Nutrient Requirements and Guidelines for Feeding the Beef Herd
Beef and Cow Management
Michigan State University Extension Service
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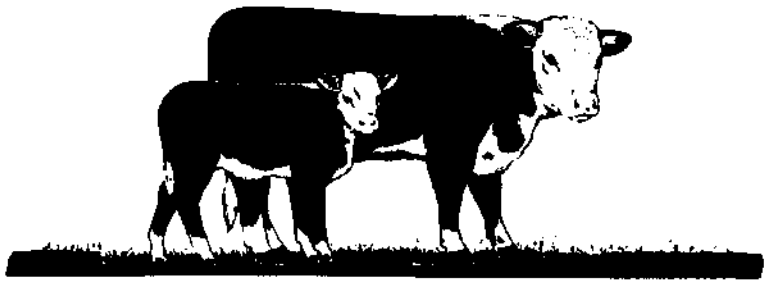

BEEF COW MANAGEMENT

COOPERATIVE EXTENSION SERVICE
MICHIGAN STATE UNIVERSITY
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Nutrient Requirements and Guidelines for Feeding the Beef Herd

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The goal of a cow-calf operation should be to produce a calf weighing a minimum of 450 pounds every 12 months from every cow. The key to success in developing a beef cow herd to reach this goal lies in becoming knowledgeable in nutrition, breeding and health management of the beef herd. You must develop economical systems to harvest and utilize roughages for fall and winter feeding and economical pasture or drylot feeding systems for the critical lactating and breeding periods. The good cowman knows the nutrient value of the feeds available and knows how to use these to meet the requirements of the cow at the various stages of her reproductive cycle. Feed costs are over ½ of the total cost in producing a calf. This is the area where the greatest reduction in costs can probably be obtained. Under-feeding, however, is false economy.

This bulletin covers the following: (1) Nutrient Requirements; (2) Feeding the Cow Herd During a 12-Month Cycle; and (3) Guideline Rations.

Nutrient Requirements

Minimum nutrient requirements for various classes of cattle are presented in the tables that follow. Requirements are listed for energy (TDN or total digestible nutrients), crude or total protein, calcium, phosphorus and vitamin A. Along with water and salt, these five nutrients are the ones that are of greatest practical concern to cattlemen. Salt (sodium chloride) and various trace minerals are certainly important, but their requirements are normally met by feeding trace mineralized salt. The vitamin D requirement is met by exposure to direct sunlight or by feeding sun-cured forages. Vitamin E deficiency is found only in young calves in the form of white muscle disease and is best prevented by a vitamin E—selenium injection at birth. Mature ruminants, including cattle, receive adequate amounts of B vitamins and vitamin K through bacterial synthesis in the rumen.

The nutrient requirements are presented in two ways: (1) in pounds, grams or international units (IU) per day; and (2) in percentage of the ration dry matter (DM). In each of the tables, an estimate is made of the animal's maximum possible daily dry matter intake. As a guide to total daily DM consumption, most dry hays and grains contain 85 to 90% dry matter, whereas most silages contain only 30 to 50%. Maximum dry matter intake varies with the moisture content of the ration, season of the year, palatability of the ration, size and age of the animal, and whether or not the animal is lactating. For example, maximum intake is usually higher on dry feeds than on silages; higher in cold weather than in hot; increases with size and age; and is generally higher for the lactating cow than for the dry cow. As can be seen in the tables, the amount of a given nutrient required per day tends to increase as young cattle grow larger; however, the required concentration of that nutrient in the diet tends to decline with age and size.

Effect of Cold Weather on Feed Requirements

Research in Western Canada, Kansas and elsewhere has shown that the stress of extremely cold weather increases the energy requirements of cattle. This can be an important consideration in the wintering of brood cows in the Northern states. The requirements listed in the tables here are valid for a temperature range of 30° to 80° F, which is normally considered the comfort zone for most cattle. Energy requirements increase when the temperature goes above, or below, this range. The increase is especially dramatic for cattle in extremely cold weather with no shelter. Wind, together with cold stress, further increases the need for additional energy to maintain body temperature and body weight. Wind chill factors for beef cattle are given in the following table:

Wind speed, mph	Temperature (°F)						
	0	5	10	15	20	25	30
0	0	5	10	15	20	25	30
5	−5	1	5	10	15	20	25
10	−8	−6	−4	4	9	14	19
15	−16	−11	−6	−1	4	9	14
20	−20	−15	−10	−5	−1	3	8
25	−27	−22	−17	−1	−9	−2	3
30	−36	−31	−26	−21	−16	−11	−6
35	−50	−45	−40	−35	−30	−25	−20
40	−66	−62	−59	−53	−48	−43	−34

