



Feeding Management for Show Steers

Jim Sprinkle

Selection

Prior to purchasing a show steer, one should determine the size of animal which needs to be purchased in order to reach show weight. Large frame steers such as Charolais, Simmental, Salers, Maine Anjou, and Chianina crosses will weigh from 1200 to 1400 pounds at finish weight. Medium frame steers which would include British crosses such as Hereford and Angus will weigh around 1100 pounds at slaughter weight. In order to reach the finish weight, be competitive in the steer show, and secure a better quality grade, minimum starting weights are required for the feeding period. Medium frame steers should weigh around 700 pounds 200 days before the steer show. At the end of the feed adjustment period (40 days) in which steers are gradually accustomed to a grain ration, medium frame steers should weigh 750 pounds. This will allow approximately 160 days to put on the desired 350 pounds. It takes about 140 days to finish a medium frame steer of this weight. Large frame steers should weigh 800 pounds 200 days before the show and at least 850 pounds at the end of the 40 day feed adjustment period.

If you are unsure of whether a steer you have purchased is medium or large frame, frame size can be estimated by hip height. Making sure that the steer is perfectly level on a flat surface, measure the hip height in inches directly over the hook bones of the steer. Make sure the measuring stick is vertical to the ground and that the sliding stick on top of the back (over the hooks) is level. It is a good idea to use a level on the measuring stick and sliding stick. Frame measuring devices can easily be made from PVC pipe.

Steers selected should show evidence of muscling by standing wide and being thick over the topline, through the stifle, and in the hindquarters. Thickly muscled steers will especially show this in the forearm where there is little fat to masquerade as muscle. Small framed, stubby cattle should be avoided. Also, large framed, slab-sided cattle with little evidence of muscling should be avoided.

You should make sure that any steer you purchase is up to date on his shots. If a steer is purchased off a ranch, you may be able to get the owner to give shots to the steer when it is purchased. Otherwise, you will need to do this yourself. If the calf has had no shots given in its lifetime, you will probably need to give an initial shot at purchase, followed by booster shots 2 weeks later. Be sure to follow direction labels and get someone experienced to help you give the shots if you have never given shots before. It can be very risky to inject shots in the vein that are supposed to be given intramuscularly or subcutaneously. Make sure that all shots go in front of the shoulder, not in the hindquarters. Without question, you must make sure that your steer has a current *Clostridium* shot. Steers which are placed on high energy diets are more subject to sudden death disease if *Clostridium* shots are not up to date. Other shots which you may need to consider giving is bovine respiratory disease complex (IBR-PI 3-BVD-BRSV) and *Pastuerella haemolytica*. In some areas, it may also be desirous to vaccinate for *Hemophilus somnus*. Local veterinarians can suggest vaccinations for your particular area.

Estimating Frame Size from Hip Height

| Age of Steer | Inches at Hook Bones | |
|--------------|----------------------|-------------------|
| | Medium Frame Steer | Large Frame Steer |
| 6 months | less than 44 | greater than 46 |
| 9 months | less than 48 | greater than 50 |
| 12 months | less than 50 | greater than 52 |

As you receive the steer, be extra alert for signs of sickness the first 3 weeks. Look for drooped ears, blood in the feces, lowered head, or a reduction in feed intake. If you see any of these signs, consult your 4-H leader, extension agent, veterinarian, or some other knowledgeable person for treatment suggestions. Usually, if the rectal temperature is over 104°F, the animal probably needs some type of antibiotic treatment. While animals are being treated, either remove grain completely and provide free choice hay or cut grain by 50%.

Steers which may not have ever drunk out of a livestock tank or bucket will need to be watched to make sure they are drinking. Hay can be placed next to the water source to encourage the steer to drink. Dehydrated steers will be more likely to get sick.

Starting Steers on Grain

Cattle which have been grazing can not be placed suddenly on a grain diet. The rumen has microbes which aid in digestion and it takes time for the microbe population to adjust to changes in diet. The microbes which digest fiber (grass) are different than those which digest grain. Sudden infusions of grain can cause digestive upsets, acidosis, founder, and in some cases death.

