



# NUTRIENT REQUIREMENTS of the Cow and Calf

TEXAS A&M UNIVERSITY  
TEXAS AGRICULTURAL EXTENSION SERVICE,  
J. E. Hutchison, Director • College Station, Texas

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# Nutrient Requirements Of the Cow and Calf

L. A. MADDOX, JR.  
EXTENSION ANIMAL HUSBANDMAN  
TEXAS A&M UNIVERSITY

PUBLISHED NUTRITIONAL REQUIREMENTS for beef cattle devote little space to the needs of the cow and calf. Information necessary to establish requirements for several functions are limited and sometimes thought inadequate, but there are sufficient data to form workable standards that can be revised as new research is reported.

Nutrient requirements of cow and calves shown in Table 10 include maintenance of cow weight, travel, reproduction, milk production and calf growth. Nutrient requirements for growing beef cattle shown in Table 11 include maintenance and growth at the rate of 1/3, 2/3, 1 and 1 1/2 pounds per day. These lower rates of growth were selected because most feeding decisions are made when forage is short and the quality is low.

The commercial cattleman who owns or operates a cow and calf business generally does not consider himself to be a cattle feeder. Actually he has just as many feeding decisions to make as the man who operates a cattle feedlot. His feeding decisions includes proper concern of *stocking rates, time of calving, time to start supplemental feeding, what and how much to feed, time to wean calves and when to increase or decrease numbers.*

The calorie is the basic unit used to measure the amount of energy in feeds and requirements for animals. The terminology used to describe the sequence of increasing the number of calories is from calories to *kilocalories* (1000 calories) to *megacalorie* (1,000,000 calories). Research workers are using the calorie system along with the total

digestible nutrients (TDN) system to describe the energy value of feeds and nutrient requirements of animals (Glossary of Energy Terms, 1962). A megacalorie is the same as a therm and is the preferred term. One pound of total digestible nutrients (TDN) is assumed to be equivalent to 2 megacalories of digestible energy.

Megacalories of apparent digestible energy are used in this publication to describe the energy value of feed and the requirements of the cattle. Digestible energy is the amount of energy that remains after the energy in the fecal matter is subtracted from gross energy of the total feed intake.

## ENERGY REQUIREMENTS

To understand why the producing cow needs certain amounts of feed for different stages of production, it is necessary to consider her requirements for *maintenance, activity, reproduction and milk production.*

Maintenance requirements differ from production requirements in that maintenance does not involve the production of milk, changes in body weight or muscular work aside from that associated with carrying out the normal nonproductive life processes. The amount of feed necessary to maintain weight depends on the weight of the animal involved. The formula  $DE = 74.5 W^{0.75}$  was used to calculate maintenance requirements for different weight cattle. The DE is digestible energy and the W is for weight of the animal (10). Maintenance requirements for mature cattle of

Table 1. Digestible energy requirement of mature beef cows for maintenance and travel

Body weight lb.	Megcal. for maintenance	Megcal. for 1 mile travel
700	10.14	.74
800	11.21	.84
900	12.24	.95
1000	13.25	1.05
1100	14.23	1.16
1200	15.19	1.26
1300	16.13	1.37
1400	17.05	1.47
1500	17.96	1.58
1600	18.85	1.68

Table 2. Digestible energy required for fetal development

Month of pregnancy	Megcal. required	
	Daily	Monthly
1	—	—
2	—	—
3	—	—
4	.10	3.05
5	.20	6.10
6	.40	12.20
7	.80	24.40
8	1.48	45.14
9	2.75	83.88
Total		174.77

Table 3. Digestible energy requirements of young beef cattle for maintenance and gain

Body weight lb.	Megcal. for maintenance	Megcal for 1 lb. gain
100	2.36	1.39
200	3.98	2.35
300	5.37	3.17
400	6.66	3.93
500	7.88	4.65
600	9.04	5.33

different weights are shown in Table 1, and the requirements for young cattle in Table 3. Two and one-tenths pounds of TDN or 4.2 megacalories of digestible energy above the needs for maintenance and milk production are needed for an increase of 1 pound in body weight in mature cattle (2).

Additional feed above that required for maintenance is necessary to supply the energy for activity of beef cows under normal grazing conditions. Cows grazing on pastures stocked at the rate of one cow to 8 to 10 acres walked 1.8 to 4.8 miles a day (4). The differences in distance traveled depends upon the individual animal, total volume of grass available, stage of growth of the grasses, size of the pasture, and distance to and from water. To develop an example an average movement of 2 miles per day was assumed. The most reliable data available indicates that .33 to .35 megacalories of energy is required to move a 1,000 pound cow 1 mile (1) (2).