Generally speaking, an 1100-lb. dry brood cow in good condition with a full coat of winter hair and no access to shelter will require 10% more energy or TDN for each 10° decline in the wind chill factor below 30°. For example, if the temperature were 0°F and the wind velocity were 30 mph, the wind chill factor would be −36, or 66 below the critical temperature of −36°. This means that her maintenance requirement for energy would be increased by 66%. According to Table 3, an 1100-lb. cow in mid-pregnancy needs 8.6 lb. TDN daily if she is in the comfort zone of 30° to 80°F; therefore, her TDN requirement should be 8.6 × 1.66 = 14.3 lb., or an increase of 5.7 lb. of TDN. If the dry matter in the hay she receives averages 50% TDN, this would require the feeding of 28.6 lb. hay DM, which challenges her expected maximum daily DM intake of 28 lb. However, cattle consume more DM during cold weather so she would likely meet her requirement. If the wind chill factor were to drop significantly lower, a higher energy feed such as corn silage or grain would probably have to replace some of the hay in order to maintain her body weight. If the wind chill factor fell to −66°, her daily TDN requirement would be increased by 96% or 8.3 lb. This amount added to 8.6 lb. would come to a total of 16.9 lb. TDN or 33.8 of hay dry matter. At this point, she may not be able to consume enough hay to maintain body weight.

An extremely thin cow with a poor haircoat is stressed even further by cold weather. Her energy requirement increases by about 20% with every 10° drop in wind chill factor below 30°F. On the other hand, feedlot cattle are not stressed as much by low temperatures; their TDN needs are increased by about 8% for every 10° decline in wind chill factor below 30°F.

When using the requirements listed in the tables that follow, allowances should be made for cattle that are under extreme cold stress for extended periods of time with no access to shelter or windbreak. One or two days of cold stress are no cause for alarm, but long periods of below zero weather should be accounted for when feeding the cow herd.

Nutrient Requirements for Growing-Fattening Calves

Nutrient requirements and guideline rations for feedlot cattle are not presented here. If you decide to feed out part or all of your calf crop, consult Fact Sheet 1201 for suggested ration programs.

Feeding the Cow Herd During A 12-Month Reproductive Cycle

Period 1. Mid-Gestation (Spring Calving, Nov.-Jan.; Fall Calving, May-July). During this time, the nutrient requirements of the cow will be at a low point. From weaning up to 2-3 months before calving, the beef cow is fed primarily for maintenance. Grazing crop residues and diverted acres or medium to poor quality hay, straw, chaff or other harvested crop residues can furnish much of the nutrients needed, when properly supplemented. Fat cows can and should lose some weight in early gestation. However, all cows should be maintaining their weight or gaining slightly (¼ to ½

Table 1. Requirements of Weaned Heifer Calves

Heifer Wt. (lb.)	Max. Daily DM (lb.)	TDN		CRUDE PROTEIN		CALCIUM		PHOSPHORUS		VITAMIN A	
		lb/day	% of DM	lb/day	% of DM	g/day	% of DM	g/day	% of DM	IU/day	IU/lb.
Average Daily Gain of 1.1 lb. per day											
330	9.9	5.7	61	1.00	11.0	14	.34	12	.29	9,000	1000
440	13.2	7.7	58	1.28	9.6	14	.23	13	.22	13,000	1000
550	14.3	8.6	58	1.37	9.5	14	.20	13	.20	14,000	1000
660	16.5	9.9	61	1.48	9.2	14	.19	14	.19	16,000	1000
770	18.3	11.2	61	1.61	8.7	15	.18	15	.18	18,000	1000
Avg., all wts.	15.0	8.6	60	1.35	9.6	14	.23	13	.22	14,000	1000
Average Daily Gain of 1.5 lb. per Day											
330	9.9	6.2	69	1.10	12.4	18	.45	14	.35	9,000	1000
440	13.2	8.4	64	1.37	10.2	18	.30	16	.27	13,000	1000
550	14.3	9.1	72	1.37	10.5	17	.29	15	.26	14,000	1000
660	16.5	10.4	72	1.48	10.1	16	.24	15	.23	16,000	1000
770	18.3	11.9	69	1.61	9.2	15	.19	15	.19	18,000	1000
Avg., all wts.	15.0	9.2	69	1.40	10.5	17	.29	15	.26	14,000	1000
Overall Avg.	15.0	8.9	65	1.40	10.0	15	.26	14	.24	14,000	1000

lb/day) within 60 days of calving. After calving they should gain weight for at least 90-120 days or until the end of breeding season.

