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NebGuide

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Feeding The Beef Cow Herd--Part II
Managing the Feeding Program

Feed costs are the cow/calf producer's greatest expense in producing a weaned calf. To remain competitive, cow/calf operators must use economical feeding programs. It is important to match the available feed resources with the nutrient requirements of the first-calf-heifer and cow. Both over- and underfeeding the cow herd can lead to high production costs.

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- Energy Nutrition
- Protein Nutrition
- Mineral Nutrition
- Vitamin Nutrition
- General Nutrition Management

Nutrient requirements for heifers calving as 2-year-olds and cows calving as 3-year-olds and older are shown in *Table I*. Beef cows are seldom fed complete rations where ingredients are weighed daily. Generally, most of a cow's ration is forages such as: 1) summer and winter range, 2) crop residues, or 3) a full feed of hay. For cattle grazing dry native range or being fed hay, producers must estimate both the quantity and quality of feed consumed.

Estimating intake is the most important criteria for developing a sound nutritional program. It is also one of the most difficult to obtain. Many related factors can influence forage intake, including cow size, milk production level, cow condition, quality and availability of forage, amount and type of supplements, and environmental factors. Consequently, the more accurately that actual intake is determined, the better one can design an appropriate feeding program. Estimated dry matter capacities for different weights of cows and heifers are shown in *Table II*. These general guidelines are adequate for balanced rations meeting the nutrient requirements in *Table I*.

If the ration is high in both protein and energy, cows will likely consume more than indicated. If the ration is low in protein and energy, cows will probably not consume as much as indicated. *Table II* provides guidelines to aid in determining forage intake. It may be more appropriate for use when intake is not actually known. Intake guidelines in *Table III* are also more appropriate when calculating or

budgeting feed needs for a total winter feeding program.

Table I. Nutrient Requirements of Heifers and Cows (Pounds or Percentage of Ration Dry Matter)[1]

	Calving to Breeding[2]				*Mid[3] Pregnancy*		*Late[4] Pregnancy*	
	Avg. Milk		*High Milk*					
	lbs	*%*	*lbs*	*%*	*lbs*	*%*	*lbs*	*%*
Heifer-Calving as 2's[5]								
Protein	1.8- 2.0	11.3	2.4	14.7			1.4- 1.6	9.0
TDN[6]	10.3-12.0	65.1	13.3	79.3			9.5-11.3	60.0
Calcium	.057-.062	.36	.083	.53			.053-.057	.33
Phosphorus	.037-.044	.24	.054	.31			.033-.040	.21
Cows-Calving as 3's or older[7]								
Protein	1.9- 2.1	9.9	2.4- 2.7	12.9	1.2- 1.4	7.0	1.5- 1.7	8.0
TDN[6]	10.8-12.8	57.3	13.1-15.2	69.8	8.2-10.1	48.8	9.8-11.8	54.0
Calcium	.053-.062	.28	.077-.086	.41	.031-.040	.19	.049-.057	.26
Phosphorus	.042-.051	.22	.053-.062	.28	.031-.040	.19	.037-.046	.21

[1]Requirements from 1984 Nutrient Requirements of Beef Cattle.
[2]Heifers fed the higher levels of protein and TDN should gain .5 lb daily; cows should gain some weight.
[3]Heifers should make some gain; cows will usually lose weight on lower levels of TDN.
[4]Heifers fed higher levels should gain 1.4 lb daily in addition to fetal weight gain; cows should gain fetal weight.
[5]Range of requirements for heifers weighing 700 to 900 lb gaining 1.4 daily before and .5 daily after calving.
[6]Total digestible nutrients (TDN) - an estimate of energy.
[7]Range of requirements for cows weighing 900 to 1200 lb, respectively.

Table II. Approximate Daily Dry Matter Intake of Beef Cows and Yearling Heifers[1]

			Lactating	
Weight[2] lb	*Mid Gestation lb*	*Late Gestation lb*	*Average Milking lb*	*High Milking lb*
700	14.0	15.3	15.9	17.1
800	15.3	16.8	17.3	18.7
900	16.7	18.3	18.8	19.7
1000	18.1	19.6	20.2	20.6
1100	19.5	21.0	21.6	22.3
1200	20.8	22.3	23.0	23.8
1300	22.0	23.6	24.3	25.3
1400	23.3	24.9	25.6	26.7

[1]Fed rations meeting nutrient requirements shown in *Table I*.
[2]Fall weight taken near time calves are weaned.

Table III. Roughage Capacity of Beef Cattle

Forage Type	*Class of Cattle*[1]	*Dry Matter Capacity*[2]	*As Fed Intake*[3]
		%	lbs
Low quality forages	dry cows	1.5	17-18
(dry grass, straw, etc.)	lactating cows	2.0	23-24
Average quality forages	dry cows	2.0	22-24
(native, brome, etc.)	lactating cows	2.3	25-28
High quality forages			
alfalfa hay	dry cows	2.5	28-30
	lactating cows	2.7	30-32
green pasture	dry cows	2.5	80-100
	lactating cows	2.7	100-110
silages	dry cows	2.5	80-85
	lactating cows	2.7	90-95

[1]900-1100 lb cow.
[2]Expected intake as a percent of body weight.
[3]Total daily capacity (as-fed or wet basis).