Commercial feedlots adjust cattle to grain rations over 21 days. This is too risky for expensive show steers, so I recommend an adjustment period of 40 days to bring a steer to a 70 to 80% grain diet. If you have plenty of time (greater than 200 days) before the show, you may be able to feed a growing ration which contains 50 to 60% hay until the last 200 days. Steers on this type of ration should gain around 2 pounds per day.

When you first receive the calf, provide free choice (3% of body weight; 15 pounds for a 500 lb. calf) high quality grass hay. Feeding alfalfa hay when calves are first received may increase the chance for bloat in range calves unaccustomed to legumes. Unless the calf has been preconditioned to a grain diet before you bought him, avoid feeding grain the first 3 days. After the first 3 days, if you desire to feed alfalfa hay, you may slowly increase the amount of alfalfa hay feed while decreasing grass hay by the same amount. A logical sequence would be 25% substitution, wait 2 days, then 50% substitution, wait 2 days, then 75% substitution, wait 2 days, then 100% alfalfa.

After the first 3 days, slowly introduce the steer to grain. Continue to keep the steer on free choice hay while doing this. I would start the steer with 2 pounds of grain per day. Determine how well the steer is eating the grain. If he is cleaning it all up, then after 2 or 3 days, increase grain to 3 pounds. Follow the same procedure before increasing grain to 4 pounds. After a period of 10 to 14 days, you should have the steer to a 50% grain/50% hay grower ration. If at any time, the steer refuses a major portion of the feed, back down on the grain ration until full intake resumes. (You may also need to check for sickness if feed is refused).

The amount of total hay and grain to be fed can be obtained by consulting Table 2 (Nutrient Requirements of Beef Cattle,

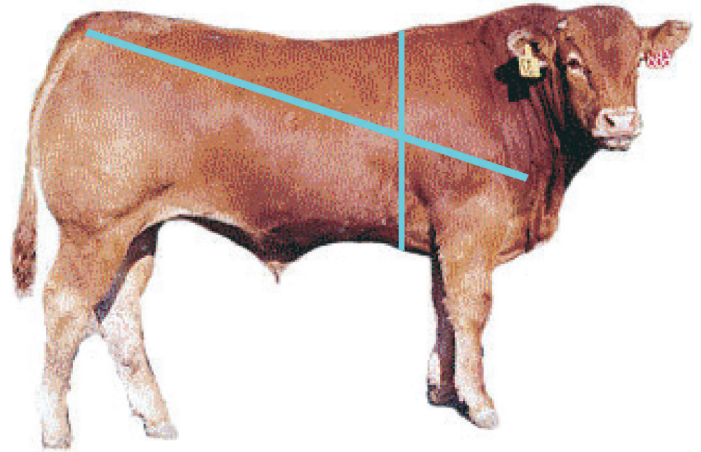


Figure 1. Measure body length (BL) and heart girth (HG) in inches. Weight in lbs. = $(HG \times HG \times BL)/300$. You can estimate weight for your market steer using a sewing tape. For the diagonal measurement, measure the distance from the point of the shoulder to the pin bone of the hip. Go all the way around the heart girth immediately behind the elbow for the other measurement.

pages 6-9) attached to this document. For instance, a 500 lb. medium frame steer that is gaining 2 pounds a day should eat around 13.1 pounds of total feed per day (dry matter basis). If you adjust for 10% moisture that is present in most dry feeds, the amount of total hay + grain you would need to feed would equal 14.6 pounds ($13.1 \div .90 = 14.6$). For a grower ration, 7.3 pounds of grain would need to be fed with 7.3 pounds of hay. Once you have the steer on the growing ration, you may eliminate free choice feeding of hay and feed according to Table 1 guidelines. You will need to increase total feed as the steer gains weight. If possible, weights should be taken every 3 to 4 weeks. If this is not possible, weight can be estimated following the directions in Figure 1. By knowing or estimating weight and by adding expected weekly gains, you can adjust feeding levels each week. Add no more than 2 or 3 pounds of added feed per increase. You should use an accurate scale (not a bathroom scale) to determine how many pounds of feed your feeding containers contain.