Period 2. 60-90 Days Before Calving (Spring Calving, Jan.-March; Fall Calving, July-Sept.). During this time, nutrients are needed for rapid fetal growth, in addition to those needed for maintenance. The nutritional level needed in the ration will depend primarily on the general condition of the cows. Additional silage or some grain may be needed if the cows are too thin. We do not want the cows too fat at calving time, however, as calving difficulties may result. Feeding for fat gain is too expensive. In addition we want her in a gaining condition between calving and re-breeding for best conception. It's difficult to flush a fat cow.

Period 3. Calving Thru Re-breeding (Spring Calving, Mar.-July; Fall Calving, Sept.-Jan.). This is the period of greatest nutritional needs. The cow loses about 125

Table 2. Requirements of Coming 2-Yr.-Old Heifers, Last 3-4 mos. of Pregnancy

Heifer Wt. (lb.)	Max. Daily DM (lb.)	TDN		CRUDE PROTEIN		CALCIUM		PHOSPHORUS		VITAMIN A	
		lb/day	% of DM	lb/day	% of DM	g/day	% of DM	g/day	% of DM	IU/day	IU/lb.
Average Daily Gain of 0.9 lb. per Day											
715	20.7	7.7	52	1.28	8.8	15	.23	15	.23	19,000	1275
770	22.0	8.1	52	1.35	8.8	15	.22	15	.22	19,000	1275
825	24.2	8.4	52	1.39	8.7	15	.21	15	.21	20,000	1275
880	25.6	8.7	52	1.43	8.7	16	.21	16	.21	21,000	1275
935	26.7	9.0	52	1.52	8.8	16	.20	16	.20	22,000	1275
Avg., all wts.	23.8	8.4	52	1.40	8.8	15	.21	15	.21	20,000	1275
Average Daily Gain of 1.3 lb. per Day											
715	20.7	9.9	52	1.65	8.8	18	.21	18	.21	23,000	1275
770	22.0	10.3	52	1.72	8.8	19	.21	19	.21	25,000	1275
825	24.2	10.8	52	1.78	8.7	19	.20	19	.20	26,000	1275
880	25.6	11.3	52	1.85	8.7	19	.20	19	.20	27,000	1275
935	26.7	11.8	52	1.80	8.8	19	.20	19	.20	26,000	1275
Avg., all wts.	23.8	10.8	52	1.80	8.8	19	.20	19	.20	26,000	1275
Overall Avg.	23.8	9.6	52	1.60	8.8	17	.21	17	.21	23,000	1275

Table 3. Requirements of Dry Pregnant Mature Cows

Cow Wt. (lb.)	Max. Daily DM (lb.)	TDN		CRUDE PROTEIN		CALCIUM		PHOSPHORUS		VITAMIN A	
		lb/day	% of DM	lb/day	% of DM	g/day	% of DM	g/day	% of DM	IU/day	IU/lb.
Middle ⅓ of Pregnancy, 0.0 lb. Average Daily Gain											
772	22	6.6	52	.71	5.9	10	.18	10	.18	15,000	1275
882	24	7.3	52	.79	5.9	11	.18	11	.18	17,000	1275
992	26	7.9	52	.86	5.9	12	.18	12	.18	19,000	1275
1102	28	8.6	52	.93	5.9	13	.18	13	.18	20,000	1275
1213	30	9.2	52	.99	5.9	14	.18	14	.18	22,000	1275
1323	32	9.8	52	1.08	5.9	15	.18	15	.18	23,000	1275
1433	34	10.4	52	1.15	5.9	16	.18	16	.18	25,000	1275
1545	36	11.0	52	1.21	5.9	17	.18	17	.18	27,000	1275
Avg., all wts.	29	8.9	52	1.00	5.9	14	.18	14	.18	21,000	1275
Last ⅓ of Pregnancy, 0.9 lb. Average Daily Gain											
772	22	8.0	52	.90	5.9	12	.18	12	.18	19,000	1275
882	24	8.7	52	.97	5.9	14	.18	14	.18	21,000	1275
992	26	9.4	52	1.06	5.9	15	.18	15	.18	23,000	1275
1102	28	10.0	52	1.12	5.9	15	.18	15	.18	24,000	1275
1213	30	10.7	52	1.19	5.9	16	.18	16	.18	26,000	1275
1323	32	11.2	52	1.26	5.9	17	.18	17	.18	27,000	1275
1433	34	11.9	52	1.32	5.9	18	.18	18	.18	29,000	1275
1545	36	12.6	52	1.39	5.9	19	.18	19	.18	30,000	1275
Avg., all wts.	29	10.3	52	1.20	5.9	16	.18	16	.18	25,000	1275
Overall Avg.	29	9.6	52	1.10	5.9	15	.18	15	.18	23,000	1275