Since about 33 percent of DE appears to be useful for movement, approximately 1.05 megacalories of digestible energy would be necessary to move 1,000 pounds of live weight a mile without any variation in altitude. This figure is low since most pastures in the State range from rolling plains to mountainous. The energy requirement for traveling in this type of terrain has been established, but such terrains could increase the energy needed by 100 percent.

Where pastures are wet and boggy for weeks at a time, additional feed will be required to furnish the energy for grazing. Table 1 also shows the energy necessary for different grazing activities for different weight breeding cows.

Nearly 60 megacalories of net energy are retained as uterine contents at the fortieth week of pregnancy. One-fourth of this energy is accumulated during the first 29 weeks of pregnancy, the next fourth in the next 6 weeks, while half is deposited in the last 5 weeks before calving (Blaxter, 1962). The daily and monthly requirements are shown in Table 2. It was assumed that 1 mega-

Table 4. Digestible energy required for milk production, DE in milk and requirements for different weights of weaning calves

Megcal. to produce milk	Lb. milk	Megcal. in milk	Calf age in mo. with est. daily milk req. for different weaning weights			
			300 lb.	400 lb.	500 lb.	600 lb.
11.40	20	6.40				
10.83	19	6.08				
10.26	18	5.76				
9.69	17	5.44				3-4
9.12	16	5.12				2-5
8.55	15	4.80				1
7.98	14	4.48				3-4
7.41	13	4.16				2-5 6
6.84	12	3.84				1
6.27	11	3.52				3-4
5.70	10	3.20				2 6
5.13	9	2.88				1-5 7
4.56	8	2.56				3-4
3.99	7	2.24				2 6
3.42	6	1.92				1-5 7
2.85	5	1.64				
2.28	4	1.28				6
1.71	3	0.96				7
1.14	2	0.64				7
0.57	1	0.32				

calorie of energy deposited as products of conception required 2½ megacalories of digestible energy.

Energy necessary for maintenance and any specific gain per day of young cattle can be estimated by using the formula  $DE = 74.5 W^{0.75} (1 + 0.59g)$  where g is pound of gain per day (10). The maintenance requirements for young cattle and the energy above maintenance necessary for 1, 2 or 3 pounds of daily gain are shown in Table 8.

A cow must have 1.78 megacalories above maintenance to produce 1 megacalorie in the milk (9).

One problem is to estimate the amount of milk required for producing beef calves with different weaning weights. Beef cows that milk over a 7-month period reach their maximum production about 77 days after calving and then level off for the next 60 days (8). Estimates of monthly milk production were based on reported milk production and nutritional requirements for the different weight and rates of gain of the nursing calves. From these estimates, one can calculate the energy the cow must receive to produce this volume of milk. See Table 4.

The energy requirements for a growing calf are fairly well established. Table 5 includes the energy required for milk production, maintenance and growth of calves at weights of 300, 400, 500 and 600 pounds at 7 months of age. The megacalories

Table 5. Digestible energy requirements and sources for calves from conception to weaning. (Maintenance and activity of dams not included)

Age in months	Megcal. required	Megcal. in milk	Megcal. nec. to prod. milk	Additional megcal. nec. for calf gain	Megcal. from pasture		
					Daily	Monthly	
300 lb. calf at 7 mo.							175
Prenatal							
1	3.52	1.92	3.42	1.60	5.02	153	
2	4.49	2.24	3.99	2.25	6.24	190	
3	5.38	2.56	4.56	2.82	7.38	225	
4	6.25	2.56	4.56	3.69	8.25	252	
5	7.06	1.92	3.42	5.14	8.56	261	
6	7.84	1.28	2.28	6.56	8.84	270	
7	8.60	0.64	1.14	7.96	9.10	278	
					Total	1804	
400 lb. calf at 7 mo.							175
Prenatal							
1	4.34	2.88	5.13	1.46	6.59	201	
2	5.89	3.20	5.70	2.69	8.39	256	
3	7.48	3.52	6.27	3.96	10.23	312	
4	8.64	3.52	6.27	5.12	11.39	347	
5	9.90	2.88	5.13	7.02	12.15	371	
6	11.12	2.44	3.99	8.68	12.67	386	
7	12.29	0.96	1.71	11.33	13.04	398	
					Total	2461	
500 lb. calf at 7 mo.							175
Prenatal							
1	5.26	3.84	6.84	1.42	8.26	252	
2	7.50	4.16	7.41	3.34	10.75	328	
3	9.56	4.48	7.98	5.08	13.06	398	
4	11.45	4.48	7.98	6.97	14.95	456	
5	13.27	4.16	7.41	9.11	16.52	504	
6	14.98	3.20	5.70	11.78	17.48	533	
7	16.66	1.92	3.42	14.74	18.16	554	
					Total	3185	
600 lb. calf at 7 mo.							175
Prenatal							
1	6.22	4.80	8.55	1.42	9.97	304	
2	9.26	5.12	9.12	4.14	13.26	406	
3	11.99	5.44	9.69	6.55	16.24	495	
4	14.55	5.44	9.69	9.11	18.80	573	
5	16.93	5.12	9.12	11.81	20.93	638	
6	19.22	4.16	7.41	15.06	22.47	685	
7	21.41	2.88	5.13	18.53	23.66	722	
					Total	3997	

