

ANR-60

ALABAMA A & M AND AUBURN UNIVERSITIES

Nutrient Requirements of Beef Cattle

This publication was prepared using information from *Nutrient Requirements of Beef Cattle*, 7th revised edition, 1996. The 7th edition is a significant revision of the 6th edition. For growing cattle the requirements are given based on their anticipated mature weight rather than on a medium or large frame. For bred heifers and brood cows the requirements are presented relative to months since calving and are based on a 12-month calving interval.

Tables 1 through 3 show the requirements of growing and finishing steers and heifers. Each table is based on the final anticipated weight of the animal. For example, if it is a steer it would be the anticipated slaughter weight and for a replacement heifer it would be her predicted weight at maturity with a body condition score of 5. This method of listing requirements is different from the method used in the previous publication, which listed requirements based on frame size (e.g., medium or large). Notice that within a class (i.e., final weight of 1,000 pounds) energy or TDN requirements are a function of growth rate and not of current body weight.

Tables 4 through 6 show the requirements of mature brood cows. These requirements are based on months since calving. This offers much more information than the previous NRC publication offered. All three of these tables assume that the calf will be weaned at 7 months of age, thus the sharp drop in nutrient requirements at this point. If the calves are weaned at a later date, the requirements will remain elevated through this time. Also within each weight group of cows described, the requirements are based on the size of calf that they wean. These weights are for a 7-month-old, male calf. Therefore, if 205-day weights are available it becomes quite easy to determine the nutrient requirements for a particular herd at any month of the year. For these tables to be meaningful, it is important to have a good estimate of daily intake by the cows. Some hay may contain fiber (NDF) contents great enough to limit daily consumption below the amount listed in the table. If this is the case, nutrient requirements as percentages will

need to be adjusted. Another important factor for effective use of these tables is current body condition of the cows. Mature cows should be a condition score 5 at calving to ensure acceptable rebreeding rates. If they are not, additional energy will be needed during late gestation to increase the condition score of the cows. Appendix Table A gives the amount of additional TDN needed per day to change the condition score in a 60-day period.

Example. Assume that a group of cows should weigh 1,200 pounds at a body condition score of 5. This herd is within 60 to 70 days of the beginning of the calving season, and they have an average condition score of 4. The herd records indicate that the average 205-day weight for the male calves is approximately 560 pounds. From Table 5, we determine that the cows will consume approximately 24 pounds of dry matter per day and that they require 52.3 percent TDN and 7.7 percent CP. Because we want to push these cows from a condition score 4 to a score of 5 in the 60 days before calving, we need to provide an additional 2.6 pounds of TDN per day. Based on the above requirements the cows need 12.55 pounds of TDN ($24 \times .523$) plus the additional 2.6 for a total of 15.15 pounds per day. As a percentage, this group of cows would require 63.1 percent TDN during this initial 30 days of the 60-day precalving time period.

Table 7 is a summary of requirements of pregnant replacement heifers. Similar to the previous tables these are relative to time of calving. The requirements in this table have included the nutrients needed for continual growth by the heifers. It is assumed that the heifers are gaining at a rate of .73, .88, and 1.02 pounds per day for the 1,000-, 1,200-, and 1,400-pound heifers, respectively.

Appendix Table B lists the mineral requirements for the various classes of cattle and also provides the maximum tolerable amount.

Table 1. Diet Nutrient Densities for Growing Cattle. Anticipated Finishing Weight (Feedlot Steers or Heifers) or Mature Weight (Replacement Heifers) of 1,000 Pounds.

