

Animal Nutrient Requirements

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Different classes of animals have different requirements for total pounds of feed (intake), energy, protein, vitamins, and minerals. As demonstrated in Figures 1.1 and 1.2, the specific amounts needed depend on the animal's stage of production and the level of performance desired by the livestock manager. Requirements also may vary depending on previous diet. For example, when an animal has been on a limited diet and then is fed a more nutritious diet, the diet is utilized more efficiently in a compensatory manner. Frame score (structural size) also influences requirements (see references, page 2).

Water is another crucial part of a livestock nutrition program. Livestock should always have access to adequate quantities of good-quality, clean water. Lack of water leads to decreased feed intake, lower production, and reduced revenues. Water requirements for a cow-calf pair range from 12 to 20 gallons per day. Yearling cattle require 6 to 14 gallons per day.

Certain metals and contaminants are detrimental to livestock if present in water at significant levels. Test water to make sure the water is free from harmful materials (see references, page 2).

Initial steps to evaluating livestock rations include: (1) describing the animal, and (2) determining the animal's nutrient requirements. Nutrient

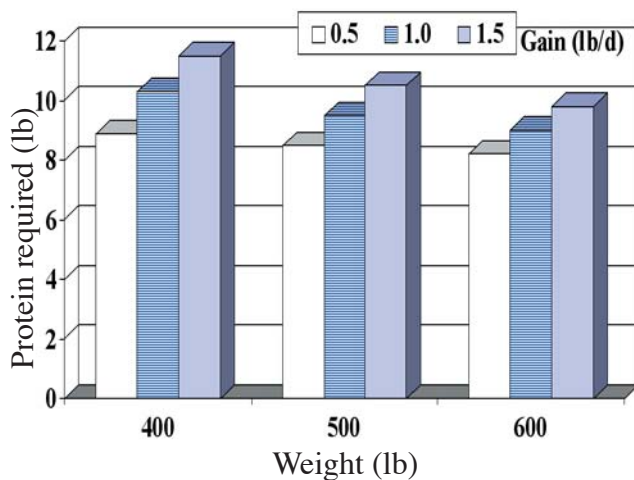


Figure 1.1—Protein requirements of medium-framed steers at various weights and rates of gain.

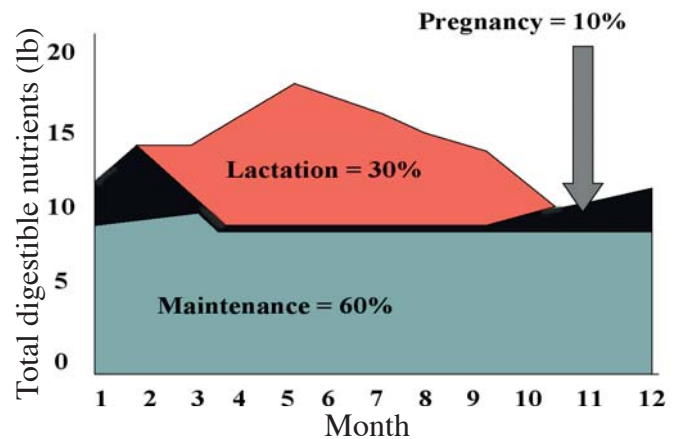


Figure 1.2—Example of annual energy inputs for a spring-calving cow. Source: Zollinger, B. and D. Hansen. 2003. *OSU Calving School Handbook*, Animal Sciences publication 110. <http://oregonstate.edu/dept/animal-sciences/cschhand.pdf>



requirements for growing and finishing cattle (Table 1.1) and for breeding cattle (Table 1.2) are included on pages 5–17.

A word of caution when using these tables: environmental factors such as mud, snow, cold, etc. increase nutrient requirements, particularly for energy. For instance, the critical temperature for most wintering cows in eastern Oregon is around 30°F. When wind chill drops below 30°F, the energy requirement increases. For each 1°F drop in wind chill, the energy requirement increases by 1 percent. If the wind chill is 0°F, the energy requirement required to maintain the cow increases by 30 percent. Also, cows in poor body condition take more energy for maintenance than cows in good body condition (see Chapter 7).

To begin an evaluation of your livestock-feeding program, fill in the following worksheets using the appropriate tables.

References

- Bagley, C.V., J. Kotuby-Amacher, and K. Farrell-Poe. 1999. Analysis of Water Quality for Livestock. CL602 in *Cow–Calf Management Guide and Cattle Producer’s Library*. Agricultural Communications, College of Agricultural and Life Sciences, University of Idaho, Moscow, ID 83844-2332. Phone: 208-885-7839. Web: <http://WBRC.ag.uidaho.edu/>
- Bartlett, B. 1999. *Watering Systems for Grazing Livestock*. Michigan State University Extension Service. Available from Ben Bartlett, U.P. Experiment Station, 102 University Dr., Chatham, MI 49816. Phone: 906-439-5880. E-mail: bartlett@msue.msu.edu
- Dansie, J.D., B. Bruce, and R. Torell. 2002. Frame Scores and Cattle Feeder Grades. CL775 in *Cow–Calf Management Guide and Cattle Producer’s Library*. Agricultural Communications, College of Agricultural and Life Sciences, University of Idaho, Moscow, ID 83844-2332. Phone: 208-885-7839. Web: <http://WBRC.ag.uidaho.edu/>
- National Research Council. 1984. *Nutrient Requirements of Beef Cattle*. National Academies Press, Washington, DC. Web: <http://www.nap.edu/>
- Zollinger, B. and D. Hansen. 2003. *OSU Calving School Handbook*, Animal Sciences publication 110. <http://oregonstate.edu/dept/animal-sciences/cschand.pdf>