Table 6. Digestible energy requirements for a 1000 lb. cow and her 500 lb. weaning calf

Month	Megcal. for cows					Megcal. for calf		Total megcal.	
	Maintenance	Travel*	Reprod.	Milk prod.	Total	From milk	From pasture	Daily	Monthly
1	13.25	2.10	—	6.85	22.19	3.84	1.42	23.61	720
2	13.25	2.10	—	7.41	22.76	4.16	3.34	26.10	796
3	13.25	2.10	—	7.98	23.33	4.48	5.08	28.41	867
4	13.25	2.10	—	7.98	23.33	4.48	6.97	30.30	924
5	13.25	2.10	—	7.41	22.76	4.16	9.11	31.87	972
6	13.25	2.10	—	5.70	21.05	3.20	11.78	32.83	1001
7	13.25	2.10	.10	3.42	18.87	1.92	14.74	33.61	1025
8	13.25	2.10	.20	—	15.55	—	—	15.55	474
9	13.25	2.10	.40	—	15.75	—	—	15.75	480
10	13.25	2.10	.80	—	16.15	—	—	16.15	493
11	13.25	2.10	1.48	—	16.83	—	—	16.83	513
12	13.25	2.10	2.75	—	18.10	—	—	18.10	552
Annual totals	4850	768	175	1426	7218	800	1599	8817	8817

\*Average 2 miles daily.



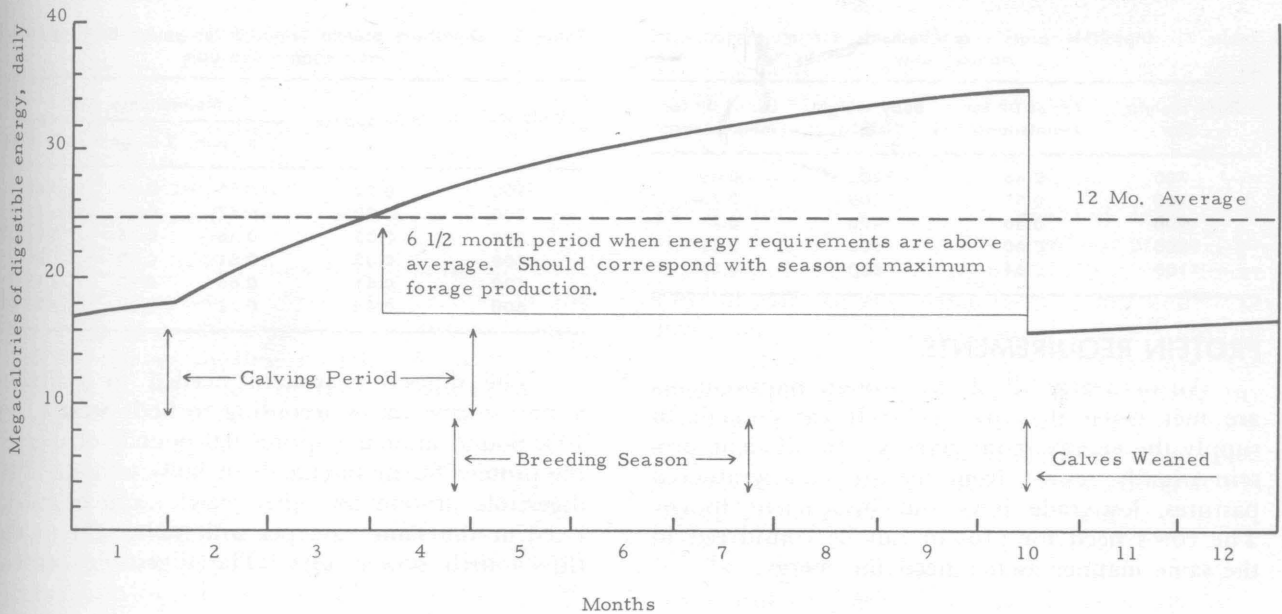


Figure 1

of energy are shown as daily and monthly requirements. No attempt was made to include a requirement for activity of the nursing calf since such information is not as reliably established as that for the mother cow.

To understand the grazing load during the year, all of these requirements have been summarized to show the day-by-day needs. Study Table 6 and figure 1. The average daily requirement for a dry cow is 16.7 megacalories. Twenty days after the calf is born, the daily requirement for the cow and calf has increased 50 percent. The

average daily requirement of a cow and her 7-month calf is 100 percent more than the dry cow.