Body Weight (lb.)	ADG (lb.)	DMI (lb./d)	TDN (%)	CP (%)	Ca (%)	P (%)
300	1.0	9.9	53.7	9.4	.39	.21
	1.5	10.2	58.2	11.3	.52	.27
	2.0	10.2	63.0	13.3	.65	.33
	2.5	10.1	68.4	15.6	.79	.40
	3.0	9.8	74.9	18.1	.95	.47
350	1.0	11.1	53.7	8.9	.35	.19
	1.5	11.4	58.2	10.6	.46	.24
	2.0	11.5	63.0	12.4	.57	.30
	2.5	11.3	68.4	14.3	.69	.35
	3.0	11.0	74.9	16.6	.83	.42
400	1.0	12.3	53.7	8.5	.32	.18
	1.5	12.6	58.2	10.0	.41	.22
	2.0	12.7	63.0	11.6	.51	.27
	2.5	12.5	68.4	13.4	.62	.32
	3.0	12.2	74.9	15.4	.74	.37
450	1.0	13.5	53.7	8.2	.30	.17
	1.5	13.8	58.2	9.5	.38	.21
	2.0	13.8	63.0	11.0	.46	.25
	2.5	13.7	68.4	12.6	.56	.29
	3.0	13.3	74.9	14.5	.68	.34
500	1.0	14.6	53.7	7.9	.27	.16
	1.5	14.9	58.2	9.2	.35	.19
	2.0	15.0	63.0	10.5	.42	.23
	2.5	14.8	68.4	12.0	.50	.27
	3.0	14.4	74.9	13.7	.60	.31
550	1.0	15.6	53.7	7.7	.26	.15
	1.5	16.0	58.2	8.9	.33	.18
	2.0	16.1	63.0	10.1	.39	.21
	2.5	15.9	68.4	11.4	.46	.25
	3.0	15.5	74.9	13.0	.54	.29
600	1.0	16.7	53.7	7.6	.25	.15
	1.5	17.1	58.2	8.6	.31	.17
	2.0	17.2	63.0	9.7	.36	.20
	2.5	17.0	68.4	11.0	.43	.23
	3.0	16.5	74.9	12.5	.50	.27
650	1.0	17.7	53.7	7.4	.24	.14
	1.5	18.1	58.2	8.4	.29	.17
	2.0	18.2	63.0	9.4	.34	.19
	2.5	18.0	68.4	10.6	.40	.22
	3.0	17.5	74.9	12.0	.46	.25

Table 2. Diet Nutrient Densities for Growing Cattle. Anticipated Finishing Weight (Feedlot Steers or Heifers) or Mature Weight (Replacement Heifers) of 1,200 Pounds.

Body Weight (lb.)	ADG (lb.)	DMI (lb./d)	TDN (%)	CP (%)	Ca (%)	P (%)
300	1.0	9.8	52.7	9.5	.40	.22
	1.5	10.1	56.6	11.4	.54	.28
	2.0	10.2	60.7	13.4	.67	.34
	2.5	10.2	65.1	15.5	.82	.41
	3.0	10.0	70.2	17.9	.97	.48
350	1.0	11.0	52.7	9.0	.36	.20
	1.5	11.3	56.6	10.6	.50	.25
	2.0	11.4	60.7	12.4	.60	.31
	2.5	11.4	65.1	14.3	.72	.36
	3.0	11.2	70.2	16.4	.85	.42
400	1.0	12.2	52.7	8.6	.33	.18
	1.5	12.5	56.6	10.1	.43	.23
	2.0	12.7	60.7	11.6	.54	.28
	2.5	12.6	65.1	13.3	.64	.33
	3.0	12.4	70.2	15.2	.76	.38
450	1.0	13.3	52.7	8.3	.31	.18
	1.5	13.7	56.6	9.6	.40	.22
	2.0	13.8	60.7	11.0	.49	.26
	2.5	13.8	65.1	12.5	.58	.30
	3.0	13.6	70.2	14.2	.68	.35
500	1.0	14.4	52.7	8.0	.29	.17
	1.5	14.8	56.6	9.2	.37	.20
	2.0	15.0	60.7	10.5	.45	.24
	2.5	14.9	65.1	11.9	.53	.28
	3.0	14.7	70.2	13.5	.62	.32
550	1.0	15.5	52.7	7.8	.28	.16
	1.5	15.9	56.6	8.9	.36	.19
	2.0	16.1	60.7	10.1	.42	.22
	2.5	16.0	65.1	11.4	.49	.26
	3.0	15.8	70.2	12.8	.57	.30
600	1.0	16.6	52.7	7.6	.26	.16
	1.5	17.0	56.6	8.7	.32	.18
	2.0	17.2	60.7	9.8	.39	.21
	2.5	17.1	65.1	11.0	.45	.24
	3.0	16.9	70.2	12.3	.53	.28
650	1.0	17.6	52.7	7.5	.25	.15
	1.5	18.0	56.6	8.4	.31	.18
	2.0	18.2	60.7	9.5	.36	.20
	2.5	18.2	65.1	10.6	.42	.23
	3.0	17.9	70.2	11.8	.49	.26

Table 3. Diet Nutrient Densities for Growing Cattle. Anticipated Finishing Weight (Feedlot Steers or Heifers) or Mature Weight (Replacement Heifers) of 1,400 Pounds.