Worksheet 1.1

Nutrient Requirements for Growing and Finishing Cattle

1. Animal description

Frame and sex _____

Growth characteristics (compensating or not) _____

Animal weight _____

Daily gain desired _____

Average daily gain = (final weight – current weight) ÷ days to gain

Climatic and lot conditions (temperature, precipitation, mud, snow, etc.) _____

2. Nutrient requirements (per day)—see Table 1.1

Expected dry matter intake (DMI): pounds _____

Protein: % in diet _____ pounds _____

Energy, total digestible nutrients (TDN): % in diet _____ pounds _____

Calcium (% Ca) _____

Phosphorus (% P) _____

Worksheet 1.2 Nutrient Requirements for Breeding Cattle

1. Animal description

Sex and age _____

Stage of pregnancy/lactation _____

Milking ability (average = 10 lb/day; superior = 20 lb/day) _____

Animal weight _____

Daily gain desired _____

Average daily gain = (final weight – current weight) ÷ days to gain

2. Nutrient requirements (per day)—see Table 1.2

Expected dry matter intake (DMI): pounds _____

Protein: % in diet _____ pounds _____

Energy, total digestible nutrients (TDN): % in diet _____ pounds _____

Calcium (% Ca) _____

Phosphorus (% P) _____

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Medium-frame steer calves								
300	0.5	7.8	9.6	0.75	54.0	4.2	0.31	0.20
	1.0	8.4	11.4	0.95	58.5	4.9	0.45	0.24
	1.5	8.7	13.2	1.14	63.0	5.5	0.58	0.28
	2.0	8.9	14.8	1.32	67.5	6.0	0.72	0.32
	2.5	8.9	16.7	1.48	73.5	6.5	0.87	0.37
	3.0	8.0	19.9	1.60	85.0	6.8	1.13	0.47
400	0.5	9.7	8.9	0.87	54.0	5.2	0.27	0.18
	1.0	10.4	10.3	1.06	58.5	6.1	0.38	0.21
	1.5	10.8	11.5	1.24	63.0	6.8	0.47	0.25
	2.0	11.0	12.7	1.41	67.5	7.4	0.56	0.26
	2.5	11.0	14.2	1.56	73.5	8.1	0.68	0.30
	3.0	10.0	16.6	1.65	85.0	8.5	0.86	0.37
500	0.5	11.5	8.5	0.98	54.0	6.2	0.25	0.17
	1.0	12.3	9.5	1.16	58.5	7.2	0.32	0.20
	1.5	12.8	10.5	1.33	63.0	8.1	0.40	0.22
	2.0	13.1	11.4	1.49	67.5	8.8	0.47	0.24
	2.5	13.0	12.5	1.63	73.5	9.6	0.56	0.27
	3.0	11.8	14.4	1.69	85.0	10.0	0.69	0.32
600	0.5	13.2	8.2	1.08	54.0	7.1	0.23	0.18
	1.0	14.1	9.0	1.26	58.5	8.3	0.28	0.19
	1.5	14.7	9.8	1.42	63.0	9.3	0.35	0.21
	2.0	15.0	10.5	1.57	67.5	10.1	0.40	0.22
	2.5	14.9	11.4	1.69	73.5	11.0	0.46	0.24
	3.0	13.5	12.9	1.73	85.0	11.5	0.57	0.29
700	0.5	14.8	7.9	1.18	54.0	8.0	0.22	0.18
	1.0	15.8	8.6	1.35	58.5	9.2	0.27	0.18
	1.5	16.5	9.2	1.50	63.0	10.4	0.31	0.20
	2.0	16.8	9.8	1.65	67.5	11.3	0.34	0.21
	2.5	16.7	10.5	1.75	73.5	12.3	0.40	0.22
	3.0	15.2	11.7	1.77	85.0	12.9	0.49	0.26

^aDM = dry matter; TDN = total digestible nutrients (energy); Ca = calcium; P = phosphorus