pounds at calving and this weight should be re-gained in 90 to 120 days after calving, with most of it recovered by the start of breeding. In addition, she has to produce milk for a calf and get her reproductive tract in shape for re-breeding and conception besides meeting her maintenance requirements. Proper feeding is important to get the cows re-bred quickly to avoid a strung out calf crop, which results in a lower average weaning weight and some cows not getting re-bred in time to stay within a 12-month calving interval. The bulls should be removed after 60-90 days to prevent late calves next year. Then, pregnancy check and cull those not pregnant.

Period 4. End of Breeding to Weaning (Spring Calving, July-Nov.; Fall Calving, Jan.-May). Nutrients for milk production as well as maintenance are still needed, but the critical feeding period is over after the cow is re-bred. Also, the calves are consuming other feeds in addition to milk. Use whatever feeds are readily available, such as temporary or permanent pastures.

Feeding Replacement Heifers

The objectives here are to have replacement heifers calve as two-year olds and then calve at the same time as mature cows the following year. This requires having them weigh 600 to 800 pounds at 14-15 months of age when first bred, and then feeding first and second calf heifers separately and at a higher nutritional level than the mature cows. The level of feeding needed from-weaning to first breeding depends on their weaning weight and breed. If we want them to weigh 600 to 800 pounds at the start of breeding, which should be 20 to

Table 4. Requirements of Lactating Cows, First 3-4 Mos. After Calving

Cow Wt. (lb.)	Max. Daily DM (lb.)	TDN		CRUDE PROTEIN		CALCIUM		PHOSPHORUS		VITAMIN A	
		lb/day	% of DM	lb/day	% of DM	g/day	% of DM	g/day	% of DM	IU/day	IU/lb.
Average Milking Ability (10-12 lb/day)											
770	27	9.7	52	1.65	9.2	24	.29	24	.29	19,000	1775
880	29	10.4	52	1.79	9.2	25	.28	25	.28	21,000	1775
990	31	11.0	52	1.90	9.2	26	.28	26	.28	23,000	1775
1100	33	11.7	52	1.98	9.2	27	.28	27	.28	24,000	1775
1210	35	12.3	52	2.14	9.2	28	.27	28	.27	26,000	1775
1320	37	13.0	52	2.23	9.2	28	.25	28	.25	27,000	1775
1430	39	13.7	52	2.32	9.2	29	.25	29	.25	29,000	1775
1540	40	14.4	52	2.41	9.2	30	.25	30	.25	31,000	1775
Avg., all wts.	34	12.0	52	2.05	9.2	27	.27	27	.27	25,000	1775
Superior Milking Ability (21-23 lb/day)											
770	32	12.8	55	2.45	10.9	45	.44	40	.39	32,000	1775
880	34	13.5	55	2.58	10.9	45	.42	41	.38	34,000	1775
990	36	14.1	55	2.71	10.9	45	.40	42	.37	36,000	1775
1100	38	14.8	55	2.84	10.9	46	.39	43	.36	38,000	1775
1210	40	15.4	55	2.98	10.9	46	.37	44	.35	41,000	1775
1320	42	16.1	55	3.11	10.9	46	.36	44	.34	43,000	1775
1430	43	16.8	55	3.22	10.9	47	.35	45	.33	45,000	1775
1540	44	17.5	55	3.33	10.9	48	.34	46	.32	47,000	1775
Avg., all wts.	38	15.1	55	2.90	10.9	46	.38	43	.35	40,000	1775
Overall Avg.	36	13.5	53.5	2.50	10.0	37	.33	35	.31	32,000	1775

Table 5. Requirements of Bulls (Growth + Maintenance, Moderate Activity)

