

266 Nutrient Requirements of Dairy Cattle

TABLE 14-7 Nutrient Requirements of Lactating Dairy Cows as Determined Using Sample Diets

Days in milk	Holstein = 680 kg Bwt. Mature Bwt = 680 kg, BCS = 3.0, 65 mos age. Milk fat = 3.5%, milk true protein = 3.0%, lactose = 4.8%. Default environmental conditions				Jersey = 454 kg Bwt. mature Bwt = 454 kg, BCS = 3.0, 65 mos age milk fat = 4.2%, milk true protein = 3.6%, lactose = 4.8% Default environmental conditions					
	90 Model predicted	90 Model predicted	90 Model predicted	90 Model predicted	90 Model predicted	90 Model predicted ^h	90 Model predicted	50 Model predicted ^h	120 Model predicted ^h	90 Model predicted + 5% ^h
Dry matter intake input										
Milk production (kg)	25	35	45	54.4	25	35	40	35	35	35
Milk production (lbs)	55	77	99	120	55	77	88	77	77	77
Dry matter intake (kg)	20.3	23.6	26.9	30	18	21.7	23.5	19.8	22.2	22.7
Dry matter intake (lbs)	44.7	51.9	59.2	66	39.6	47.7	51.7	43.6	48.8 ^c	49.9
Daily wt change (kg)	0.5	0.3	0.1	-0.2	0	-0.2	-0.5	-0.7	-0.1	0
Days to gain one condition score	221	316	1166		3777					4247
Days to lose one condition score				544		241	110	80	532	
Energy ^d										
NE _L (Mcal/day)	27.9	34.8	41.8	48.3	27.7	35.6	39.5	35.6	35.6	35.6
NE _L (Mcal/kg)	1.37	1.47	1.55	1.61	1.54	1.64	1.68	1.8 a	1.6	1.57
NE _L (Mcal/lb)	0.62	0.67	0.7	0.73	0.7	0.74	0.76	0.82	0.73	0.71
Protein										
Metabolizable protein (g/d)	1862	2407	2954	3476	1991	2639	2965	2579	2656	2672
Diet % MP	9.2	10.2	11	11.6	11.1	12.2	12.6	13	12	11.8
Rumen degradable protein (g/d)	1937	2296	2636	2947	1747	2125	2288	1971	2167	2206
Diet % RDP	9.5	9.7	9.8	9.8	9.7	9.8	9.7	10	9.8	9.7
Rumen undegradable protein (g/d)	933	1291	1677	2089	1151	1632	1865	1670	1619	1611
Diet % RUP	4.6	5.5	6.2	6.9	6.4	7.5	7.9	8.4	7.3	7.1
% RDP + % RUP (crude protein) ^b	14.1	15.2	16.0	16.7	16.1	17.3	17.6	18.4	17.1	16.8
Fiber and carbohydrate ^c										
NDF, min %	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33	25-33
ADF, min %	17-21	17-21	17-21	17-21	17-21	17-21	17-21	17-21	17-21	17-21
NFC, max %	36-44	36-44	36-44	36-44	36-44	36-44	36-44	36-44	36-44	36-44
Minerals										
Absorbable calcium (g/day)	52.1	65	76.5	88	50.7	65.2	72.4	65.2	65.2	65.2
Dietary Ca %	0.62	0.61	0.67	0.6	0.57	0.57	0.63	0.66	0.54	0.53
Absorbable phosphorus (g/day)	44.2	56.5	68.8	80.3	41.4	54.1	60.4	52.2	54.6	55.1
Dietary P %	0.32	0.35	0.36	0.38	0.33	0.37	0.36	0.44	0.35	0.34
Mg ^d %	0.18	0.19	0.2	0.21	0.18	0.19	0.2	0.21	0.19	0.19
Cl %	0.24	0.26	0.28	0.29	0.24	0.26	0.27	0.28	0.25	0.25
K ^e %	1	1.04	1.06	1.07	1.02	1.03	1.04	1.07	1.03	1.02
Na %	0.22	0.23	0.22	0.22	0.2	0.2	0.2	0.22	0.2	0.19
S %	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Co mg/kg	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Cu mg/kg ^f	11	11	11	11	10	10	10	11	10	9
I mg/kg ^g	0.6	0.5	0.44	0.4	0.44	0.4	0.34	0.4	0.36	0.35
Fe mg/kg	12.3	15	17	18	14	16	17	18	16	15
Mn mg/kg	14	14	13	13	12	12	12	13	12	12
Se mg/kg	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Zn mg/kg	43	48	52	55	45	49	51	54	48	47
Vitamin A (IU/day)	75000	75000	75000	75000	49500	49500	49500	49500	49500	49500
Vitamin D (IU/day)	21000	21000	21000	21000	13500	13500	13500	13500	13500	13500
Vitamin E (IU/day)	545	545	545	545	360	360	360	360	360	360
Vitamin A (IU/kg)	3695	3169	2780	2500	2772	2300	2123	2520	2247	2198
Vitamin D (IU/kg)	1004	864	758	680	755	627	579	687	613	600
Vitamin E (IU/kg)	27	23	20	18	20	17	16	18	16	16

Sample diets used in model to generate tables. Ingredients listed as kg/day DM.

Corn silage, normal	5.48	8.21	5.61	12.02	8.96	7.77	7.39	7.1	7.96	8.15
Soybean meal, solv. 48% CP	1.01	1.62	1.41	2.39	2.16	2.78	1.67	2.54	2.85	2.91
Legume forage silage, mid-maturity	3.85	4.57			2.67	3.1		2.83	3.18	3.25
Corn grain, steam flaked	1.8	4.33	7.08	6.35	2.6	4.91	5.88	4.48	5.03	5.15
Calcium carbonate	0.04	0.07	0.09	0.02	0.06	0.04	0.03	0.04	0.04	0.04
Monosodium phosphate (1 H ₂ O)	0.02	0.02	0.04	0.06	0.01	0.01	0.03	0.01	0.01	0.01
Soybean meal, expellers							1.16			
Legume forage hay, immature			6.16	5.42			4.59			
Sodium chloride	0.12	0.011	0.12	0.14	0.1	0.1	0.12	0.09	0.1	0.1
Grass hay, c-3, mid-mat	4.47	3.21	0.98	0.93	0.85	0.95	0.97			
Vitamin and mineral premix	0.54	0.49	0.51	0.49	0.5	0.5	0.5	0.45	0.51	0.52
Permethrin, low residual			0.57							