The amount of time that a steer is left on the growing ration is dependent upon the time remaining before the show. As mentioned previously, steers need to be on a finishing diet for at least 140 days. The total digestible nutrients (TDN) of a ration will need to be adjusted upwards for increased average daily gain and also for finishing steers later in the feeding period. To gain 2.75 pounds a day, a diet with 80% TDN will need to be provided. Steers need to be placed on a 70% to 85% grain diet to finish adequately. During the last 100 pounds of gain, the diet may approach 85% grain content. However, for safety, it is recommended that most market steer projects be fed a 70% grain finishing diet unless there is a problem with the steer making the desired sale weight.

To avoid digestive upsets and possible acidosis, step up rations are used to go from a grower ration to a finishing ration. The amount of grain in the ration should be increased by no more than 10% a week. In other words, if a steer was

being moved from a 50% grain grower ration to a 80% grain finishing ration, it would require feeding 60% grain for one week and 70% grain for one week before feeding the 80% grain ration. You will need to plan ahead for the step-up rations in order to allow 140 days on the desired finishing ration. To avoid grain bloat with high grain diets, provide a free choice molasses block with Rumensin® or have Rumensin added to your grain by a feed mill. Follow label directions when using any medicated product.

Planning for Desired Weight Gains

If you know your animals current weight and the number of days until the show, you can calculate the average daily gain needed and the TDN % needed in the ration (see checklist on page 4). For example, a medium frame steer weighs 775 pounds and there are 180 days remaining before the show. If finish weight is 1150 pounds, then the steer will need to gain 375 pounds or 2 pounds a day. According to Table 2, an 800 pound medium frame steer gaining 2 pounds a day needs 67.5% TDN. The chart in the handout on feed mixtures (Table 1, page 5) shows that 50% alfalfa hay/50% corn provides 70.5% TDN, 40% alfalfa hay/60% barley provides 70.4% TDN, and 30% alfalfa hay/70% oats provides 68.2% TDN. For the last 140 days of the feeding program, we probably want to have at least 70% grain in the ration in order for the steer to finish properly. So, feeding a 70 to 80% oats and 20 to 30% alfalfa ration would be the best choice. If another grain was being used, the change to oats could be done over a week to 10 days. Step-up rations would need to be done as outlined above. It would take 15 days to step-up the grain ration from 50% grain to 80% grain. (see checklist on page 4)

Some may choose to feed a commercial steer ration instead of grains such as corn, barley, or oats. Although they are often more costly than farm grains, most commercial rations contain added minerals. The problem with commercial supplements are that TDN values are not listed on the feed tag. Without additional information, this makes it difficult to predict average daily gain. Fortunately, TDN can be estimated from the amount of fiber, protein, fat, and ash listed on the feed tag (See page 5). For example, a commercial ration with 4% fiber, 6% ash, 2% fat, and 13% protein would contain 81.7% TDN. Also, feed mills can provide you this type of information upon request.

By determining the average daily gain needed as shown above and coupling this with TDN requirements for the desired gain (Table 2), the percentage of grain and hay to be fed can be estimated (Table 1). To decrease average daily gain, either more forage must be included in the ration or lower energy grains must be used. It may also be necessary to increase exercise for heavy weight steers. Corn has the highest energy value of any of the common grains, so it is fed when higher average daily gains are desired. To increase average daily gains and TDN, less forage must be included in the diet. If there is some question as to whether a steer will be big enough at show time, then he should be moved as quickly as possible from a growing ration to a higher TDN (80 or 85%) finishing ration. Just be sure to allow for adequate rumen adjustment

by using step-up rations. Also, measures should be taken to prevent acidosis with higher grain diets, such as by adding Rumensin® to the diet.

Protein

It is important to meet the animal's daily protein requirements in order to achieve desired weight gains. Table 2 shows the protein requirements for the desired weight gains. If you determine that protein is inadequate for the feed mixture you are feeding (Table 1), then protein needs to be substituted for part of the grain in the ration. The most common protein supplements are cottonseed meal (75% TDN, 44.8% protein), soybean meal (81% TDN, 51.3% protein), and linseed meal (76% TDN, 38.6% protein). Table 3 lists nutrients in different feeds and forages.

