

Appendix C

Procedure to Determine 12-Month Nutrient Requirements for Cows with Different Calf Birth Dates

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Beef cows require energy, protein, minerals, vitamins, and water. The daily quantities of each nutrient required by the cow depend on the size of cow, level of milk production, and production period (dry gestation, 3rd trimester, early lactation, lactation). The quantities of nutrients required by cows for 12 months depend on the month in which calf birth occurs. Calf birth date affects the time of year during which the production periods occur and the length of the production periods. The length of the production periods and the time of the year during which they occur determine the type of forage available during any given production period and the amount of forage needed from pasture or from harvested forage.

The 12-month quantities of dry matter, energy (TDN), crude protein, calcium, and phosphorus required by cows having average milk production but different weights and different calf birth months can be determined with the procedures presented in this report, the worksheet provided, and the information provided about the daily nutrient requirements (Table 1) and the length in days of the production periods and forage types for calf birth dates for 4 months (Table 2). A separate worksheet for each cow-size category and month of calf birth will need to be completed. An example worksheet for 1200-pound cows with calf birth dates in March is provided to illustrate the procedures.

In the appropriate spaces near the top of the worksheet, record the cow weight and calf birth month. On the appropriate line in the top section of the worksheet, place the number of days for the production periods and forage types corresponding to the selected calf birth month. These figures can be found in Table 2, which was developed to have low numbers of acres per cow per year and to implement management strategies that graze domesticated grass and native range pastures at the proper time of year. Domesticated grasses reach grazing readiness about a month earlier than native range and can be grazed starting in early May. Native range is ready to be grazed starting in early June. With the use of rotation grazing systems based on grass phenology, the nutritional quality of native range can be manipulated to match requirements of lactating cows until mid

October. Domesticated grass pastures of wildrye types can provide adequate nutrients for lactating cows until mid November. Harvested-forage rations will provide adequate nutrient levels during the remainder of the year.

Check the values for the days at the right side of the worksheet to ensure that the total number of days on ration and days on pasture equals 365.

Locate the daily nutrient requirements in pounds for the various production periods from the appropriate cow-weight category on Table 1, and record these requirements in pounds on the middle section of the worksheet.

To determine the number of pounds of nutrients required for each production period and forage type, multiply the pounds of nutrients required per day by the number of days in the period and for the available forage type. Record these values in the appropriate spaces on the bottom section of the worksheet. Combine the nutrient quantity values for ration-forage and pasture-forage types. Then add the total values for ration forage to the total values for pasture forage to determine the total quantity of required nutrients for a 12-month period for the selected cow weight and calf birth month. Record these values in the bottom right section of the worksheet.

The quantity of nutrients required by a cow for 12 months is variable and depends on cow weight and calf birth month. The quantity of nutrients provided from harvested forage in rations and from pasture forages varies with calf birth month because different forage types are available during production periods that occur at different times of the year.

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Table 1. Intake nutrient requirements in pounds per day for beef cows with average milk production during four production periods (data from NRC 1996).

	Dry Gestation	3 rd Trimester	Early Lactation	Lactation
1000 lb cows				
Dry matter	21	21	24	24
Energy (TDN)	9.64	10.98	14.30	13.73
Crude protein	1.30	1.64	2.52	2.30
Calcium	0.03	0.05	0.07	0.06
Phosphorus	0.02	0.03	0.05	0.04
1200 lb cows				
Dry matter	24	24	27	27
Energy (TDN)	11.02	12.62	15.85	15.23
Crude protein	1.49	1.87	2.73	2.51
Calcium	0.04	0.06	0.08	0.07
Phosphorus	0.03	0.04	0.05	0.05
1400 lb cows				
Dry matter	27	27	30	30
Energy (TDN)	12.42	14.28	17.40	16.71
Crude protein	1.67	2.13	2.94	2.70
Calcium	0.04	0.07	0.08	0.08
Phosphorus	0.03	0.05	0.06	0.05

Data compiled from National Research Council. 1996. Nutrient requirements of beef cattle, 7th rev. ed. National Academy Press, Washington, DC.