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Medium-frame steer calves (continued)								
800	0.5	16.4	7.7	1.27	54.0	8.9	0.22	0.17
	1.0	17.5	8.3	1.44	58.5	10.2	0.24	0.19
	1.5	18.2	8.8	1.58	63.0	11.5	0.28	0.19
	2.0	18.6	9.2	1.72	67.5	12.6	0.31	0.20
	2.5	18.5	9.8	1.81	73.5	13.6	0.35	0.21
	3.0	16.8	10.8	1.81	85.0	14.3	0.42	0.25
900	0.5	17.9	7.6	1.36	54.0	9.7	0.21	0.18
	1.0	19.1	8.0	1.52	58.5	11.2	0.23	0.18
	1.5	19.9	8.4	1.66	63.0	12.5	0.25	0.19
	2.0	20.3	8.8	1.79	67.5	13.7	0.28	0.20
	2.5	20.2	9.3	1.87	73.5	14.8	0.31	0.20
	3.0	18.3	10.1	1.85	85.0	15.6	0.37	0.23
1,000	0.5	19.3	7.5	1.45	54.0	10.4	0.21	0.18
	1.0	20.7	7.8	1.60	58.5	12.1	0.21	0.18
	1.5	21.5	8.1	1.74	63.0	13.5	0.24	0.18
	2.0	22.0	8.4	1.85	67.5	14.9	0.25	0.19
	2.5	21.9	8.8	1.92	73.5	16.1	0.27	0.19
	3.0	19.8	9.5	1.88	85.0	16.8	0.32	0.22
Large-frame steer calves and compensating medium-frame yearling steers								
300	0.5	8.2	9.5	0.77	52.5	4.3	0.30	0.19
	1.0	8.7	11.3	0.99	56.0	4.9	0.46	0.23
	1.5	9.1	12.9	1.19	59.5	5.4	0.58	0.27
	2.0	9.4	14.6	1.37	63.5	6.0	0.70	0.30
	2.5	9.6	16.3	1.55	67.5	6.5	0.85	0.34
	3.0	9.6	18.0	1.73	72.0	6.9	0.99	0.39
	3.5	9.3	20.3	1.88	78.5	7.3	1.16	0.45
400	0.5	10.1	8.9	0.89	52.5	5.3	0.26	0.17
	1.0	10.8	10.2	1.10	56.0	6.0	0.37	0.20
	1.5	11.3	11.4	1.30	59.5	6.7	0.47	0.23
	2.0	11.7	12.7	1.47	63.5	7.4	0.57	0.26
	2.5	11.9	13.9	1.64	67.5	8.0	0.65	0.30
	3.0	11.9	15.2	1.81	72.0	8.6	0.76	0.33
	3.5	11.5	16.9	1.94	78.5	9.0	0.90	0.36

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Large-frame steer calves and compensating medium-frame yearling steers (continued)								
500	0.5	12.0	8.5	1.00	52.5	6.3	0.24	0.17
	1.0	12.8	9.5	1.21	56.0	7.2	0.33	0.19
	1.5	13.4	10.4	1.40	59.5	8.0	0.39	0.21
	2.0	13.8	11.4	1.57	63.5	8.8	0.46	0.24
	2.5	14.0	12.4	1.73	67.5	9.5	0.55	0.25
	3.0	14.0	13.4	1.88	72.0	10.1	0.63	0.28
	3.5	13.6	14.7	2.00	78.5	10.7	0.73	0.32
600	0.5	13.8	8.2	1.11	52.5	7.2	0.22	0.18
	1.0	14.6	9.0	1.31	56.0	8.2	0.29	0.18
	1.5	15.3	9.7	1.50	59.5	9.1	0.35	0.20
	2.0	15.8	10.5	1.66	63.5	10.0	0.40	0.22
	2.5	16.1	11.3	1.81	67.5	10.9	0.47	0.23
	3.0	16.1	12.1	1.95	72.0	11.6	0.52	0.26
	3.5	15.6	13.2	2.05	78.5	12.2	0.61	0.28
700	0.5	15.4	7.9	1.21	52.5	8.1	0.21	0.17
	1.0	16.4	8.6	1.41	56.0	9.2	0.27	0.19
	1.5	17.2	9.2	1.59	59.5	10.2	0.31	0.19
	2.0	17.8	9.8	1.74	63.5	11.3	0.36	0.21
	2.5	18.0	10.5	1.88	67.5	12.2	0.40	0.22
	3.0	18.0	11.1	2.01	72.0	13.0	0.45	0.23
	3.5	17.5	12.0	2.10	78.5	13.7	0.52	0.26
800	0.5	17.1	7.7	1.31	52.5	8.9	0.21	0.18
	1.0	18.2	8.3	1.51	56.0	10.2	0.24	0.18
	1.5	19.0	8.8	1.68	59.5	11.3	0.28	0.19
	2.0	19.6	9.3	1.82	63.5	12.4	0.32	0.20
	2.5	19.9	9.8	1.96	67.5	13.4	0.35	0.21
	3.0	19.9	10.4	2.07	72.0	14.3	0.40	0.22
	3.5	19.3	11.1	2.15	78.5	15.2	0.45	0.24
900	0.5	18.6	7.6	1.40	52.5	9.8	0.20	0.18
	1.0	19.8	8.0	1.60	56.0	11.2	0.23	0.18
	1.5	20.8	8.5	1.77	59.5	12.4	0.27	0.18
	2.0	21.4	8.9	1.90	63.5	13.6	0.29	0.20
	2.5	21.8	9.3	2.03	67.5	14.7	0.31	0.20
	3.0	21.7	9.8	2.13	72.0	15.6	0.36	0.21
	3.5	21.1	10.4	2.19	78.5	16.6	0.40	0.23