Bull Wt. (lb.)	Avg. Daily Gain (lb.)	Max. Daily DM (lb.)	TDN		CRUDE PROTEIN		CALCIUM		PHOSPHORUS		VITAMIN A	
			lb/day	% of DM	lb/day	% of DM	g/day	% of DM	g/day	% of DM	IU/day	IU/lb.
660	2.4	20	13.2	77	2.16	12	29	.41	23	.32	34,000	1775
880	2.0	25	15.4	64	2.27	12	23	.21	23	.21	43,000	1775
1100	1.5	28	16.5	61	2.36	10	22	.18	22	.18	48,000	1775
1323	1.1	30	16.1	61	2.25	9	22	.18	22	.18	48,000	1775
1543	0.3	32	17.0	55	2.38	8.5	23	.18	23	.18	50,000	1775
1764	0	34	12.8	55	1.96	8.5	19	.18	19	.18	41,000	1775
1984	0	36	13.9	55	2.32	8.5	22	.18	22	.18	48,000	1775
2205	0	38	15.2	55	2.32	8.5	22	.18	22	.18	48,000	1775
2425	0	40	16.4	55	2.40	8.5	23	.18	23	.18	51,000	1775

30 days ahead of the mature cows, they will usually need to gain 200 to 250 pounds in 180-210 days, requiring a gain of 1 to 1½ pounds per day from weaning to first breeding.

During breeding season (14 to 16 mos.) heifers should gain about 1.3 lb. per day. After breeding season, up to 120 days prior to calving (16 to 20 mos.), they can afford to gain as little as ½ lb. per day. During the last 120 days of gestation (20 to 24 mos.), they should be fed to gain 0.9 to 1.3 lb. per day. After calving, they should continue to gain weight until they are bred.

In order for heifers to obtain the level of feed needed to gain properly, they should ideally be fed separately from the rest of the herd during their first and second winters. If not, the mature cows may consume more than their share of the feed, and the heifers are apt to suffer. This especially is true in larger herds of cattle and in herds where feeding space is limited. It is also a good idea to winter the coming 3-year-olds separately during their third winter if they are extremely thin from raising their first calf. In fact, many good producers feed their first and second-calf heifers and their old, thin cows all together as one nutritional management group.

Fall Calving vs. Spring Calving

Some producers prefer fall calving since it allows them to wean calves in the spring when feeder cattle prices are often at their peak. They may also use these calves to utilize summer pasture and then sell them in the fall as yearlings, resulting in more pounds of calf being marketed per cow every 12 months. This also avoids calving during the busy spring planting season.

This system requires more intensive management of the cow during the winter in the northern U.S., as harvested feeds must be fed during nearly all of the ciritcal lactation and breeding periods. Good quality spring pasture meets requirements in a spring calving system with little additional feed other than minerals. For most producers, spring calving is the preferred system.

Guideline Rations

In the paragraphs that follow, suggested rations are given for various ages and classes of beef cattle. These rations are based on the requirements listed previously in Tables 1 through 5.

In addition to the rations presented below, a salt-mineral mix should be offered free-choice at all times. Several possible mixes are listed later in this bulletin. Vitamin A should also be added to the diet or injected intramuscularly if the forage is of low quality and apt to be deficient in this vitamin. If injected, a dose of 1 to 3 million IU is recommended. The injected dose will last for 90 to 100 days.

If you are in doubt about the nutrient content of your feedstuffs, it is probably wise to submit a sample to your local extension agent for analysis of crude protein, estimated energy content, and levels of various mineral elements. He can arrange to have the sample sent to a qualified laboratory equipment to perform such analysis. The Research-Extension Analytical Laboratory, O.A.R.D.C., Wooster, Ohio 44691 is one such laboratory. Cost per sample ranges from $12 to $20.

Rations for Weaned Heifer Calves

The goal in feeding open heifers is to achieve enough gain in weight so that they may be bred one heat period prior to the main cow herd at about 14 months of age, as mentioned before. Their daily gain from weaning to breeding should average 1.0 to 1.5 lb. per day. The following rations are possibilities.

1. High quality pasture + 5# grain
2. 12# hay (full-feed) + 5# grain
3. 40 # corn silage (30% DM) + 1# soybean meal or equivalent
4. 30# wet haylage (35% DM) + 5# grain
5. 20# dry haylage (50% DM) + 5# grain
6. 5# hay + 30# corn silage + ½# soybean meal or equivalent
7. 10# hay + 20# corn silage
8. 40# forage sorghum silage (30% DM) + 2½# grain + 1# soybean meal or equivalent
9. 40# oat silage (30% DM) + 2½# grain + ¼# soybean meal or equivalent

Rations for Coming 2-Year-Old Pregnant Heifers

The goal in feeding pregnant heifers is to achieve about 1.0 lb. average daily gain for 120 days prior to calving; for example, from 800 lb. to 920 lb. Underfeeding pregnant heifers can be disastrous because they are still growing as well as developing fetus and preparing for the stress of their first lactation. Over-feeding, however, can lead to too much internal fat, resulting in a higher incidence of calving difficulty.

