

Nutrition Management and Feeding

Table 1. Daily Water Requirements for Various Classes of Cattle From 40 to 90 Degrees Fahrenheit

	40	50	60	70	80	90
Growing calves						
400 pounds	4.0	4.3	5.0	5.8	6.7	9.5
600 pounds	5.3	5.8	6.6	7.8	8.9	12.7
800 pounds	6.3	6.8	7.9	9.2	10.6	15.0
Pregnant cows	6.0	6.5	7.4	8.7		
Lactating cows	11.4	12.6	14.5	16.9	17.9	16.2
Mature bulls	8.7	9.4	10.8	12.6	14.5	20.6

Use of Intake Limiters

Cows nursing young calves and replacement heifers occasionally need additional energy and protein. This often occurs during the winter months when cattle are fed hay. These nutrients are needed in fairly small amounts, which can make it difficult to feed economically and be assured that all cattle are getting their fair share.

Daily hand-feeding requires a large amount of labor and trough feeding space. In addition, boss cows usually keep timid cows from

getting adequate amounts of the supplement. If the supplements can be self-fed, nutritional needs could be more likely met, and labor cost could be greatly reduced.

Intake limiters can make self-feeding practical. Many cattle producers think of intake limiters as products that are added to a diet in relatively small amounts to reduce consumption. However, a limiter can make up a large portion of the diet. For example, nutrient intake can be limited by diluting the diet with bulky ingredients such as peanut hulls, cottonseed hulls, gin trash, or hay. With this example, the amount of intake is determined by the amount of bulk that the cattle can consume.

Salt, on the other hand, limits intake by physiological changes produced in the cow. Thus, it is very important to accustom cattle to the feed via hand-feeding for a week or so before allowing them free access to the feed. For many years, salt has been used as a successful intake limiter. The amount consumed depends on the availability of other feeds. In general, cattle consume about $\frac{1}{10}$ pound of salt per 100 pounds of body weight when salt is used to limit intake of a palatable feed. Table 2 shows estimated salt intake for various weights of cattle.

Table 2. Expected Daily Salt Consumption for Varying Weights of Cattle

Salt Consumption (pounds/day)			
Body Weight (pounds)	Low	Average	High
300	0.3	0.5	0.6
500	0.5	0.6	0.7
700	0.6	0.7	0.9
900	0.7	0.9	1.1
1100	0.8	1.1	1.3
1300	0.9	1.3	1.5
1500	1.0	1.5	1.6

As an example, if we have a group of cows with an average weight of 1,100 pounds and we want to supplement them with 2 pounds of cottonseed meal per day, we would make a bulk mix of 1.1 parts salt per 2 parts cottonseed meal. In other words, we would mix 1,100 pounds of salt with 2,000 pounds (1 ton) of cottonseed meal, ensuring a mix that these cows would consume at our desired rate. When using high-moisture feeds such as silage, the amount of salt that cattle consume will increase. Cattle consuming salt-regulated supplements should always have available adequate water. Cattle that are fed high levels of salt will consume at least 50 percent more

water than usual. This will amount to approximately 5 gallons of additional water for each pound of salt consumed. Thus, high-salt feeds should not be located close to water or overconsumption might be a problem.

Negative Aspects of Using Salt as an Intake Limiter

- Salt is corrosive to equipment used to handle the mixes.
- When continually fed in the same pasture area, salt can build up in the soil and cause productivity problems.
- Cattle that consume a high-salt supplement consume less mineral mix.

Take-Home Message

- Self-fed supplements decrease labor and allow timid cows better access to the feed.
- Salt can be used as an effective intake limiter.
- Generally, cows will consume 0.1 pounds of salt per 100 pounds of body weight.
- Hand-feed the supplement for a week to allow cattle to adjust.
- Continually monitor intake and make adjustments as needed.