Figure 2 shows the average energy requirement for a group of producing cows and their calves. These averages are based on a 90-day calving season, 1,000 pound cows and 500 pound calves at 7 months of age. The average daily energy requirement is slightly less than 24 megacalories. On this graph, the requirements are above the average for nearly 6½ months. This period should correspond with the season of maximum forage production.

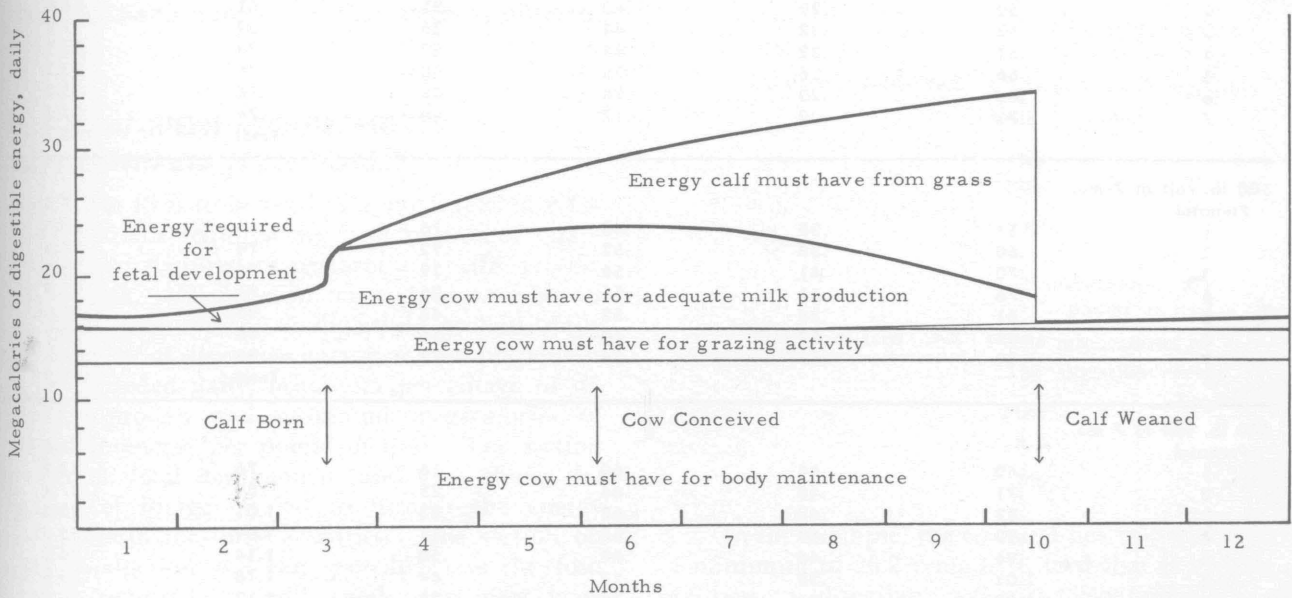


Figure 2

Table 7. Digestible protein requirements for maintenance of mature cattle

Body weight, lb.	Lb. of DP for maintenance	Body weight, lb.	Lb. of DP for maintenance
700	0.46	1200	0.69
800	0.51	1300	0.73
900	0.56	1400	0.77
1000	0.60	1500	0.81
1100	0.64	1600	0.85

Table 8. Digestible protein required for young beef cattle for maintenance and gain

Body weight, lb.	Maintenance	Maintenance and		
		1 lb. gain	2 lb. gain	3 lb. gain
100	0.22	0.36	0.49	0.62
200	0.30	0.47	0.65	0.83
300	0.35	0.56	0.76	0.97
400	0.38	0.61	0.83	1.06
500	0.41	0.66	0.90	1.15
600	0.45	0.72	0.99	1.26

### PROTEIN REQUIREMENTS

All or nearly all of the protein requirements are met when the cow and calf eat enough to supply the energy requirements. Insufficient protein usually results from mature and weathered pastures, low-grade hays and insufficient forage. The cow's need for protein can be considered in the same manner as her need for energy.