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Large-frame steer calves and compensating medium-frame yearling steers (continued)								
1,000	0.5	20.2	7.5	1.49	52.5	10.6	0.20	0.17
	1.0	21.5	7.8	1.69	56.0	12.0	0.23	0.17
	1.5	22.5	8.2	1.85	59.5	13.4	0.25	0.18
	2.0	23.2	8.6	1.98	63.5	14.7	0.27	0.18
	2.5	23.6	8.9	2.09	67.5	15.9	0.29	0.19
	3.0	23.6	9.3	2.19	72.0	17.0	0.32	0.20
	3.5	22.8	9.8	2.24	78.5	17.9	0.35	0.21
1,100	0.5	21.7	7.4	1.58	52.5	11.4	0.19	0.18
	1.0	23.1	7.7	1.77	56.0	12.9	0.21	0.18
	1.5	24.1	8.0	1.93	59.5	14.3	0.23	0.18
	2.0	24.9	8.3	2.05	63.5	15.8	0.25	0.18
	2.5	25.3	8.5	2.16	67.5	17.1	0.26	0.18
	3.0	25.3	8.9	2.25	72.0	18.2	0.29	0.19
	3.5	24.5	9.3	2.28	78.5	19.2	0.32	0.21
Medium-frame bulls								
300	0.5	7.8	9.7	0.76	53.5	4.2	0.31	0.20
	1.0	8.3	11.6	0.96	57.5	4.8	0.48	0.24
	1.5	8.6	13.4	1.15	61.5	5.3	0.62	0.28
	2.0	8.8	15.2	1.34	65.5	5.8	0.75	0.33
	2.5	8.9	17.0	1.52	70.0	6.2	0.92	0.37
	3.0	8.7	19.3	1.68	76.5	6.7	1.09	0.43
400	0.5	9.6	9.0	0.87	53.5	5.1	0.28	0.18
	1.0	10.3	10.4	1.07	57.5	5.9	0.39	0.21
	1.5	10.7	11.8	1.26	61.5	6.6	0.49	0.25
	2.0	11.0	13.1	1.44	65.5	7.2	0.60	0.28
	2.5	11.1	14.4	1.60	70.0	7.8	0.70	0.32
	3.0	10.8	16.1	1.74	76.5	8.3	0.84	0.37
500	0.5	11.4	8.6	0.98	53.5	6.1	0.25	0.17
	1.0	12.1	9.7	1.17	57.5	7.0	0.35	0.20
	1.5	12.7	10.7	1.35	61.5	7.8	0.42	0.23
	2.0	13.0	11.7	1.52	65.5	8.5	0.49	0.25
	2.5	13.1	12.8	1.68	70.0	9.2	0.59	0.27
	3.0	12.8	14.1	1.81	76.5	9.8	0.69	0.31

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Medium-frame bulls (continued)								
600	0.5	13.1	8.3	1.08	53.5	7.0	0.24	0.19
	1.0	13.9	9.2	1.27	57.5	8.0	0.30	0.19
	1.5	14.5	10.0	1.44	61.5	8.9	0.36	0.21
	2.0	14.9	10.8	1.61	65.5	9.8	0.43	0.24
	2.5	15.0	11.6	1.75	70.0	10.5	0.50	0.25
	3.0	14.7	12.7	1.86	76.5	11.2	0.57	0.29
700	0.5	14.7	8.0	1.18	53.5	7.9	0.23	0.18
	1.0	15.6	8.8	1.37	57.5	9.0	0.28	0.20
	1.5	16.3	9.4	1.53	61.5	10.0	0.32	0.20
	2.0	16.7	10.1	1.69	65.5	10.9	0.38	0.22
	2.5	16.8	10.8	1.82	70.0	11.8	0.43	0.24
	3.0	16.5	11.7	1.92	76.5	12.6	0.49	0.25
800	0.5	16.2	7.8	1.27	53.5	8.7	0.22	0.19
	1.0	17.3	8.4	1.45	57.5	9.9	0.25	0.19
	1.5	18.0	9.0	1.61	61.5	11.1	0.29	0.20
	2.0	18.5	9.5	1.76	65.5	12.1	0.33	0.21
	2.5	18.6	10.1	1.89	70.0	13.0	0.38	0.23
	3.0	18.2	10.8	1.97	76.5	13.9	0.44	0.24
900	0.5	17.7	7.7	1.36	53.5	9.5	0.21	0.19
	1.0	18.9	8.2	1.54	57.5	10.9	0.25	0.19
	1.5	19.7	8.6	1.69	61.5	12.1	0.28	0.19
	2.0	20.2	9.1	1.83	65.5	13.2	0.31	0.21
	2.5	20.3	9.6	1.95	70.0	14.2	0.34	0.22
	3.0	19.9	10.2	2.02	76.5	15.2	0.39	0.23
1,000	0.5	19.2	7.5	1.45	53.5	10.3	0.21	0.18
	1.0	20.4	8.0	1.62	57.5	11.7	0.24	0.18
	1.5	21.3	8.4	1.77	61.5	13.1	0.26	0.19
	2.0	21.8	8.7	1.90	65.5	14.3	0.28	0.19
	2.5	22.0	9.1	2.01	70.0	15.4	0.31	0.20
	3.0	21.5	9.6	2.07	76.5	16.4	0.35	0.22
1,100	0.5	20.6	7.4	1.54	53.5	11.0	0.20	0.19
	1.0	21.9	7.8	1.70	57.5	12.6	0.22	0.19
	1.5	22.9	8.1	1.85	61.5	14.1	0.24	0.19
	2.0	23.4	8.4	1.97	65.5	15.3	0.26	0.19
	2.5	23.6	8.7	2.07	70.0	16.5	0.28	0.20
	3.0	23.1	9.2	2.11	76.5	17.7	0.32	0.21