Example protein substitution problem. If a large frame steer weighed 700 pounds and was fed 17.5 pounds of a 30% alfalfa hay/70% corn diet, crude protein in the diet would be 10.9% (Table 1) or 1.91 pounds of protein (17.5 lbs. * .109 protein = 1.91 lbs. protein). If the desired gain was 3.5 pounds per day, then this steer would be deficient .19 pounds of protein. (See Table 2, 700 pound large frame steer gaining 3.5 pounds per day. Protein requirements of 2.1 pounds - 1.91 lbs. protein supplied = .19 pounds.) To determine the amount of protein to substitute for corn, divide the amount of protein needed by the amount of protein per pound of protein supplement. For example, each 1 pound of cottonseed meal contains .448 pounds of protein and **(.19 lbs. protein needed ÷ .448 pounds of protein per pound of cottonseed meal = .42 pounds cottonseed meal)**. Accounting for 10% moisture in feeds (.42 lbs. cottonseed meal ÷ .9 = .47 lbs. cottonseed meal), about ½ pound of cottonseed meal would need to be substituted for corn. The TDN content would only change slightly (78.2% instead of 78.7%), so this would not be anything to worry about. Unless forages are used for protein supplements, TDN will not change much when substituting protein supplements for grain.

Minerals

Farm grains require supplementation of a free choice trace mineral salt block if not provided in a commercial grain ration. If a balanced trace mineral package is included in the daily ration and you are using a good quality hay, a plain white iodized salt block may suffice.

Exercise

Exercise is important for the show steer to maintain muscle tone and to prevent them from getting too fat. A common practice is to walk steers 1 mile a day.

Additional Resources

Managing Beef Cattle for Show. L. L. Boleman, D. B. Herd, and C. T. Boleman. 2001. Texas A & M Cooperative Extension, Publication # AS 1-2.

Available at:
http://www.thejudgingconnection.com/pdfs/Managing_Beef_for_Show.pdf

Checklist for Calculating Steer Ration and Average Daily Gain

1. My steer is a _____ large frame steer and will weigh _____ at his finished slaughter weight. (Range is from 1200 to 1400 pounds.)
2. My steer is a _____ medium frame steer and will weigh _____ at his finished slaughter weight. (Range is from 1000 to 1150 pounds.)
3. My steer weighed _____ when I bought him and now weighs _____ and I have _____ days left before the show.
4. My steer needs to gain _____ pounds before the show. (Subtract what the steer now weighs from the finished slaughter weight in # 1 or # 2.)
5. The average daily gain needed is _____ pounds per day. (Divide # 4 by days left before the show.)
6. For the average daily gain needed, I need to feed a ration that contains _____ % TDN. (Find medium or large frame steer, current weight, average daily gain desired, and TDN needed from Table 2.)
7. To supply the diet containing _____ % TDN, I need to feed a diet with _____ % grain and _____ % forage. (See page 5). I am going to feed a ration with _____ type of hay and _____ type of grain. **Be sure to use step-up rations if changing the percent grain by more than 10%.**
8. If commercial feed rations are going to be fed, what is the TDN % (see page 5) _____ % TDN. To estimate the amount of **alfalfa hay** to feed with a commercial grain ration, use the column entitled **alfalfa hay/oats** for commercial grain supplements with **70 to 79% TDN**; the column entitled **alfalfa hay/barley** for commercial grain supplements with **80 to 88% TDN**; and the column entitled **alfalfa hay/corn** for commercial grain supplements with **greater than 88% TDN**. To estimate the amount of **bermuda grass hay** to feed with a commercial grain ration, use the column entitled **bermuda grass hay/oats** for commercial grain supplements with **70 to 79% TDN**; the column entitled **bermuda grass hay/barley** for commercial grain supplements with **80 to 88% TDN**; and the column entitled **bermuda grass hay/corn** for commercial grain supplements with **greater than 88% TDN**.
9. My steer will currently be eating _____ pounds of feed (from Table 2, medium or large frame, current weight, and weight gain desired). Is protein shown for grain/ hay mix less than percentage requirements shown on Table 2? _____ If so, substitute protein as shown on page 3 of this document. Do not estimate protein content for commercial grain and hay mixes with columns suggested in # 8 above. You must multiply the lbs. of commercial grain ration * lbs. protein/lb. grain ration and add this to lbs. hay * lbs. protein/lb. hay (see Table 3). Compare this to the pounds of protein required for your steer (Table 2). Example: **(8 lbs. grain * .14 protein) + (9.5 lbs. corn * .10) = 2.07 lbs protein.**