The digestible protein needed to maintain a mature cow varies according to body weight. A 1000-pound animal requires 0.6 pounds of digestible protein for maintenance of body weight. The digestible protein for other weights can be calculated at the same rate per unit of weight to the three-fourth power (9). The digestible protein

Table 9. Digestible protein requirements and sources for calves from conception to weaning. (Maintenance of dams not included)

Age in mo.	Pounds of digestible protein					
	Required	In milk	Nec. for milk prod.	Additional nec. calf gain	From pastures	
					Daily	Monthly
<b>300 lb. calf at 7 mo.</b>						
Prenatal						8.8
1	.36	.17	.24	.19	.43	13.1
2	.40	.20	.28	.20	.48	14.6
3	.44	.23	.32	.21	.53	16.2
4	.48	.23	.32	.25	.57	17.4
5	.51	.17	.24	.34	.58	17.7
6	.54	.12	.16	.42	.58	17.7
7	.57	.06	.08	.51	.59	18.0
					Total	123.5
<b>400 lb. calf at 7 mo.</b>						
Prenatal						8.8
1	.42	.26	.36	.16	.52	15.9
2	.50	.29	.40	.21	.61	18.6
3	.57	.32	.44	.25	.69	21.0
4	.61	.32	.44	.29	.73	22.3
5	.66	.26	.36	.40	.76	23.2
6	.68	.20	.28	.48	.76	23.2
7	.73	.09	.12	.64	.76	23.2
					Total	156.2
<b>500 lb. calf at 7 mo.</b>						
Prenatal						8.8
1	.51	.35	.48	.16	.64	19.5
2	.60	.38	.52	.22	.74	22.6
3	.70	.41	.56	.29	.85	25.9
4	.76	.41	.56	.35	.91	27.8
5	.81	.38	.52	.43	.95	29.0
6	.85	.29	.40	.56	.96	29.3
7	.89	.17	.24	.72	.96	29.3
					Total	192.2
<b>600 lb. calf at 7 mo.</b>						
Prenatal						8.8
1	.60	.44	.60	.16	.76	23.2
2	.71	.46	.64	.25	.89	27.1
3	.82	.49	.68	.33	1.01	30.8
4	.90	.49	.68	.41	1.09	33.2
5	.96	.46	.64	.50	1.14	34.8
6	1.02	.38	.52	.64	1.16	35.4
7	1.08	.26	.36	.82	1.18	36.0
					Total	229.3



required for gain in mature animals is estimated at approximately 4.75 percent of megacalories of digestible energy required for gain. This percent is slightly lower than that suggested for young growing animals (3), but when combined with maintenance requirements is very near the suggested requirements (10). See Table 8.

Muscular activity does not increase the need for digestible protein (3). The protein in the feed required to take care of the additional energy required during the last months of pregnancy is sufficient to take care of the additional protein needed.

The digestible protein required for maintenance and growth of young animals can be calculated as a percentage of the TDN (3). Pounds of TDN are changed to megacalories of digestible energy by multiplying pounds of TDN by two. The digestible energy protein is calculated by multiplying the megacalories of digestible energy by 9.5, 7.5, 6.5, 5.75, 5.25 and 5.0 percent for animals of 10, 20, 30, 40, 50 and 60 percent of mature weight.

To form continuity for young animals of heavier weights, it was assumed that animals that are 70 percent of mature weight should be multiplied by 4.85 percent and 80 and 90 percent by 4.8 percent to determine the protein requirements. See Table 8.

The simple protein requirement for the nursing calf does not explain the total needs for protein. More protein is necessary for milk production than is recovered by the calf. Table 9 shows estimates of the amounts of protein needed from milk and pasture for calves that wean at different weights.

## DAILY NUTRIENT REQUIREMENTS AND MINIMUM FEED QUALITY

Table 10 is to be used as a quick reference for daily nutrient requirements and minimum qualities of feed required to perform a specific physiological task. The section on maintenance shows the daily requirement of digestible protein, daily requirement of digestible energy, minimum pounds of feed needed daily, minimum percentage of digestible protein and minimum megacalories of digestible energy per pound of feed. The section on travel, fetal development and gain shows the quality of forage needed to furnish the energy and protetin for these activities. The section on milk production and calf growth shows the feed quality required for milk production after body maintenance, reproduction and travel has been

satisfied. Feed of this quality probably will furnish sufficient nutrients for nursing calves to grow at the rate necessary to reach the suggested weaning weight at 7 months of age.

The daily nutrient requirements and nutrient composition of rations for growing beef cattle shown in Table 11 were developed for growing replacement heifers. The requirements are for lower rates of gain, because when feed is short and/or of low-quality beef cattle breeders decide the level of growth that can be maintained. To estimate the requirements for a young growing heifer and her nursing calf, the feed requirements for milk production and calf growth in Table 10 must be added to feed requirements for maintenance and gain and travel in Table 11.