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Large-frame bull calves and compensating large-frame yearling steers								
300	0.5	7.9	9.7	0.77	52.5	4.1	0.31	0.20
	1.0	8.4	11.7	0.98	56.0	4.7	0.47	0.24
	1.5	8.8	13.5	1.18	59.5	5.2	0.63	0.28
	2.5	9.2	17.0	1.56	66.5	6.1	0.91	0.36
	3.0	9.2	18.8	1.74	70.5	6.5	1.08	0.43
	3.5	9.1	20.9	1.91	75.5	6.9	1.24	0.48
	4.0	8.2	24.7	2.04	86.0	7.1	1.53	0.59
400	0.5	9.8	9.0	0.89	52.5	5.1	0.27	0.18
	1.0	10.4	10.5	1.09	56.0	5.8	0.40	0.21
	1.5	10.9	11.9	1.29	59.5	6.5	0.51	0.24
	2.0	11.2	13.1	1.48	62.5	7.0	0.61	0.28
	2.5	11.4	14.5	1.65	66.5	7.6	0.72	0.31
	3.0	11.5	15.9	1.82	70.5	8.1	0.82	0.35
	3.5	11.3	17.5	1.98	75.5	8.5	0.96	0.39
500	0.5	11.6	8.6	1.00	52.5	6.1	0.25	0.19
	1.0	12.3	9.8	1.20	56.0	6.9	0.36	0.21
	1.5	12.9	10.9	1.39	59.5	7.7	0.43	0.22
	2.0	13.2	11.8	1.58	62.5	8.3	0.52	0.25
	2.5	13.5	12.9	1.74	66.5	9.0	0.59	0.28
	3.0	13.6	14.0	1.90	70.5	9.6	0.68	0.31
	3.5	13.4	15.3	2.05	75.5	10.1	0.77	0.35
600	0.5	13.3	8.3	1.10	52.5	7.0	0.23	0.18
	1.0	14.1	9.2	1.30	56.0	7.9	0.31	0.20
	1.5	14.8	10.1	1.48	59.5	8.8	0.37	0.21
	2.0	15.2	10.9	1.67	62.5	9.5	0.44	0.23
	2.5	15.5	11.8	1.82	66.5	10.3	0.51	0.26
	3.0	15.5	12.7	1.97	70.5	10.9	0.58	0.27
	3.5	15.3	13.7	2.11	75.5	11.6	0.66	0.30
4.0	13.8	15.6	2.16	86.0	11.9	0.81	0.37	

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Large-frame bull calves and compensating large-frame yearling steers (continued)								
700	0.5	14.9	8.0	1.20	52.5	7.8	0.22	0.18
	1.0	15.9	8.8	1.40	56.0	8.9	0.29	0.19
	1.5	16.6	9.6	1.57	59.5	9.9	0.35	0.21
	2.0	17.0	10.2	1.75	62.5	10.6	0.39	0.22
	2.5	17.4	11.0	1.90	66.5	11.6	0.44	0.24
	3.0	17.5	11.7	2.04	70.5	12.3	0.50	0.25
	3.5	17.2	12.5	2.16	75.5	13.0	0.56	0.25
	4.0	15.5	14.1	2.20	86.0	13.3	0.70	0.33
800	0.5	16.5	7.9	1.30	52.5	8.7	0.21	0.19
	1.0	17.5	8.5	1.49	56.0	9.8	0.26	0.19
	1.5	18.3	9.1	1.66	59.5	10.9	0.31	0.20
	2.0	18.8	9.7	1.84	62.5	11.8	0.35	0.21
	2.5	19.2	10.3	1.97	66.5	12.8	0.40	0.23
	3.0	19.3	10.9	2.11	70.5	13.6	0.45	0.24
	3.5	19.0	11.6	2.22	75.5	14.3	0.50	0.26
	4.0	17.1	13.0	2.24	86.0	14.7	0.61	0.31
900	0.5	18.0	7.7	1.39	52.5	9.5	0.22	0.18
	1.0	19.2	8.3	1.58	56.0	10.8	0.25	0.18
	1.5	20.0	8.8	1.74	59.5	11.9	0.29	0.20
	2.0	20.6	9.2	1.92	62.5	12.9	0.32	0.20
	2.5	21.0	9.8	2.04	66.5	14.0	0.36	0.21
	3.0	21.1	10.3	2.17	70.5	14.9	0.40	0.23
	3.5	20.8	10.9	2.27	75.5	15.7	0.45	0.24
	4.0	18.7	12.1	2.27	86.0	16.1	0.53	0.28
1,000	0.5	19.5	7.6	1.48	52.5	10.2	0.21	0.18
	1.0	20.7	8.1	1.66	56.0	11.6	0.25	0.19
	1.5	21.7	8.5	1.83	59.5	12.9	0.27	0.19
	2.0	22.3	8.9	1.99	62.5	13.9	0.30	0.20
	2.5	22.7	9.3	2.11	66.5	15.1	0.33	0.20
	3.0	22.8	9.7	2.23	70.5	16.1	0.36	0.21
	3.5	22.5	10.3	2.32	75.5	17.0	0.40	0.24
	4.0	20.2	11.3	2.30	86.0	17.4	0.48	0.27