What to Look for in a Mineral Supplement

Trace mineral salt is not a complete mineral; it contains no calcium or phosphorus. When evaluating the composition tag on a bag of minerals, look for the following:

- 15 to 30 percent salt
- 6 to 12 percent calcium
- 6 to 12 percent phosphorus
- 1 to 4 percent magnesium (8 to 14 percent for Hi-Mag)
- .09 to .18 percent copper
- .18 to .36 percent zinc
- .0026 to .0052 percent selenium

If concentrations of these minerals are considerably outside of these ranges, look for another bag of minerals. Consumption levels should be between 2 and 4 ounces per day. There will be extreme differences in prices; make sure that you consider composition and daily intake when evaluating these price differences. (The least expensive bag is not necessarily the best buy.)

Other Considerations

- If cows routinely run out of mineral supplements, their consumption levels will not be in the 2 to 4 ounce range. It is important to have mineral supplements available at all times.
- If you feed abundant quantities of poultry litter, mineral consumption will nearly cease.
- If you feed a “hot mix” such as cottonseed meal and salt during the winter, take special care to ensure adequate trace mineral, calcium, and phosphorus consumption.
- A good homemade recipe is: mix a 50-pound sack of trace mineral salt with a 50-pound sack of dicalcium phosphate. Feed this free-choice.
- High-Mag mineral does not need to be fed all year long; the most critical time is during the spring.

Predicting Intake

When you plan for winter feed needs and assess the nutrient needs of beef cattle, it is important that you are able to predict daily intake. For most of the hays fed in Alabama, you can estimate daily intake by looking at the amount of fiber present in the hay. A hay sample can be analyzed for neutral detergent fiber content (NDF) by any hay testing laboratory. Once the NDF value has been determined, you can use the prediction of dry matter intake = $120/\text{NDF}$. For example, if the hay report indicates that your hay contains 60 percent NDF, you would predict an intake of $120/60 = 2$ percent of body weight per day. For this particular hay, you would predict that a 1,200-pound cow would consume 24 pounds per day (2 percent of 1,200).

Typical Weaning and Preconditioning Diets

When you wean calves, it is extremely important to provide a palatable feed. This will get calves consuming quickly. For the first 24 hours after weaning, it is good practice to feed good quality hay at 2 percent of a calf's body weight, and concentrate at 1 percent of the calf's body weight. Then, over the next 48 hours, convert the calf to a complete diet.

The following are some example weaning diets that work well for calves:

Diet 1

300 pounds chopped hay
 300 pounds corn gluten feed
 390 pounds soyhulls
 5 pounds trace mineral salt
 5 pounds dicalcium phosphate

Diet 2

250 pounds peanut hulls (loose, not ground or pelleted)
 250 pounds cracked corn
 370 pounds soyhulls
 120 pounds soybean meal
 5 pounds trace mineral salt
 5 pounds dicalcium phosphate

Diet 3

- 300 pounds peanut hay
- 690 pounds soyhulls
- 5 pounds trace mineral salt
- 5 pounds dicalcium phosphate

Feeder Space

When you supplement brood cows, provide about 30 inches of linear bunk or trough space for each cow, and about 24 inches per head for weaned calves.

When you provide free-choice feed, approximately 6 inches per calf is enough feeder space. This may need to be increased to 12 inches for bigger cattle in a backgrounding situation.

Creep feeders should have openings of 16 to 20 inches wide and 36 to 42 inches high.

Commodity Sheds

In order to take advantage of a bargain-priced feed at low-demand times of the year, you need to have a storage system such as a commodity shed. As you begin to plan a commodity, it is important to consider various factors.

Delivery vehicle. The typical commodity feed delivered in Alabama is transported by tractor-trailers that use 53-foot trailers and need about 14 feet of vertical clearance. It is important to note that the trailer may be a dump trailer or a walking-floor type. Those with walking floors are most often used to eliminate the need for excessively high roof clearance. These are also used to avoid having to dump feed outside and then move inside with a front-end loader.

Size of commodity shed. Size considerations for your commodity shed must begin with the fact that most feeds come in increments of 24 tons. Tractor-trailers need an eave height of at least 14 feet, and each bay should be at least 12 to 14 feet wide. Clearance is needed along each side of the truck in order to open end doors. Most feeds that are unloaded off of a live-bottom truck will be piled to a height of 6 to 8 feet.