With the following information a producer can determine the nutritional needs for a cow and her calf:

Information Needed	Example
1. Cow weight	1000 pounds
2. Miles of travel	2 miles
3. Fetal development	None
4. Gain of cow	None
5. Usual weaning weight	400 pounds
6. Average age of calves	3 months

	Digestible protein	Digestible energy	Pounds of feed
1000 pounds	0.60	13.25	14.0
2 miles travel	—	2.10	2.0
3 mo. old calf (400 lb.)	.69	10.23	10.2
	<u>1.29</u>	<u>25.58</u>	<u>26.2</u>

		4.9 percentage digestible protein in feed
Pounds of feed	26.2	<u>1.2900</u> pounds of digestible protein
		1 048
		<u>2420</u>
		2358
		<u>62</u>
		.97 megacalories per pound of feed
Pounds of feed	26.2	<u>25.580</u> megacalories of digestible energy
		23 58
		<u>2 000</u>
		1 834
		<u>166</u>

In the example, the cow and her calf will need a minimum of 26.2 pounds of feed that is at least 4.9 percent digestible protein that contains 0.97 or more megacalories of digestible energy.

Table 10. Daily nutrient requirements and nutrient composition of rations for mature beef cows and their calves. (Based upon air-dry feed containing 90 percent dry matter)

Daily nutrient requirements			Minimum amounts and qualities of feed		
Body weight lb.	Digestible protein lb.	Digestible energy megcals.	Daily feed per animal lb.	Digestible protein %	Digestible energy megcal./lb.
Feed requirements for maintenance of body weight					
800	0.51	11.21	12.0	4.3	0.95
900	0.56	12.24	13.0	4.3	0.95
1000	0.60	13.25	14.0	4.3	0.95
1100	0.64	14.23	15.0	4.3	0.95
1200	0.69	15.19	16.0	4.3	0.95
1300	0.73	16.13	17.0	4.3	0.95
Feed requirements for milk production and calf growth					
Av. age and wt.		1.11 lb. per day — 300 lb. calf at 7 mo. of age			
Mo.	Lb.				
1	87	0.43	5.02	5.2	7.0
2	120	0.48	6.24	6.6	7.0
3	153	0.53	7.38	7.8	7.0
4	187	0.56	8.25	8.7	7.0
5	220	0.57	8.56	9.0	7.0
6	253	0.59	8.84	9.3	7.0
7	286	0.59	9.10	9.6	7.0
		1.57 lb. per day — 400 lb. calf at 7 mo. of age			
1	94	0.53	6.59	6.6	7.0
2	141	0.61	8.39	8.4	7.0
3	188	0.69	10.23	10.2	7.0
4	235	0.73	11.39	11.4	7.0
5	282	0.76	12.15	12.2	7.0
6	329	0.76	12.67	12.7	7.0
7	376	0.76	13.04	13.0	7.0
		2.05 lb. per day — 500 lb. calf at 7 mo. of age			
1	101	0.64	8.26	7.9	7.0
2	162	0.74	10.75	10.2	7.0
3	224	0.85	13.06	12.2	7.0
4	285	0.91	14.95	14.2	7.0
5	347	0.95	16.52	15.7	7.0
6	408	0.96	17.48	16.7	7.0
7	470	0.96	18.16	17.3	7.0
		2.57 lb. per day — 600 lb. calf at 7 mo. of age.			
1	108	0.76	9.97	9.1	7.0
2	183	0.89	13.26	12.0	7.0
3	259	1.01	16.24	14.8	7.0
4	335	1.09	18.80	17.1	7.0
5	410	1.14	20.93	19.0	7.0
6	486	1.16	22.47	20.4	7.0
7	561	1.18	23.66	21.5	7.0
Feed requirements for 1 mile travel, fetal development and gain					
Per 1000 lb. of body wt.	—	1.05	1.1	—	0.95
8th-9th mo. of pregnancy	0.10	2.00	2.1	4.5	0.95
For each one lb. gain	0.20	4.2	4.4	4.5	0.95

Table 11. Daily nutrient requirements and nutrient composition of rations for growing beef cattle. (Based upon air-dry feed containing 90 percent dry matter)