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Large-frame bull calves and compensating large-frame yearling steers (continued)								
1,100	0.5	20.9	7.5	1.57	52.5	11.0	0.21	0.19
	1.0	22.3	7.9	1.75	56.0	12.5	0.23	0.19
	1.5	23.3	8.3	1.91	59.5	13.9	0.26	0.19
	2.0	23.9	8.6	2.07	62.5	14.9	0.28	0.19
	2.5	24.2	9.0	2.18	66.5	16.1	0.30	0.20
	3.0	24.5	9.3	2.29	70.5	17.3	0.32	0.21
	3.5	24.1	9.8	2.37	75.5	18.2	0.36	0.22
	4.0	21.7	10.7	2.33	86.0	18.7	0.43	0.25
Medium-frame heifer calves								
300	0.5	7.5	9.6	0.73	56.0	4.2	0.29	0.21
	1.0	8.0	11.4	0.91	62.0	5.0	0.44	0.22
	1.5	8.2	13.1	1.08	68.5	5.6	0.59	0.27
	2.0	8.0	15.1	1.22	77.0	6.2	0.74	0.33
400	0.5	9.3	8.9	0.84	56.0	5.2	0.26	0.19
	1.0	9.9	10.2	1.01	62.0	6.1	0.36	0.20
	1.5	10.2	11.4	1.17	68.5	7.0	0.45	0.24
	2.0	10.0	12.9	1.29	77.0	7.7	0.57	0.29
500	0.5	11.0	8.5	0.94	56.0	6.2	0.24	0.18
	1.0	11.8	9.4	1.11	62.0	7.3	0.30	0.21
	1.5	12.1	10.3	1.25	68.5	8.4	0.38	0.22
	2.0	11.8	11.4	1.35	77.0	9.1	0.45	0.24
600	0.5	12.6	8.1	1.04	56.0	7.1	0.23	0.18
	1.0	13.5	8.8	1.19	62.0	8.4	0.28	0.20
	1.5	13.8	9.5	1.32	68.5	9.5	0.32	0.21
	2.0	13.5	10.4	1.41	77.0	10.4	0.38	0.23
700	0.5	14.1	7.9	1.13	56.0	8.0	0.22	0.19
	1.0	15.1	8.4	1.28	62.0	9.4	0.25	0.19
	1.5	15.5	9.0	1.39	68.5	10.6	0.28	0.20
	2.0	15.2	9.6	1.46	77.0	11.7	0.32	0.22
800	0.5	15.6	7.7	1.22	56.0	8.7	0.21	0.18
	1.0	16.7	8.1	1.36	62.0	10.4	0.22	0.18
	1.5	17.2	8.5	1.46	68.5	11.8	0.24	0.19
	2.0	16.8	9.0	1.51	77.0	12.9	0.28	0.20

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Medium-frame heifer calves (continued)								
900	0.5	17.1	7.5	1.31	56.0	9.6	0.21	0.18
	1.0	18.3	7.8	1.44	62.0	11.3	0.22	0.18
	1.5	18.8	8.1	1.53	68.5	12.9	0.22	0.19
	2.0	18.3	8.5	1.56	77.0	14.1	0.25	0.19
1,000	0.5	18.5	7.4	1.39	56.0	10.4	0.20	0.19
	1.0	19.8	7.6	1.51	62.0	12.3	0.20	0.18
	1.5	20.3	7.8	1.59	68.5	13.9	0.21	0.18
	2.0	19.8	8.1	1.61	77.0	15.2	0.22	0.19
Large-frame heifer calves and compensating medium-frame yearling heifers								
300	0.5	7.8	9.5	0.76	54.0	4.2	0.31	0.20
	1.0	8.4	11.3	0.95	59.0	5.0	0.45	0.24
	1.5	8.8	13.0	1.13	64.0	5.6	0.58	0.25
	2.0	8.9	14.6	1.30	69.5	6.2	0.69	0.30
	2.5	8.7	16.7	1.45	77.0	7.0	0.86	0.35
400	0.5	9.7	8.9	0.87	54.0	5.2	0.27	0.18
	1.0	10.5	10.1	1.06	59.0	6.2	0.36	0.21
	1.5	10.9	11.3	1.23	64.0	7.0	0.45	0.22
	2.0	11.1	12.6	1.38	69.5	7.7	0.54	0.26
	2.5	10.8	14.1	1.51	77.0	8.3	0.65	0.31
500	0.5	11.5	8.4	0.98	54.0	6.1	0.23	0.17
	1.0	12.4	9.4	1.16	59.0	7.3	0.30	0.20
	1.5	12.9	10.3	1.32	64.0	8.3	0.38	0.20
	2.0	13.1	11.2	1.46	69.5	9.1	0.44	0.24
	2.5	12.8	12.4	1.57	77.0	10.0	0.53	0.26
600	0.5	13.2	8.1	1.08	54.0	7.1	0.22	0.18
	1.0	14.1	8.9	1.25	59.0	8.3	0.28	0.19
	1.5	14.8	9.6	1.41	64.0	9.5	0.33	0.19
	2.0	15.0	10.3	1.54	69.5	10.4	0.38	0.22
	2.5	14.6	11.2	1.63	77.0	11.2	0.44	0.24
700	0.5	14.8	7.9	1.18	54.0	8.0	0.21	0.18
	1.0	15.9	8.5	1.34	59.0	9.4	0.25	0.18
	1.5	16.6	9.0	1.49	64.0	10.6	0.29	0.19
	2.0	16.8	9.6	1.61	69.5	11.7	0.33	0.20
	2.5	16.4	10.3	1.68	77.0	12.6	0.38	0.22