Estimated feed intakes in *Tables II* and *III* are the amount of feed consumed by the cattle and do not account for feed wasted during feeding. If hay is fed on the ground or if waste is a factor, consider feeding losses when calculating a balanced ration. (Refer to NebGuide *G84-738, Management to Minimize Hay Waste.*)

Nutritional composition of harvested forages can be estimated by laboratory analysis from representative feed samples. However, it's difficult to estimate the quality of standing forages. Cattle are selective and tend to consume the most nutritious plants or plant parts. Past experience and careful attention to changes in cow condition are important factors to consider when estimating forage nutrient content. Clipped grass samples are often misleading and offer erroneous information on nutritive quality. Often forage quality analysis of clipped samples is lower in nutrient content than what is selected and consumed by the cow.

Because most cow herds are managed so that strict control of the nutrition program is difficult, general guides can be developed based on an understanding of nutrient requirements, previous experience feeding the beef herd, and research results from similar feeding programs.

The following principles can help you develop feeding programs.

Energy Nutrition

1. Winter range, crop residues, and low quality harvested roughages will usually provide adequate energy for bred females if the feed is properly supplemented with protein. Yearling heifers fed low quality feeds such as straw, mature cereal grain hays, or sudan-grass hay may be an exception. Grain, in addition to protein, may be needed for heifers fed low quality feedstuffs. Higher quality forages should provide adequate energy and protein for the cow or heifer prior to

calving.

2. Supplementing low quality forages with a natural plant protein will improve the cow's energy nutrition more than feeding small amounts of high energy, low protein grains. Supplemental protein increases the digestibility and intake of low quality forages and increases energy intake. However, a low level of supplementation will not compensate for a lack of feed.

3. Feeding small amounts of grain or molasses (without natural protein supplementation) usually lowers energy intake of cows eating low quality forages because feeds high in starch and sugars tend to decrease forage digestibility and intake. Grain should be considered primarily as a forage substitute to spare the forage supply.

4. Feeding small amounts of grain to cows eating high quality protein hays such as alfalfa or low quality forages with adequate protein supplementation improves the animal's energy status. When there are severe roughage shortages, grain can be fed to meet nutrient requirements as long as 3 to 5 pounds of roughage is fed daily. It appears that the response to grain supplements is likely to be best with high quality forages and poor with low quality forages.

5. Spring calving cows that graze dormant pasture after calving and before new grass growth is adequate will not consume enough energy to meet their nutritional needs. Inadequate nutrition shortly before and after calving can reduce fertility and increase the interval from calving to first heat.

6. When grass is in short supply in summer, weaning the calves early usually will be more profitable than feeding cows for greater milk production. Calf removal reduces lactational stress and helps initiate estrous cycles in cows that are not cycling.

7. Consider feeding grain by-products when energy is not adequate. Feeds like corn gluten feed, distillers grains (wet or dry), soyhulls, wheat middlings, and beet pulp may be economical in beef cow feeding programs. These by-product feeds have the advantage of providing energy primarily through highly digestible fiber rather than starch, which is the source of energy from grain. Research shows that when grain is added to a forage ration, the digestibility of the forage decreases due to the starch from the grain. Research also indicates that when by-product feeds are added to a forage ration at a level of .5% of body weight or less (dry matter basis), there are no adverse effects on forage digestibility and there may be an improvement in forage digestibility. Therefore, grain by-products appear to be an alternative to grain in beef cow rations that need extra energy. Grain by-products may be included in rations for replacement heifers, first-calf-heifers after calving, or mature cows that have high milk potential.

Protein Nutrition

1. Protein requirements should be met to provide adequate rumen nitrogen to maximize forage digestion.

2. Protein can increase the digestibility and intake of low quality forages that are the primary energy sources in the ration.

3. Cows have an internal system to recycle nitrogen as urea back into the rumen that can then be combined with the energy source in the rumen to make microbial protein.

4. It is essential that the rumen degradable protein needs are met to ensure maximum forage digestion. NPN (urea) may be included in beef cow rations to meet the rumen degradable protein needs.

5. NPN (urea) and a portion of the natural (i.e., plant and animal proteins) protein is degraded in the rumen of cattle. If urea or proteins extensively degraded in the rumen are used as a protein source for the rumen microbes to make their own protein, a rumen bypass (proteins that escape microbial degradation in the rumen; e.g., feather meal, fish meal, meat and bone meal) protein should also be included in the supplement.

6. Natural plant protein supplements, including SBM, CSM, and legumes appear to be as effective when fed two or three times a week as when fed daily. When greater amounts are fed less frequently, timid cows may be more likely to eat their fair share.

7. Protein supplements should be evaluated and purchased by nutrient cost and feeding cost. Protein sources, such as alfalfa hay, can be an inexpensive or cost effective supplement.