Daily nutrient requirements			Minimum amounts and quality of feed		
Body weight lb.	Digestible protein lb.	Digestible energy megcals.	Daily feed per animal lb.	Digestible protein %	Digestible energy megal./lb.
Feed requirements for maintenance of body weight					
400	0.38	6.66	7.0	5.4	0.95
500	0.41	7.88	8.3	5.0	0.95
600	0.45	9.04	9.5	4.7	0.95
700	0.49	10.14	10.7	4.6	0.95
800	0.54	11.21	11.8	4.6	0.95
900	0.58	12.24	12.9	4.5	0.95
Feed requirements for maintenance and $\frac{1}{3}$ lb. gain per day					
400	0.46	7.97	8.0	5.7	1.00
500	0.50	9.43	9.9	5.0	0.95
600	0.54	10.82	11.4	4.7	0.95
700	0.59	12.13	12.7	4.6	0.95
800	0.64	13.41	14.1	4.6	0.95
900	0.70	14.65	15.4	4.5	0.95
Feed requirements for maintenance and $\frac{2}{3}$ lb. gain per day					
400	0.53	9.28	9.3	5.7	1.00
500	0.58	10.98	11.0	5.3	1.00
600	0.63	12.60	12.6	5.0	1.00
700	0.69	14.13	14.9	4.6	0.95
800	0.75	15.62	16.4	4.6	0.95
900	0.82	17.06	18.0	4.5	0.95
Feed requirements for maintenance and 1 lb. gain per day					
400	0.61	10.59	10.6	5.7	1.00
500	0.66	12.53	12.5	5.3	1.00
600	0.72	14.37	14.4	5.0	1.00
700	0.78	16.12	16.1	4.9	1.00
800	0.86	17.82	17.8	4.8	1.00
900	0.93	19.46	20.0	4.7	0.95
Feed requirements for maintenance and $1\frac{1}{2}$ lb. gain per day					
400	0.72	12.56	12.0	6.0	1.05
500	0.77	14.86	14.1	5.4	1.05
600	0.85	17.04	17.0	5.0	1.00
700	0.93	19.11	19.1	4.9	1.00
800	1.01	21.12	21.1	4.8	1.00
900	1.11	23.07	23.1	4.8	1.00
Feed requirements for 1 mile travel and fetal development					
Per 100 lb. of body wt.	—	0.105	0.11	—	0.95
Month of pregnancy, 8th & 9th	0.10	2.00	2.1	4.5	0.95

Table 12. Composition of Texas grasses

Grasses	90% dry matter		As consumed by cattle		
	Digestible protein	Digestible Energy	Dry matter	Digestible Protein	Digestible Energy
	%	Megcal./lb.	%	%	Megcal./lb.
<b>Bermudagrass, common</b>					
Young	7.1	1.06	35	2.8	0.41
Medium	4.5	1.11	55	2.8	0.68
Bloom	3.6	1.08	65	2.6	0.78
Mature	1.9	1.03	90	1.9	1.03
<b>Bluestem, big</b>					
Young	3.9	1.17	35	1.5	0.46
Bloom	2.1	1.11	65	1.5	0.80
Mature	1.8	1.13	90	1.8	1.13
<b>Bluestem, little</b>					
Young	4.0	1.12	35	2.9	0.43
Medium	3.4	1.09	55	2.1	0.67
Bloom	2.5	1.09	65	1.8	0.79
Mature	1.5	1.05	90	1.5	1.05
<b>Bluestem, Texas</b>					
Young	3.5	1.19	35	1.4	0.46
Bloom	1.8	1.08	65	1.3	0.78
Mature	1.9	1.12	90	1.9	1.12
<b>Buffalograss</b>					
Young	5.2	1.10	65	2.0	0.43
Medium	2.2	0.81	55	1.3	0.50
Bloom	1.6	0.82	65	1.1	0.59
Mature	1.4	0.86	90	1.4	0.86
<b>Dallisgrass</b>					
Young	5.6	1.13	35	2.2	0.44
Bloom	2.6	1.04	65	1.9	0.75
Mature	2.1	1.08	90	2.1	1.08
<b>Dropseed, sand</b>					
Young	6.4	1.02	35	2.5	0.40
Medium	3.4	1.09	55	2.1	0.67
Bloom	3.3	1.13	65	2.4	0.81
Mature	2.5	1.13	90	2.5	1.13
<b>Gramagrass, Blue*</b>					
Young	5.7	1.12	35	2.2	0.43
Bloom	3.8	1.00	65	2.6	0.72
Mature	1.2	0.73	90	1.2	0.75
<b>Gramagrass, Eastern</b>					
Young	6.8	1.13	35	2.6	0.44
Medium	2.5	1.07	55	1.5	0.66
Bloom	3.4	1.08	65	2.5	0.78
Mature	2.0	1.04	90	2.0	1.04
<b>Gramagrass, Hairy</b>					
Young	6.2	1.13	35	2.4	0.44
Bloom	1.4	0.78	65	1.0	0.57
Mature	1.4	0.76	90	1.4	0.77
<b>Gramagrass, Side-oats</b>					
Young	5.8	1.10	35	2.3	0.43
Medium	3.4	0.98	55	2.1	0.50