Table 1.1. Nutrient requirements for growing and finishing cattle (nutrient concentration in diet dry matter)^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Large-frame heifer calves and compensating medium-frame yearling heifers (continued)								
800	0.5	16.4	7.7	1.27	54.0	8.9	0.20	0.17
	1.0	17.6	8.2	1.43	59.0	10.4	0.24	0.18
	1.5	18.3	8.6	1.57	64.0	11.7	0.25	0.18
	2.0	18.6	9.0	1.67	69.5	12.9	0.28	0.19
	2.5	18.1	9.6	1.74	77.0	13.9	0.33	0.21
900	0.5	17.8	7.5	1.36	54.0	9.6	0.20	0.18
	1.0	19.2	7.9	1.52	59.0	11.3	0.22	0.18
	1.5	20.0	8.2	1.64	64.0	12.8	0.23	0.18
	2.0	20.3	8.6	1.74	69.5	14.1	0.26	0.18
	2.5	19.8	9.0	1.78	77.0	15.2	0.29	0.20
1,000	0.5	19.3	7.4	1.45	54.0	10.4	0.19	0.18
	1.0	20.8	7.7	1.60	59.0	12.3	0.21	0.18
	1.5	21.7	8.0	1.71	64.0	13.9	0.21	0.18
	2.0	22.0	8.2	1.80	69.5	15.3	0.23	0.18
	2.5	21.5	8.6	1.83	77.0	16.6	0.25	0.18
1,100	0.5	20.8	7.3	1.54	54.0	11.2	0.19	0.18
	1.0	22.3	7.5	1.68	59.0	13.2	0.20	0.18
	1.5	23.3	7.7	1.78	64.0	14.9	0.20	0.18
	2.0	23.6	7.9	1.86	69.5	16.4	0.21	0.18
	2.5	23.1	8.2	1.88	77.0	17.8	0.22	0.18

Source: Adapted from National Research Council. 1984. *Nutrient Requirements of Beef Cattle*. National Academies Press, Washington, DC.

Table 1.2. Nutrients requirements of breeding beef cattle (nutrient concentration in diet dry matter).^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Pregnant yearling heifers—last third of pregnancy								
700	0.9	15.3	8.4	1.3	55.4	8.5	0.27	0.20
	1.4	15.8	9.0	1.4	60.3	9.6	0.33	0.21
	1.9	15.8	9.8	1.5	67.0	10.6	0.33	0.21
750	0.9	16.1	8.3	1.3	55.1	8.9	0.27	0.19
	1.4	16.6	8.9	1.5	59.9	10.0	0.32	0.21
	1.9	16.6	9.5	1.6	66.5	11.1	0.37	0.23
800	0.9	16.8	8.2	1.4	54.8	9.2	0.28	0.20
	1.4	17.4	8.8	1.5	59.6	10.4	0.33	0.21
	1.9	17.5	9.3	1.6	66.1	11.6	0.35	0.21
850	0.9	17.6	8.2	1.4	54.5	9.6	0.26	0.20
	1.4	18.2	8.6	1.6	59.3	10.8	0.30	0.21
	1.9	18.3	9.1	1.7	65.7	12.1	0.34	0.22
900	0.9	18.3	8.1	1.5	54.3	9.9	0.26	0.20
	1.4	19.0	8.5	1.6	59.1	11.3	0.30	0.21
	1.9	19.2	9.0	1.7	65.4	12.5	0.32	0.21
950	0.9	19.0	8.0	1.5	54.1	10.3	0.27	0.20
	1.4	19.8	8.4	1.7	58.9	11.7	0.29	0.21
	1.9	20.0	8.8	1.8	65.1	13.0	0.32	0.21
Dry pregnant mature cows—middle third of pregnancy								
800	0.0	15.3	7.1	1.1	48.8	7.5	0.17	0.17
900	0.0	16.7	7.0	1.2	48.8	8.2	0.18	0.18
1,000	0.0	18.1	7.0	1.3	48.8	8.8	0.18	0.18
1,100	0.0	19.5	7.0	1.4	48.8	9.5	0.19	0.19
1,200	0.0	20.8	6.9	1.4	48.8	10.1	0.19	0.19
1,300	0.0	22.0	6.9	1.5	48.8	10.8	0.20	0.20
1,400	0.0	23.3	6.9	1.6	48.8	11.4	0.20	0.20
Dry pregnant mature cows—last third of pregnancy								
800	0.9	16.8	8.2	1.4	54.5	9.2	0.26	0.20
900	0.9	18.2	8.0	1.5	54.0	9.8	0.27	0.21
1,000	0.9	19.6	7.9	1.6	53.6	10.5	0.26	0.20
1,100	0.9	21.0	7.8	1.6	53.2	11.2	0.26	0.21
1,200	0.9	22.3	7.8	1.7	52.9	11.8	0.26	0.21
1,300	0.9	23.6	7.7	1.8	52.7	12.5	0.26	0.21
1,400	0.9	24.9	7.6	1.9	52.5	13.1	0.26	0.21