Table 1. Energy and Protein Values for Different Feed Mixtures in Show Steer Rations

| | | Nutrient Composition of Feedstuffs | | | | | | | | | | | |
|---|---------|------------------------------------|----------------------|--------------------|------------------|--------------------|------------------|--------|------|------|------|------|------|
| | | alfalfa hay | | | corn | | | barley | | | oats | | |
| bermuda grass hay | | %CP | %TDN | %CP | %TDN | %CP | %TDN | %CP | %TDN | %CP | %TDN | %CP | %TDN |
| 8.9 | 46 | 12.9 | 50 | 10.1 | 91 | 12.9 | 84 | 12.2 | 76 | | | | |
| Feed Mixtures | | | | | | | | | | | | | |
| Feeding Rations | %forage | bermuda grass/corn | bermuda grass/barley | bermuda grass/oats | alfalfa hay/corn | alfalfa hay/barley | alfalfa hay/oats | | | | | | |
| | 100 | %CP | %TDN | %CP | %TDN | %CP | %TDN | %CP | %TDN | %CP | %TDN | %CP | %TDN |
| 20 | 80 | 8.9 | 46.0 | 8.9 | 46.0 | 12.9 | 50.0 | 12.9 | 50.0 | 12.9 | 50.0 | 12.9 | 50.0 |
| 30 | 70 | 9.1 | 55.0 | 9.6 | 52.0 | 12.3 | 58.2 | 12.9 | 56.8 | 12.8 | 55.2 | 12.7 | 57.8 |
| 40 | 60 | 9.3 | 59.5 | 9.9 | 55.0 | 12.1 | 62.3 | 12.9 | 60.2 | 12.6 | 60.4 | 12.6 | 63.0 |
| 50 | 50 | 9.4 | 64.0 | 10.2 | 58.0 | 11.8 | 66.4 | 12.9 | 63.6 | 12.6 | 60.4 | 12.6 | 63.0 |
| 60 | 40 | 9.5 | 68.5 | 10.6 | 61.0 | 11.5 | 70.5 | 12.9 | 67.0 | 12.6 | 63.0 | 12.6 | 63.0 |
| 70 | 30 | 9.6 | 73.0 | 10.9 | 64.0 | 11.2 | 74.6 | 12.9 | 70.4 | 12.5 | 65.6 | 12.5 | 65.6 |
| 80 | 20 | 9.7 | 77.5 | 11.2 | 67.0 | 10.9 | 78.7 | 12.9 | 73.8 | 12.4 | 68.2 | 12.4 | 68.2 |
| 85 | 15 | 9.9 | 82.0 | 11.5 | 70.0 | 10.7 | 82.8 | 12.9 | 77.2 | 12.3 | 70.8 | 12.3 | 70.8 |
| | | 9.9 | 84.3 | 11.7 | 71.5 | 10.5 | 84.9 | 12.9 | 78.9 | 12.3 | 72.1 | 12.3 | 72.1 |
| “Estimated TDN % in feeds containing 2% fat, 13% protein, and different levels of fiber as shown on feed labels*” | | | | | | | | | | | | | |
| Different levels of ash + minerals on feed tag | | | | | | | | | | | | | |
| %Fiber listed on feed tag | | 2 | 4 | 6 | 8 | 10 | 12 | | | | | | |
| 2 | | 86.9 | 85.1 | 83.3 | 81.5 | 79.7 | 77.9 | | | | | | |
| 3 | | 86.1 | 84.3 | 82.5 | 80.7 | 78.9 | 77.1 | | | | | | |
| 4 | | 85.3 | 83.5 | 81.7 | 79.9 | 78.1 | 76.3 | | | | | | |
| 5 | | 84.5 | 82.7 | 80.9 | 79.1 | 77.3 | 75.5 | | | | | | |
| 6 | | 83.7 | 81.9 | 80.1 | 78.3 | 76.5 | 74.7 | | | | | | |
| 7 | | 82.9 | 81.1 | 79.3 | 77.5 | 75.7 | 73.9 | | | | | | |
| 8 | | 82.1 | 80.3 | 78.5 | 76.7 | 74.9 | 73.1 | | | | | | |
| 9 | | 81.3 | 79.5 | 77.7 | 75.9 | 74.1 | 72.3 | | | | | | |
| 10 | | 80.5 | 78.7 | 76.9 | 75.1 | 73.3 | 71.5 | | | | | | |