Body Weight (lb.)	ADG (lb.)	DMI (lb./d)	TDN (%)	CP (%)	Ca (%)	P (%)
300	1.0	9.8	51.9	9.6	.41	.22
	1.5	10.0	55.4	11.5	.55	.28
	2.0	10.2	59.0	13.5	.69	.35
	2.5	10.2	62.8	15.5	.84	.42
	3.0	10.1	67.1	17.8	.99	.49
350	1.0	11.0	51.9	9.0	.37	.20
	1.5	11.3	55.4	10.7	.50	.26
	2.0	11.4	59.0	12.5	.62	.32
	2.5	11.4	62.8	14.3	.74	.37
	3.0	11.4	67.1	16.3	.87	.43
400	1.0	12.1	51.9	8.6	.34	.19
	1.5	12.5	55.4	10.2	.45	.24
	2.0	12.6	59.0	11.7	.56	.29
	2.5	12.7	62.8	13.3	.66	.34
	3.0	12.6	67.1	15.1	.78	.39
450	1.0	13.2	51.9	8.3	.32	.18
	1.5	13.6	55.4	9.7	.41	.20
	2.0	13.8	59.0	11.1	.51	.27
	2.5	13.8	62.8	12.6	.60	.31
	3.0	13.7	67.1	14.2	.70	.36
500	1.0	14.3	51.9	8.1	.30	.17
	1.5	14.7	55.4	9.3	.38	.21
	2.0	14.9	59.0	10.6	.47	.25
	2.5	15.0	62.8	11.9	.55	.29
	3.0	14.9	67.1	13.4	.64	.33
550	1.0	15.4	51.9	7.8	.29	.17
	1.5	15.8	55.4	9.0	.36	.20
	2.0	16.0	59.0	10.2	.44	.23
	2.5	16.1	62.8	11.4	.51	.27
	3.0	16.0	67.1	12.8	.59	.31
600	1.0	16.4	51.9	7.7	.27	.16
	1.5	16.9	55.4	8.7	.34	.19
	2.0	17.1	59.0	9.8	.41	.22
	2.5	17.2	62.8	11.0	.48	.25
	3.0	17.0	67.1	12.2	.55	.29
650	1.0	17.4	51.9	7.5	.26	.16
	1.5	17.9	55.4	8.5	.32	.18
	2.0	18.2	59.0	9.5	.38	.21
	2.5	18.2	62.8	10.6	.45	.24
	3.0	18.1	67.1	11.8	.51	.27

Table 4. Daily Dry Matter Intake and Diet Nutrient Densities for Beef Cows–Mature Weight = 1,000 Pounds

	Months Since Calving											
	1	2	3	4	5	6	7	8	9	10	11	12
1,000-pound cow weaning 7-month-old male weighing 456 pounds												
DM, lb./day	21.6	22.1	23.0	22.5	22.1	21.7	21.1	21.0	20.9	20.8	21.0	21.4
TDN, %	55.8	56.6	54.3	53.4	52.5	51.8	44.9	45.7	47.0	49.1	52.0	55.7
CP, %	8.7	9.1	8.4	8.0	7.5	7.1	6.0	6.2	6.5	7.0	7.7	8.7
Ca, %	.24	.25	.23	.22	.20	.19	.15	.15	.15	.24	.24	.24
P, %	.17	.17	.16	.15	.14	.14	.11	.11	.11	.15	.15	.15
1,000-pound cow weaning 497-pound calf												
DM, lb./day	24.0	25.0	25.4	24.4	23.5	22.7	21.1	21.0	20.9	20.8	21.0	21.4
TDN, %	59.6	60.9	58.6	57.0	55.4	54.0	44.9	45.7	47.0	49.1	52.0	55.7
CP, %	10.5	11.2	10.4	9.6	8.9	8.2	6.0	6.2	6.5	7.0	7.7	8.7
Ca, %	.30	.32	.30	.27	.24	.22	.15	.15	.15	.24	.24	.24
P, %	.20	.21	.19	.18	.17	.15	.11	.11	.11	.15	.15	.15
1,000-pound cow weaning 535-pound calf												
DM, lb./day	26.4	27.8	27.8	26.4	24.9	23.7	21.1	21.0	20.9	20.8	21.0	21.4
TDN, %	62.8	64.5	62.1	60.1	57.9	55.9	44.9	45.7	47.0	49.1	52.0	55.7
CP, %	12.1	12.9	12.0	11.1	10.0	9.1	6.0	6.2	6.5	7.0	7.7	8.7
Ca, %	.35	.38	.35	.32	.28	.25	.15	.15	.15	.24	.24	.24
P, %	.22	.24	.22	.21	.19	.17	.11	.11	.11	.15	.15	.15