Mineral Nutrition

1. Most mature forages are low in phosphorus; therefore, phosphorus may be deficient in the cow's diet except when grazing young growing grass from spring until mid-July to early August. Phosphorus deficiencies have been shown to decrease weaning weight.

2. Supplemental phosphorus can be fed in the protein supplement, a commercial mineral supplement, or a home-blended, salt-mineral mix. Salt is used to limit consumption of supplemental phosphorus. Bred cows and heifers grazing winter range, crop residues, or low quality forages need about .01 to .015 pounds of supplemental phosphorus daily during gestation. A 10-15 percent phosphorus mineral mixed equally by weight with salt will provide about the correct phosphorus intake for dry cows, cows in late lactation, or cows during early lactation fed high quality hay. In areas where grass is high in sodium, mixtures of three to four parts phosphorus carrier to one part salt (NaCl) may be needed to get the proper phosphorus intake.

3. Magnesium supplementation is recommended in some areas before and during grazing of early lush pasture. In areas prone to grass tetany or when conditions suggest a likely problem with grass tetany, feed supplemental magnesium oxide (see NebGuide *G73-32, Grass Tetany*).

4. Research has not indicated that trace minerals are always needed in Nebraska. Any deficiencies should be dealt with and be supplemented on an individual ranch basis. Copper content of forages, especially mature forages, seems to be the trace element likely deficient especially in the Sandhills. Ranchers should consult with Extension educators for information about deficient areas and trace element analyses of ranch forages. Trace minerals can be included in protein or mineral supplements at low cost if a thorough analysis indicates they are needed.

5. Calcium is usually adequate in most rations because forages are usually high in calcium. However, high grain rations fed to heavy milking heifers or cows may need calcium supplementation because they contain considerable amounts of grain which is low in calcium. When legumes high in calcium are fed, there is little need to feed calcium mineral supplements to improve the calcium phosphorus ratio.

Vitamin Nutrition

1. Vitamin A appears to be the only vitamin supplement routinely needed by the cow herd.

2. Vitamin A supplementation can begin about 60 days before calving. Include Vitamin A in the protein supplement, salt mineral mix, or inject it. Vitamin A should be fed at a rate of about 25,000 IU per head daily before calving and 40,000 IU per head daily after calving. If Vitamin A is mixed with salt, mix about 1,250,000 IU per pound of salt before calving and 2,000,000 IU per pound of salt after calving. It is important to keep minerals fresh and dry to assure a high level of active Vitamin A. If high quality, green leafy alfalfa hay that is less than a year old is fed, it is doubtful if Vitamin A supplementation is needed.

Table IV. Example Rations for Late Gestation and Lactation[1]

	Late Gestation		*Lactation*					
	Heifers	*Cows*	*Young Cows (2-3 year olds)*				*Mature Cows*	
			Avg Milk		*High Milk*		*Avg Milk*	*High Milk*
	lbs	lbs	no gain lbs	.5 lb gain lbs	no gain lbs	.5 lb gain lbs	lbs	lbs
Alfalfa Hay (early bloom)	6-8	5-7	__	__	__	__	10-13	__
Milo or Corn Stover	12-16	15-24	__	__	__	__	10-16	__
Alfalfa Hay (early bloom)	5-6	__	10-14	10-14	18-22	10-12	8-10	13-15
Milo or Corn Stover	10-12	__	10-14	__	__	__	10-12	__
Corn Silage	10-12	__	10	35-45	15-20	35-40	15-20	35-40
Grain	__	__	__	__	__	2	__	__
Alfalfa Hay (early bloom)	__	__	10-14	16-20	18-22	18-22	8-10	12-15
Brome or Prairie Hay (early bloom)	16-22	20-26	14-18	8-12	6-10	__	18-20	12-15
Grain	__	__	__	__	__	5-6	__	__
32% Protein Supplement	__	__	3	3	4	4	1.5	2
Brome or Prairie Hay (early bloom)	__	__	16-18	12-14	18-20	14-16	20-23	19-21
Grain	__	__	__	3	__	4	__	4

[1]Feeds as fed: hay stover and grain 85 to 90 percent D.M.; corn silage 35 percent D.M.

General Nutrition Management

1. Underfeeding the cow herd after calving can lower milk production and reduce the number of cows cycling early in the breeding season. This is especially true for cows and heifers that are thin (body condition score 4 or less) at calving.

2. When dry or cool weather delays grass growth, extending the length of the breeding season will help prevent having a high percentage of open cows.

3. Feed costs can be reduced by extending grazing in the fall and winter on range, meadows or crop residues rather than feeding harvested feeds.

4. If feed costs are extremely high, it may indicate that the cow's nutrient needs are not matched with the nutrient quality of the grass/forage resource. Producers may consider changing when calving occurs and/or when calves are weaned based on the nutrient content of the forage resource to help reduce feed costs.

Example rations for late gestation and lactation are shown in *Table IV*. Extension educators can help producers "fine tune" their feeding programs using computer least-cost ration programs. Rations can be developed if producers know alternative forages that are available and the forages being considered have been analyzed for nutrient content.

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