Table 12, Continued

Grasses	90% dry matter		As consumed by cattle		
	Digestible protein	Digestible Energy	Dry matter	Digestible Protein	Digestible Energy
Bloom	3.2	1.05	65	2.3	0.76
Mature	1.3	.88	90	1.3	0.88
Gramagrass, Texas					
Young	4.9	1.08	35	1.9	0.42
Medium	3.5	0.95	55	2.1	0.58
Bloom	2.7	1.05	65	1.9	0.76
Mature	1.4	0.80	90	1.4	0.80
Johnsongrass					
Young	9.8	1.20	35	3.8	0.47
Bloom	4.5	1.11	65	3.2	0.80
Mature	2.8	1.10	90	2.8	1.10
Mesquitegrass, curly					
Young	4.2	1.03	35	1.6	0.40
Bloom	2.2	0.87	65	1.6	0.62
Mature	1.0	0.76	90	1.0	0.76
Needlegrass, Texas					
Young	6.5	1.10	35	2.5	0.43
Medium	2.8	0.86	55	1.7	0.52
Bloom	3.4	1.06	65	2.4	0.77
Mature	2.2	0.94	90	2.2	0.94
Silver beardgrass					
Young	6.6	1.11	35	2.6	0.43
Medium	3.4	1.07	55	2.1	0.66
Bloom	2.7	1.09	65	1.9	0.79
Mature	1.5	1.06	90	1.5	1.06
Tobosgrass					
Young	5.6	1.04	35	2.2	0.40
Medium	3.5	1.01	55	2.1	0.62
Bloom	2.4	1.00	65	1.7	0.72
Mature	2.7	1.04	90	2.7	1.04
Windmillgrass					
Young	6.2	1.00	35	2.4	0.39
Medium	3.4	0.99	55	2.1	0.61
Bloom	3.7	0.99	65	2.7	0.71
Mature	1.4	0.77	90	1.4	0.77

\*Proximate composition of bloom and mature reversed to conform to pattern shown in other grass sample in Texas Bulletins and National Research Council Publication.

## COMPOSITION OF TEXAS GRASSES AND OTHER FEEDS

Table 12 shows the dry matter, digestible protein and digestible energy in several Texas grasses at different growth stages. The formula used to predict the digestibility of protein and total digestible nutrients was developed by Schnieder (11). TDN was multiplied by two to get megacalories of digestible energy. The basic data for calculating the composition of Texas grass was taken from bulletins published by the Texas Agricultural Experiment Station (5) (6) (7).

Most of the composition of other feeds in Table 13 was taken from the "Nutrient Requirements of Beef Cattle." In both tables, the composition of feeds are shown as 90 percent dry matter and as normally consumed by cattle.

A shortage of digestible protein is indicated by the composition of pasture grasses during the bloom and mature stages. The response of cattle grazing pasture in the bloom and early maturity stage indicates sufficient protein. Selective grazing of the more nutritive parts of the grass plant instead of eating the entire plant as analyzed for Table 12 may account for the apparent discrepancy.

Table 13. Composition of other feeds

	90 % dry matter		As consumed by cattle		
	Digestible Protein	Digestible Energy	Dry matter	Digestible Protein	Digestible Energy
	%	Megcal./lb.	%	%	Megcal./lb.
<b>Harvested forages</b>					
Alfalfa hay, average	10.9	1.02	89	10.8	1.01
Bermudagrass hay, coastal	5.6	0.89	91	5.6	0.90
Bermudagrass hay, common	4.1	0.87	91	4.1	0.88
Corn fodder	4.3	1.21	82	4.0	1.10
Corn stover	3.2	0.99	87	3.1	0.96
Clover hay, average	11.0	1.07	89	10.9	1.06
Johnsongrass hay	3.1	1.00	91	3.1	1.00
Prairie hay	1.4	0.89	91	1.5	0.90
Sorghum fodder or hay	2.7	1.13	86	2.6	1.08
Sorghum stover*	1.6	0.90	92	1.8	0.92
Sudangrass hay	4.3	0.99	89	4.3	0.98
Tobosagrass hay	1.5	1.03	90	1.5	1.03
Corn silage	5.2	1.09	26	1.5	0.34
Sorghum silage	1.9	0.94	29	0.6	0.30
<b>Grains</b>					
Corn, yellow dent, #2	7.0	1.62	89	6.9	1.60
Oats	8.8	1.30	90	8.8	1.30
Sorghum, milo	8.7	1.44	89	8.6	1.42
<b>Miscellaneous</b>					
Cottonseed	1.6	1.76	93	17.0	1.82
Cottonseed hulls	0.2	0.88	90	0.2	0.88
Cottonseed meal, solvent	34.1	1.31	91	34.5	1.32
Cottonseed, whole pressed	17.9	1.27	91	18.1	1.28
Milk	21.8	2.40	12	2.9	0.32
Molasses, cane	0.0	1.31	74	0.0	1.08
Pricklypear**	2.8	1.30	32	1.0	0.46

\*Digestible protein not given in NRC. Calculated by using same digestibility as sorghum fodder.

\*\*Dry matter—Tex. Agri. Ext. Serv. B-218, Digestible Protein—Tex. Agr. Exp. St. B-461. Digestible energy comparison of similar productive energy value in B-461 to digestible energy value in NRC.

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