1. High quality pasture.
2. 20 to 25# hay (full-feed)
3. 45# corn silage (30% DM) + 1¼# soybean meal or equivalent
4. 55# wet haylage (35% DM)
5. 40# dry haylage (50% DM)
6. 5# hay + 35# corn silage + ¾# soybean meal or equivalent
7. 10# hay + 25# corn silage + ¼# soybean meal or equivalent
8. 15# hay + 15# corn silage
9. 55# forage sorghum silage (30% DM) + 1# soybean meal or equivalent
10. 55# oat silage (30% DM)

Rations for Dry 1100-lb. Mature Cow, Middle ⅓ of Pregnancy

The goal here is to maintain the body weight of pregnant mature cows in good condition after their calves have been weaned.

1. Low to medium quality pasture.

2. 17 to 25# hay.
3. 10# hay + 15# straw
4. 40# corn silage (30% DM)
5. 50# wet haylage (35% DM)
6. 35# dry haylage (50% DM)
7. 5# hay or 7# straw + 30# corn silage
8. 10# hay or 13# straw + 20# corn silage
9. 15# hay or 19# straw + 10# corn silage
10. 50# forage sorghum silage (30% DM)
11. 50# oat silage (30% DM)
12. 1 to 2 acres cornstalks per cow + hay or supplement as needed
13. Full-feed dry corn refuse (16# DM) + 3# hay
14. Full-feed corn refuse silage (18# DM)

Rations for Dry 1100-lb. Mature Cow, Last ⅓ of Pregnancy

The goal during the last 90 to 120 days of pregnancy is to achieve an average daily gain of 0.5 to 1.0 lb. per day. Ideally, cows should be on a rising plane of nutrition prior to and after calving so as to be in proper condition for the start of breeding season.

1. Medium to high quality pasture.
2. 25 to 30# hay
3. 50# corn silage (30% DM)
4. 60# wet haylage (35% DM)
5. 40# dry haylage (50% DM)
6. 5# hay + 35# corn silage
7. 10# hay + 25# corn silage
8. 15# hay + 15# corn silage
9. 60# forage sorghum silage (30% DM)
10. 60# oat silage (30% DM)

Rations for 1100-lb. Lactating Cow (Average Milking Ability)

The goal here is to keep the cow in a positive nutritional status so she will conceive by 80 days after calving and average 10 to 12 lb. of milk per day during the first 3 to 4 months of lactation. This level of milk production would be typical of most British beef cows.

1. High quality pasture.
2. 30 to 40# hay (full-feed)
3. 60# corn silage (30% DM) + 1¼# soybean meal or equivalent
4. 70# wet haylage (35% DM), full-feed
5. 50# dry haylage (50% DM), full-feed
6. 10# hay + 40# corn silage
7. 15# hay + 30# corn silage
8. 20# hay + 20# corn silage
9. 75# forage sorghum silage (30% DM), full-feed + 1# soybean meal or equivalent
10. 70# oat silage (30% DM), full-feed

Rations for 1100-lb. Lactating Cow (Heavy Milker)

The goal is the same as for the average milking cow except that milk production is 20 to 24 lb. per day, which is typical of dairy x beef crossbred females and some dual-purpose exotics. It is difficult for females of this type to consume enough energy to get back in shape for breeding season so as to conceive on schedule.

1. High quality pasture + grain if necessary
2. 35 to 40# hay (full-feed) + grain if necessary
3. 75# corn silage (30% DM), full-feed + 2¼# soybean meal or equivalent
4. 85# wet haylage (35% DM), full-feed + grain if necessary
5. 60# dry haylage (50% DM), full-feed + grain if necessary
6. 90# forage sorghum silage (30% DM), full-feed + 1½# soybean meal or equivalent
7. 85# oat silage (30% DM), full feed + ¾# soybean meal or equivalent

Rations for Mature Herd Sires

The goal is to maintain the weight of mature bulls in good condition and to put weight on thin bulls.

1. High quality pasture + grain to condition
2. 30# hay + grain to condition
3. 80# corn silage (30% DM) + 1# soybean meal or equivalent
4. 95# wet haylage (35% DM) + grain to condition
5. 65# dry haylage (50% DM) + grain to condition
6. 100# forage sorghum silage (30% DM)
7. 90# oat silage (30% DM)

Rations for Young Herd Sires (Yearlings and 2-Yr.-Olds)

The goal is to provide adequate nutrition to support an average daily gain of 1.5 lb. on yearling bulls and 0.7 lb. on 2-year-old bulls.