Table 2. Twelve-month range cow production period sequences for calf birth dates in January to April.

12-Months	Calf Birth Month			
	January	February	March	April
late Nov	RATION (cont') 3rd Trimester 3.0m, 90d	RATION 3rd Trimester 3.0m, 90d	Dry Gestation 1.0m, 32d	RATION Dry Gestation 2.0m, 62d
Dec			RATION	
Jan	Calf Birth	Calf Birth	3rd Trimester 3.0m, 90d	3rd Trimester 3.0m, 90d
Feb	Early Lactation 1.0m, 32d			
Mar	Lactation 2.5m, 75d	Early Lactation 1.0m, 32d	Calf Birth	Calf Birth
Apr		Lactation 1.5m, 45d	Early Lactation 1.5m, 45d	
May	PASTURE Lactation (spring) 1.0m, 31d	PASTURE Lactation (spring) 1.0m, 31d	PASTURE Lactation (spring) 1.0m, 31d	Early Lactation 0.5m, 15d
Jun				PASTURE Lactation (spring) 1.0m, 31d
Jul	Lactation (summer) 4.5m, 137d	Lactation (summer) 4.5m, 137d	Lactation (summer) 4.5m, 137d	Lactation (summer) 4.5m, 137d
Aug	Calf age-9m Calf Weaning	Lactation (fall) 1.0m, 30d Calf age-9m Calf Weaning	Lactation (fall) 1.0m, 30d Calf age-8m Calf Weaning	Lactation (fall) 1.0m, 30d Calf age-7m Calf Weaning
Sep				
Oct	RATION 3rd Trimester 3.0m, 90d	Lactation (fall) 1.0m, 30d Calf age-9m Calf Weaning	Lactation (fall) 1.0m, 30d Calf age-8m Calf Weaning	Lactation (fall) 1.0m, 30d Calf age-7m Calf Weaning
early Nov				

Worksheet to determine 12-month nutrient requirements for cows of different sizes and with different calf birth dates.

Cow size (weight) _____

Calf birth month _____

Production Periods	Dry Gestation		3 rd Trimester		Early Lactation		Lactation					
Forage Type	Ration	Pasture	Ration	Pasture	Ration	Pasture	Ration	Pasture		# Days Ration	# Days Pasture	# Days 12 months
Number Days from Chart												

Requirements lbs/day from Table 1.

Dry matter								
Energy (TDN)								
Crude Protein								
Calcium								
Phosphorus								

Nutrient lbs/day X #days = Nutrient lbs/period

Totals for periods									Totals for Ration	Totals for Pasture	Totals for 12 months
Dry matter											
Energy (TDN)											
Crude Protein											
Calcium											
Phosphorus											

Worksheet to determine 12-month nutrient requirements for cows of different sizes and with different calf birth dates.

Cow size (weight) 1200 lbs

Calf birth month March

Production Periods	Dry Gestation		3 rd Trimester		Early Lactation		Lactation					
Forage Type	Ration	Pasture	Ration	Pasture	Ration	Pasture	Ration	Pasture		# Days Ration	# Days Pasture	# Days 12 months
Number Days from Chart		32	90		45			198		135	230	365

Requirements lbs/day from Table 1.

Dry matter		24	24		27			27
Energy (TDN)		11.02	12.62		15.85			15.23
Crude Protein		1.49	1.87		2.73			2.51
Calcium		0.04	0.06		0.08			0.07
Phosphorus		0.03	0.04		0.05			0.05

Nutrient lbs/day X #days = Nutrient lbs/period

Totals for periods

								Totals for Ration	Totals for Pasture	Totals for 12 months
Dry matter		768	2160		1215			3375	6114	9489
Energy (TDN)		352.64	1135.80		713.25			1849.05	3368.18	5217.23
Crude Protein		47.68	168.30		122.85			291.15	544.66	835.80
Calcium		1.28	5.40		3.60			9.00	15.14	24.14
Phosphorus		0.96	3.60		2.25			5.85	10.86	16.71