To size your shed, you need to consider the bulk density of various commodity feeds. For example, determine the size of bay needed to store one load of cottonseed weighing 24 tons. At 25 pounds per cubic foot, 24 tons (48,000 pounds) of cottonseed would require 1,920 cubic feet of space. It is always best to have about 25 percent extra size. By adding 25 percent, you end up with a total of 2,400 cubic feet. If you can stack it to a height of 6 feet and the bay is 14 feet wide, you need a length of 28 feet.

Table 3 gives an average weight of various commodity feeds from around the state of Alabama.

Table 3. Bulk Densities of Various Commodity Feeds

Commodity	Pounds/Cubic Foot
Broiler litter	30
Corn, shelled	45
Corn gluten feed	33
Cottonseed	25
Cottonseed meal	38
Oats	26
Peanut hulls, loose	7
Peanut skins	11
Soybean hulls, loose	28
Soybean hulls, pelleted	40
Wheat flour	40

Body Condition Scores

Body condition scores are numbers used to assess the relative fatness of a cow. The system uses scores from 1 to 9, with a 1 being extremely thin and a 9 being extremely fat. The target for most cows should be a score of 5 to 6. If cows are too thin, they will not return to estrus and will not rebreed. It is very important to assess body condition scores across the entire herd at 75 days prior to the calving season. This assessment will allow you time to make necessary adjustments in nutrition. For most cows, an increase of one body condition score equates to gaining about 70 to 80 pounds of body weight. The accompanying photos and descriptions describe the nine body condition scores.

Indications to Look for on the Body Condition Score 1-9 Scale



Figure 1. Bone structure of shoulder, ribs, back, hooks, and pins sharp to touch and easily visible. Little evidence of fat deposits or muscling. Cow is severely emaciated and physically weak. There is muscle breakdown and the cow is likely to go down when stressed by hauling, cold weather, and so forth.



Figure 2. Little evidence of fat deposits, yet some muscling in the hindquarters but severely depleted. The spinous processes feel sharp to the touch and are easily seen with space between them. Still, the cow is not weak.



Figure 3. Beginning of fat cover over the loin, back, and foreribs. Backbone still highly visible. Processes of the spine can be identified individually by touch and may still be visible. Spaces between the processes are less pronounced.



Figure 4. Foreribs not noticeable; twelfth and thirteenth ribs still noticeable to the eye, particularly in cattle with a big spring of rib and ribs wide apart. The transverse spinous processes can be identified only by palpation (with slight pressure) to feel rounded rather than sharp. Full but straightness of muscling in the hindquarters.



Figure 5. Twelfth and thirteenth ribs not visible to the eye unless the animal has been shrunk. The transverse spinous processes can be felt only with firm pressure and feel rounded—not noticeable to the eye. Spaces between the processes not visible and only distinguishable with firm pressure. Areas on each side of the tailhead are fairly well-filled but not mounded. The cow can be described as thin to moderate.



Figure 6. Ribs fully covered, not noticeable to the eye. Hindquarters plump and full. Noticeable sponginess to the covering of foreribs and on each side of the tailhead. Firm pressure is now required to feel the transverse processes. The cow appears smooth throughout.



Figure 7. Ends of the spinous processes can only be felt with very firm pressure. Spaces between processes can barely be distinguished at all. There is abundant fat cover on either side of tailhead with some patchiness evident. The cow appears in very good flesh.



Figure 8. Animal taking on a smooth, blocky appearance; bone structure disappearing from sight. The fat cover is thick and spongy with patchiness likely. The cow is obese.



Figure 9. Bone structure not seen or easily felt. Tailhead buried in fat. Animal's mobility may actually be impaired by excess fat.

Nutrient Requirements of Beef Cattle

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

Months Since Calving

	1	2	3	4	5	6	7	8	9	10	11	12
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

Months Since Calving

	1	2	3	4	5	6	7	8	9	10	11	12
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

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

Months Since Calving

	1	2	3	4	5	6	7	8	9	10	11	12
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

Table 8. Mineral Requirements and Maximum Tolerable Amounts

Mineral	Growing/ Finishing	Gestating Cow	Lactating Cow	Maximum
	Calves			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 to .08	.06 to .08	.10	—
Sulfur, %	.15	.15	.15	.40
Zinc, mg/kg	30	30	30	500