1. High quality pasture + 12# grain
2. 20# mixed hay + 12# grain
3. 80# corn silage (30% DM) + 1# soybean meal or equivalent
4. 50# wet haylage (35% DM) + 12# grain
5. 35# dry haylage (50% DM) + 12# grain
6. 70# forage sorghum silage (30% DM) + 6# grain mix + ½# soybean meal or equivalent
7. 80# oat silage + 3# grain

NPN as Supplemental Crude Protein

Non-protein nitrogen (NPN) compounds such as urea, ammonia, etc. are usually more economical sources of crude protein than natural sources such as soybean meal. NPN is particularly well utilized on corn silage based diets. Therefore, treating the silage with NPN or feeding a supplement formulated with NPN as the major contributor of crude protein is often a recommended practice when corn silage is the primary feedstuff.

When treating silage with NPN, care must be taken to

apply the correct amount. If in doubt, submit several representative samples of treated silage for crude protein analysis to be certain that the desired level of treatment was attained. Generally, the silage should be treated so that the dry matter contains at least 10.5% crude protein.

Free-choice lick tank supplements are a convenient and popular means of supplementing beef cow herds. However, over-consumption is sometimes a problem, which can result in undue expense. Therefore, lick tanks should be watched closely for signs of over-consumption.

Winter Feed Budgets

Tables 6, 7 and 8 are an attempt to illustrate the total winter feed requirements for a 50-cow beef herd, utilizing various combinations of feed stuffs. In Table 6, hay is the only roughage source, whereas in Table 7, corn silage is the only roughage. In Table 8, about 50% of the roughage dry matter is furnished by hay and 50% by corn silage. In developing these budgets, minimum nutrient requirements for 1100-lb. mature cows were used, and no allowance was made for cold stress. Furthermore, it is assumed that any mineral deficiencies would be offset by free-choice feeding of a salt-mineral mix. In addition, the following assumptions were made: (1) a total winter feeding period of 180 days; (2) on an average, the herd is lactating during the last 60 days of the winter feeding period; (3) half of the cows are average milkers, half are heavy milkers; (4) 13 open yearlings are kept as herd replacements; (5) the pregnant herd consists of 40 mature cows and 10 coming 2-year-olds; (6) the mixed hay contains 50% TDN and 10% crude protein.

Table 6. Winter Feed Budget for a 50-Cow Beef Herd Using Hay as Roughage

			HAY			GRAIN		
Class of Cattle	No. Head	No. Days	lb. per Head per Day	Herd Total for Winter (T)	Total per cow Unit (T)	lb. per Head per Day	Herd Total for Winter (lb.)	Total per cow Unit (lb.)
Pregnant mature cows	40	120	25	60.0	1.20	---	---	---
Lactating mature cows	40	60	35	42.0	0.84	---	---	---
Pregnant 2-yr. heifers	10	120	25	15.0	0.30	---	---	---
Lactating 2-yr. heifers	10	60	35	10.5	0.21	---	---	---
Open yrlg. heifers	13	180	12	14.0	0.28	5	11,700	234
Mature herd sire	1	180	30	2.7	9.95	10	1,800	36
Young herd sire	1	180	20	1.8	0.04	12	2,160	43
Total	---	---	---	146.0	2.92	---	15,660	313

As shown in Table 6, it takes about 3 T. of hay and 300 lb. of grain per producing female to winter a herd consisting of 50 breeding age females, 13 open yearling replacement heifers and 2 herd sires for 180 days. In addition, it would take a total of about 35 lb. of salt-mineral mix per cow unit, or a total for the entire herd or approximately 1,750 lb. over the 180-day period.

Table 7. Winter Feed Budget for a 50-Cow Beef Herd Using Corn Silage as Roughage

			30% DM CORN SILAGE			SOYBEAN MEAL EQUIVALENT		
Class of Cattle	No. Head	No. Days	lb. per Head per Day	Herd Total for Winter (T.)	Total per Cow Unit (T.)	lb. per Head per Day	Herd Total for Winter (lb.)	Total per Cow Unit (lb.)
Pregnant mature cows	40	120	45	108.0	2.16	---	---	---
Lactating mature cows	40	60	65	78.0	1.56	2.0	4,800	96.0
Pregnant 2-yr. heifers	10	120	45	27.0	0.54	1.1	1,320	26.4
Lactating 2-yr. heifers	10	60	65	19.5	0.39	2.0	1,200	24.0
Open yrlg. heifers	13	180	40	46.8	0.94	1.0	2,340	46.8
Mature herd sire	1	180	80	7.2	0.14	1.0	180	3.6
Young herd sire	1	180	80	7.2	0.14	1.0	180	3.6
Total	---	---	---	293.7	5.87	---	10,020	200.4

Table 7 shows that it takes slightly over 5¾ T. of corn silage and about 200 lb. of soybean meal equivalent per producing cow to winter a 50-cow herd for 180 days. In many instances, NPN compounds such as urea would be a more economical source of supplemental crude protein than soybean meal, as mentioned previously.