^aDM = dry matter; TDN = total digestible nutrients (energy); Ca = calcium; P = phosphorus

Table 1.2. Nutrients requirements of breeding beef cattle (nutrient concentration in diet dry matter).^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Two-year-old heifers nursing calves—first 3 to 4 months postpartum—10 lb milk/day								
700	0.5	15.9	11.3	1.8	65.1	10.3	0.36	0.24
750	0.5	16.7	11.0	1.8	64.4	10.8	0.34	0.24
800	0.5	17.6	10.8	1.9	63.8	11.2	0.34	0.24
850	0.5	18.4	10.6	1.9	63.2	11.6	0.33	0.23
900	0.5	19.2	10.4	2.0	62.7	12.0	0.33	0.23
950	0.5	20.0	10.2	2.0	62.3	12.5	0.32	0.23
1,000	0.5	20.8	10.0	2.1	61.9	12.9	0.31	0.23
Cows nursing calves—average milking ability—first 3 to 4 months postpartum—10 lb milk/day								
800	0.0	17.3	10.2	1.8	58.2	10.1	0.30	0.22
900	0.0	18.8	9.9	1.9	57.3	10.8	0.28	0.22
1,000	0.0	20.2	9.6	2.0	56.6	11.5	0.28	0.22
1,100	0.0	21.6	9.4	2.0	56.0	12.1	0.27	0.22
1,200	0.0	23.0	9.3	2.1	55.5	12.8	0.27	0.22
1,300	0.0	24.3	9.1	2.2	55.1	13.4	0.27	0.22
1,400	0.0	25.6	9.0	2.3	54.7	14.0	0.27	0.22
Cows nursing calves—superior milking ability—first 3 to 4 months postpartum—20 lb milk/day								
800	0.0	15.7	14.2	2.2	77.3	12.1	0.48	0.31
900	0.0	18.7	12.9	2.4	69.8	13.1	0.41	0.28
1,000	0.0	20.6	12.3	2.5	67.0	13.8	0.39	0.27
1,100	0.0	22.3	11.9	2.6	65.2	14.5	0.38	0.27
1,200	0.0	23.8	11.5	2.7	63.7	15.2	0.36	0.26
1,300	0.0	25.3	11.2	2.8	62.6	15.9	0.36	0.26
1,400	0.0	26.7	11.0	2.9	61.7	16.5	0.35	0.26
Bulls, maintenance and slow rate of growth—regain body condition								
<1,300	For growth and development, use Table 1.1							
1,300	1.0	25.4	7.6	1.9	55.8	14.2	0.22	0.19
	1.5	26.1	7.9	2.0	59.7	15.6	0.24	0.19
	2.0	26.2	8.2	2.2	64.0	16.8	0.26	0.20
1,400	1.0	26.8	7.5	2.0	55.8	15.0	0.21	0.19
	1.5	27.6	7.7	2.1	59.7	16.5	0.23	0.19
	2.0	27.7	8.0	2.2	64.0	17.8	0.25	0.20
1,500	0.0	25.2	6.9	1.7	48.4	12.2	0.20	0.20
	1.0	28.3	7.4	2.1	55.8	15.8	0.21	0.19
	1.5	29.0	7.6	2.2	59.7	17.3	0.22	0.19
1,600	0.0	26.5	6.9	1.8	48.4	12.8	0.19	0.20
	1.0	29.7	7.3	2.2	55.8	16.6	0.22	0.19
	1.5	30.4	7.4	2.3	59.7	18.2	0.22	0.20

Table 1.2. Nutrients requirements of breeding beef cattle (nutrient concentration in diet dry matter).^a

Weight (lb)	Daily gain (lb/day)	DM intake (lb)	Protein (%)	Protein (lb)	TDN (%)	TDN (lb)	Ca (%)	P (%)
Bulls, maintenance and slow rate of growth—regain body condition (continued)								
1,700	0.0	27.7	6.8	1.9	48.4	13.4	0.21	0.21
	0.5	29.6	7.0	2.1	52.0	15.4	0.20	0.19
1,800	0.0	28.9	6.8	2.0	48.4	14.0	0.21	0.21
	0.5	30.9	7.0	2.2	52.0	16.1	0.20	0.20
1,900	0.0	30.1	6.8	2.0	48.4	14.6	0.21	0.21
	0.5	32.2	6.9	2.2	52.0	16.8	0.20	0.20
2,000	0.0	31.3	6.8	2.1	48.4	15.2	0.21	0.21
2,100	0.0	32.5	6.8	2.2	48.4	15.7	0.22	0.22
2,200	0.0	33.6	6.8	2.3	48.4	16.3	0.22	0.22

Source: Adapted from National Research Council. 1984. *Nutrient Requirements of Beef Cattle*. National Academies Press, Washington, DC.

