aTDN values apply to both beef and dairy cattle.