Table 5. Daily Dry Matter Intake and Diet Nutrient Densities for Beef Cows–Mature Weight = 1,200 Pounds

	Months Since Calving											
	1	2	3	4	5	6	7	8	9	10	11	12
1,200-pound cow weaning 7-month-old male weighing 496 pounds												
DM, lb./day	24.4	24.9	26.0	25.6	25.1	24.8	24.2	24.1	24.0	23.9	24.1	24.6
TDN, %	55.3	56.0	53.7	52.9	52.1	51.5	44.9	45.8	47.1	49.3	52.3	56.2
CP, %	8.4	8.8	8.1	7.7	7.3	7.0	6.0	6.2	6.5	7.0	7.7	8.8
Ca, %	.24	.25	.23	.21	.20	.19	.15	.15	.15	.26	.25	.25
P, %	.17	.17	.16	.15	.14	.14	.12	.12	.12	.16	.16	.16
1,200-pound cow weaning 558-pound calf												
DM, lb./day	26.8	27.8	28.4	27.4	26.5	25.7	24.2	24.1	24.0	23.9	24.1	24.6
TDN, %	58.7	59.9	57.6	56.2	54.7	53.4	44.9	45.8	47.1	49.3	52.3	56.2
CP, %	10.1	10.7	9.9	9.2	8.5	7.9	6.0	6.2	6.5	7.0	7.7	8.8
Ca, %	.29	.31	.29	.26	.24	.22	.15	.15	.15	.26	.25	.25
P, %	.19	.21	.19	.18	.17	.15	.12	.12	.12	.16	.16	.16
1,200-pound cow weaning 598-pound calf												
DM, lb./day	29.2	30.6	30.8	29.4	27.9	26.7	24.2	24.1	24.0	23.9	24.1	24.6
TDN, %	61.6	63.2	60.8	59.0	57.0	55.2	44.9	45.8	47.1	49.3	52.3	56.2
CP, %	11.5	12.2	11.4	10.6	9.6	8.8	6.0	6.2	6.5	7.0	7.7	8.8
Ca, %	.34	.36	.34	.31	.27	.25	.15	.15	.15	.26	.25	.25
P, %	.22	.23	.22	.20	.18	.17	.12	.12	.12	.16	.16	.16

Table 6. Daily Dry Matter Intake and Diet Nutrient Densities for Beef Cows–Mature Weight = 1,400 Pounds

	Months Since Calving											
	1	2	3	4	5	6	7	8	9	10	11	12
1,400-pound cow weaning 7-month-old male weighing 535 pounds												
DM, lb./day	27.1	27.6	28.9	28.5	28.0	27.7	27.2	27.0	26.9	26.8	27.0	27.6
TDN, %	54.9	55.5	53.3	52.5	51.8	51.2	45.0	45.8	47.3	49.5	52.6	56.6
CP, %	8.2	8.6	7.9	7.6	7.2	6.9	6.0	6.2	6.5	7.0	7.8	8.9
Ca, %	.23	.25	.23	.21	.20	.19	.16	.16	.16	.27	.26	.26
P, %	.17	.17	.16	.15	.15	.14	.12	.12	.12	.17	.17	.17
1,400-pound cow weaning 612-pound calf												
DM, lb./day	29.5	30.5	31.3	30.3	29.4	28.6	27.2	27.0	26.9	26.8	27.0	27.6
TDN, %	58.0	59.1	56.8	55.5	54.1	53.0	45.0	45.8	47.3	49.5	52.6	56.6
CP, %	9.8	10.3	9.6	8.9	8.3	7.7	6.0	6.2	6.5	7.0	7.8	8.9
Ca, %	.28	.30	.28	.26	.24	.22	.16	.16	.16	.27	.26	.26
P, %	.19	.20	.19	.18	.17	.16	.12	.12	.12	.17	.17	.17
1,400-pound cow weaning 656-pound calf												
DM, lb./day	31.9	33.3	33.7	32.3	30.8	29.6	27.2	27.0	26.9	26.8	27.0	27.6
TDN, %	60.7	62.2	59.8	58.1	56.2	54.7	45.0	45.8	47.3	49.5	52.6	56.6
CP, %	11.1	11.8	11.0	10.2	9.3	8.5	6.0	6.2	6.5	7.0	7.8	8.9
Ca, %	.33	.35	.32	.30	.27	.24	.16	.16	.16	.27	.26	.26
P, %	.22	.23	.21	.20	.18	.17	.12	.12	.12	.17	.17	.17