*For 16% protein, deduct .5% TDN. For example a feed tag with 2% ash, 2% fiber, and 16% protein would be 86.4% TDN.
 **For 10% protein, add .5% TDN. For example a feed tag with 2% ash, 2% fiber, and 10% protein would be 87.4 % TDN.
 ***For each 1% added fat, add 2.25% TDN.

Nutrient Requirements of Beef Cattle
Table 2. Nutrient requirements for growing and finishing cattle
(nutrient concentration in diet dry matter, avoirdupois system).

| Weight (lb) | Daily Gain (lb) | Dry Matter Intake (lb) | Protein Intake (lb) | Protein (%) | TDN (%) | CA (%) | P (%) |
|----------------------------------|-----------------|------------------------|---------------------|-------------|---------|--------|-------|
| <i>Medium-frame steer calves</i> | | | | | | | |
| 300 | 0.5 | 7.8 | 0.75 | 9.6 | 54.0 | 0.31 | 0.20 |
| | 1.0 | 8.4 | 0.95 | 11.4 | 58.5 | 0.45 | 0.24 |
| | 1.5 | 8.7 | 1.14 | 13.2 | 63.0 | 0.58 | 0.28 |
| | 2.0 | 8.9 | 1.32 | 14.8 | 67.5 | 0.72 | 0.32 |
| | 2.5 | 8.9 | 1.48 | 16.7 | 73.5 | 0.87 | 0.37 |
| | 3.0 | 8.0 | 1.60 | 19.9 | 85.0 | 1.13 | 0.47 |
| | 400 | 0.5 | 9.7 | 0.87 | 8.9 | 54.0 | 0.27 |
| 1.0 | | 10.4 | 1.06 | 10.3 | 58.5 | 0.38 | 0.21 |
| 1.5 | | 10.8 | 1.24 | 11.5 | 63.0 | 0.47 | 0.25 |
| 2.0 | | 11.0 | 1.41 | 12.7 | 67.5 | 0.56 | 0.26 |
| 2.5 | | 11.0 | 1.56 | 14.2 | 73.5 | 0.68 | 0.30 |
| 3.0 | | 10.0 | 1.65 | 16.6 | 85.0 | 0.86 | 0.37 |
| 500 | | 0.5 | 11.5 | 0.98 | 8.5 | 54.0 | 0.25 |
| | 1.0 | 12.3 | 1.16 | 9.5 | 58.5 | 0.32 | 0.20 |
| | 1.5 | 12.8 | 1.33 | 10.5 | 63.0 | 0.40 | 0.22 |
| | 2.0 | 13.1 | 1.49 | 11.4 | 67.5 | 0.47 | 0.24 |
| | 2.5 | 13.0 | 1.63 | 12.5 | 73.5 | 0.56 | 0.27 |
| | 3.0 | 11.8 | 1.69 | 14.4 | 85.0 | 0.69 | 0.32 |
| | 600 | 0.5 | 13.2 | 1.08 | 8.2 | 54.0 | 0.23 |
| 1.0 | | 14.1 | 1.26 | 9.0 | 58.5 | 0.28 | 0.19 |
| 1.5 | | 14.7 | 1.42 | 9.8 | 63.0 | 0.35 | 0.21 |
| 2.0 | | 15.0 | 1.57 | 9.8 | 67.5 | 0.40 | 0.22 |
| 2.5 | | 14.9 | 1.69 | 11.4 | 73.5 | 0.46 | 0.24 |
| 3.0 | | 13.5 | 1.73 | 12.9 | 85.0 | 0.57 | 0.29 |
| 700 | | 0.5 | 14.8 | 1.18 | 7.9 | 54.0 | 0.22 |
| | 1.0 | 15.8 | 1.35 | 8.6 | 58.5 | 0.27 | 0.18 |
| | 1.5 | 16.5 | 1.50 | 9.2 | 63.0 | 0.31 | 0.20 |
| | 2.0 | 16.8 | 1.65 | 9.8 | 67.5 | 0.34 | 0.21 |
| | 2.5 | 16.7 | 1.75 | 10.5 | 73.5 | 0.40 | 0.22 |
| | 3.0 | 15.2 | 1.77 | 11.7 | 85.0 | 0.49 | 0.26 |