Table 8. Winter Feed Budget for a 50-Cow Beef Herd Using Hay and Corn Silage

Class of Cattle	No. Head	No. Days	HAY			30% DM CORN SILAGE		
			lb. per Head per Day	Herd Total for Winter (T.)	Total per cow Unit (T.)	lb. per Head per Day	Herd Total for Winter (T.)	Total per cow Unit (T.)
Pregnant mature cows	40	120	5	12.0	0.24	30	72.0	1.44
Lactating mature cows	40	60	10	12.0	0.24	45	54.0	1.08
Pregnant 2-yr. heifers	10	120	15	9.0	0.18	15	9.0	0.18
Lactating 2-yr. heifers	10	60	10	3.0	0.06	45	13.5	0.27
Open yrlg. heifers	13	180	10	11.7	0.23	20	23.4	0.47
Mature herd sire	1	180	15	1.4	0.03	50	4.5	0.09
Young herd sire	1	180	10	0.9	0.02	60	5.4	0.11
Total	---	---	---	50.0	1.00	---	181.8	3.64

As shown in Table 8, about 1 T. of hay and 3.6 T. of corn silage per producing cow are required to winter a 50-cow herd for 180 days. With hay at 90% DM and corn silage at 30% DM, approximately half of the total dry matter is supplied by each of these feeds.

Free-Choice Mineral Mixtures

Mixture 1. For the cow herd during breeding season to provide extra phosphorus.

	% of Mix	% Ca	% P
Trace mineralized salt	33	---	---
Bonemeal or dicalcium phosphate	67	22-27	13-18
TOTAL IN MIX	100	14.7-18.0	8.7-12.8

Mixture 2. For the cow herd before and after breeding season.

	% of Mix	% Ca	% P
Trace mineralized salt	50	---	---
Bonemeal or dicalcium phosphate	50	22-27	13-19
TOTAL IN MIX	100	11.0-13.5	6.5-9.5

Mixture 3. For cattle in drylot on grain or other feedstuffs low in calcium content.

	% of Mix	% Ca	% P
Trace mineralized salt	33.3	---	---
Bonemeal or dicalcium phosphate	33.3	22-27	13-19
Ground limestone	33.3	38	---
TOTAL IN MIX	100.0	20.0-21.7	4.3-6.3

Mixture 4. For feeding to herds during late winter and early spring in areas where grass tetany (magnesium deficiency) is a problem. No other salt or mineral mixture should be offered, or daily magnesium intake may be too low.

	% of Mix	% Ca	% P	% Mg
Magnesium oxide	25	---	---	60
Trace mineralized salt	25	---	---	---
Bonemeal or dicalcium phosphate	25	22-27	13-19	---
Ground corn	25	---	.35	---
TOTAL IN MIX	100	5.5-6.8	3.3-4.8	15.0

Commercial Mixtures. Salt-mineral mixtures comparable to those listed above may be purchased commercially. Beware of mineral blocks that are extremely hard and dense because it is very difficult or impossible for cattle to obtain their daily mineral requirements from such blocks.

Feeding Salt and Mineral Separately. To ensure adequate intake of salt and all other mineral elements, it is often considered preferable to feed Mixture 1, 2 or 3 in one feeder and straight trace mineralized salt in another feeder.

How to Feed Mineral Mixes. All salt or mineral mixes should be fed under cover to keep out rain and/or snow. When fed outside, weather-vane type feeders that rotate with the wind are the most desirable. They may be constructed at home or purchased commercially. Mineral feeders should be located in sites where cattle have daily contact.

How to Budget Mineral Consumption. When fed free-choice, cattle will consume approximately 0.1 to 0.2 lb. of salt-mineral mix per head per day. A figure of 0.15 lb. per day or 55 lb. per cow per year would be a rough average.

Adding Vitamin A to Mineral Mixes. Adding a Vitamin A premix to the mineral mix is a convenient method of providing this vitamin. However, vitamin A loses its potency with time, so these mixes should not be stored for extended periods of time. Enough vitamin A should be added to the mineral mix so that each animal receives its requirement (10,000 to 50,000 IU) in 0.1 to 0.2 lb. of total mix.

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