Table 7. Daily Dry Matter Intake and Diet Nutrient Densities for Pregnant Replacement Heifers

	Months Since Conception								
	1	2	3	4	5	6	7	8	9
1,000-pound mature weight									
DM, lb./day	16.7	17.2	17.7	18.2	18.7	19.4	20.0	20.7	21.3
TDN, %	50.1	50.2	50.4	50.7	51.3	52.3	54.0	56.8	61.3
CP, %	7.2	7.2	7.2	7.2	7.3	7.6	8.0	8.7	10.0
Ca, %	.22	.22	.22	.21	.21	.20	.32	.31	.31
P, %	.17	.17	.17	.17	.17	.16	.23	.23	.22
1,200-pound mature weight									
DM, lb./day	19.3	19.8	20.3	20.9	21.5	22.2	23.0	23.7	24.4
TDN, %	50.5	50.5	50.7	50.9	51.4	52.3	53.8	56.2	59.9
CP, %	7.2	7.2	7.2	7.2	7.3	7.5	7.9	8.5	9.6
Ca, %	.23	.23	.22	.22	.22	.21	.31	.31	.30
P, %	.18	.18	.18	.17	.17	.17	.23	.22	.22
1,400-pound mature weight									
DM, lb./day	21.7	22.3	22.9	23.5	24.2	24.9	25.8	26.6	27.4
TDN, %	50.7	50.8	50.9	51.2	51.6	52.4	53.7	55.8	59.0
CP, %	7.2	7.2	7.2	7.2	7.3	7.5	7.8	8.4	9.3
Ca, %	.24	.24	.23	.23	.22	.22	.31	.31	.30
P, %	.18	.18	.18	.18	.18	.18	.23	.22	.22

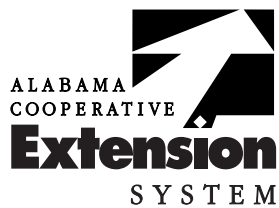
Appendix Table A. Pounds of Additional TDN Required Per Day for 60 Days to Increase Cow Body Condition Score by 1 Unit^a

BCS	Cow Weight at BCS of 5		
	1,000	1,200	1,400
2	1.75	2.02	2.25
3	1.91	2.20	2.43
4	2.13	2.40	2.63
5	2.33	2.60	2.83
6	2.56	2.83	3.06

^aWhen determining the amount of TDN required to increase body condition score, use the number associated with the higher value. For example, increasing a 1,200-pound cow from a 4 to a 5 requires 2.60 additional pounds of TDN.

Appendix Table B. Mineral Requirements and Maximum Tolerable Amounts

Mineral	Growing/Finishing Calves	Gestating Cow	Lactating Cow	Maximum Tolerable
Chromium, mg/kg	—	—	—	1,000
Cobalt, mg/kg	.10	.10	.10	10
Copper, mg/kg	10	10	10	100
Iodine, mg/kg	.50	.50	.50	50
Iron, mg/kg	50	50	50	1,000
Magnesium, %	.10	.12	.20	.40
Manganese, mg/kg	20	40	40	1,000
Molybdenum, mg/kg	—	—	—	5
Nickel, mg/kg	—	—	—	50
Potassium, %	.60	.60	.70	3
Selenium, mg/kg	.10	.10	.10	2
Sodium, %	.06-.08	.06-.08	.10	—
Sulfur, %	.15	.15	.15	.40
Zinc, mg/kg	30	30	30	500



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