Nutrient Requirements of Beef Cattle
Table 2. Nutrient requirements for growing and finishing cattle
(nutrient concentration in diet dry matter, avoirdupois system).

| Weight (lb) | Daily Gain (lb) | Dry Matter Intake (lb) | Protein Intake (lb) | Protein (%) | TDN (%) | CA (%) | P (%) |
|----------------------------------|---|------------------------|---------------------|-------------|---------|--------|-------|
| <i>Medium-frame steer calves</i> | | | | | | | |
| 800 | 0.5 | 16.4 | 1.27 | 7.7 | 54.0 | 0.22 | 0.17 |
| | 1.0 | 17.5 | 1.44 | 8.3 | 58.5 | 0.24 | 0.19 |
| | 1.5 | 18.2 | 1.58 | 8.8 | 63.0 | 0.28 | 0.19 |
| | 2.0 | 18.6 | 1.72 | 9.2 | 67.5 | 0.31 | 0.20 |
| | 2.5 | 18.5 | 1.81 | 9.8 | 73.5 | 0.35 | 0.21 |
| | 3.0 | 16.8 | 1.81 | 10.8 | 85.0 | 0.42 | 0.25 |
| | <i>900</i> | | | | | | |
| 900 | 0.5 | 17.9 | 1.36 | 7.6 | 54.0 | 0.21 | 0.18 |
| | 1.0 | 19.1 | 1.52 | 8.0 | 58.5 | 0.23 | 0.18 |
| | 1.5 | 19.9 | 1.66 | 8.4 | 63.0 | 0.25 | 0.19 |
| | 2.0 | 20.3 | 1.79 | 8.8 | 67.5 | 0.28 | 0.20 |
| | 2.5 | 20.2 | 1.87 | 9.3 | 73.5 | 0.31 | 0.20 |
| | 3.0 | 18.3 | 1.85 | 10.1 | 85.0 | 0.37 | 0.23 |
| | <i>1000</i> | | | | | | |
| 1000 | 0.5 | 19.3 | 1.45 | 7.5 | 54.0 | 0.21 | 0.18 |
| | 1.0 | 20.7 | 1.60 | 7.8 | 58.5 | 0.21 | 0.18 |
| | 1.5 | 21.5 | 1.74 | 8.1 | 63.0 | 0.24 | 0.18 |
| | 2.0 | 22.0 | 1.85 | 8.4 | 67.5 | 0.25 | 0.19 |
| | 2.5 | 21.9 | 1.92 | 8.8 | 73.5 | 0.27 | 0.19 |
| | 3.0 | 19.8 | 1.88 | 9.5 | 85.0 | 0.32 | 0.22 |
| | <i>Large-frame steer calves and compensating medium-frame yearling steers</i> | | | | | | |
| 300 | 0.5 | 8.2 | 0.77 | 9.5 | 52.5 | 0.30 | 0.19 |
| | 1.0 | 8.7 | 0.99 | 11.3 | 56.0 | 0.46 | 0.23 |
| | 1.5 | 9.1 | 1.19 | 12.9 | 59.5 | 0.58 | 0.27 |
| | 2.0 | 9.4 | 1.37 | 14.6 | 63.5 | 0.70 | 0.30 |
| | 2.5 | 9.6 | 1.55 | 16.3 | 67.5 | 0.85 | 0.34 |
| | 3.0 | 9.6 | 1.73 | 18.0 | 72.0 | 0.99 | 0.39 |
| | 3.5 | 9.3 | 1.88 | 20.3 | 78.5 | 1.16 | 0.45 |
| <i>400</i> | | | | | | | |
| 400 | 0.5 | 10.1 | 0.89 | 8.9 | 52.5 | 0.26 | 0.17 |
| | 1.0 | 10.8 | 1.10 | 10.2 | 56.0 | 0.37 | 0.20 |
| | 1.5 | 11.3 | 1.30 | 11.4 | 59.5 | 0.47 | 0.23 |
| | 2.0 | 11.7 | 1.47 | 12.7 | 63.5 | 0.57 | 0.26 |
| | 2.5 | 11.9 | 1.64 | 13.9 | 67.5 | 0.65 | 0.30 |
| | 3.0 | 11.9 | 1.81 | 15.2 | 72.0 | 0.76 | 0.33 |
| | 3.5 | 11.5 | 1.94 | 16.9 | 78.5 | 0.90 | 0.36 |

Nutrient Requirements of Beef Cattle
Table 2. Nutrient requirements for growing and finishing cattle
(nutrient concentration in diet dry matter, avoirdupois system).

| Weight (lb) | Daily Gain (lb) | Dry Matter Intake (lb) | Protein Intake (lb) | Protein (%) | TDN (%) | CA (%) | P (%) |
|-------------|-----------------|------------------------|---------------------|-------------|---------|--------|-------|
| | | | | | | | |
| | | | | | | | |
| 500 | 0.5 | 12.0 | 1.0 | 8.5 | 52.5 | 0.24 | 0.17 |
| | 1.0 | 12.8 | 1.21 | 9.5 | 56.0 | 0.33 | 0.19 |
| | 1.5 | 13.4 | 1.40 | 10.4 | 59.5 | 0.39 | 0.21 |
| | 2.0 | 13.8 | 1.57 | 11.4 | 63.5 | 0.46 | 0.24 |
| | 2.5 | 14.0 | 1.73 | 12.4 | 67.5 | 0.55 | 0.25 |
| | 3.0 | 14.0 | 1.88 | 13.4 | 72.0 | 0.63 | 0.28 |
| | 3.5 | 13.6 | 2.00 | 14.7 | 78.5 | 0.73 | 0.32 |
| | | | | | | | |
| 600 | 0.5 | 13.8 | 1.11 | 8.2 | 52.5 | 0.22 | 0.18 |
| | 1.0 | 14.6 | 1.31 | 9.0 | 56.0 | 0.29 | 0.18 |
| | 1.5 | 15.3 | 1.50 | 9.7 | 59.5 | 0.35 | 0.20 |
| | 2.0 | 15.8 | 1.66 | 10.5 | 63.5 | 0.40 | 0.22 |
| | 2.5 | 16.1 | 1.81 | 11.3 | 67.5 | 0.47 | 0.23 |
| | 3.0 | 16.1 | 1.95 | 12.1 | 72.0 | 0.52 | 0.26 |
| | 3.5 | 15.6 | 2.05 | 13.2 | 78.5 | 0.61 | 0.28 |
| | | | | | | | |
| 700 | 0.5 | 15.4 | 1.21 | 7.9 | 52.5 | 0.21 | 0.17 |
| | 1.0 | 16.4 | 1.41 | 8.6 | 56.0 | 0.27 | 0.19 |
| | 1.5 | 17.2 | 1.59 | 9.2 | 59.5 | 0.31 | 0.19 |
| | 2.0 | 17.8 | 1.74 | 9.8 | 63.5 | 0.36 | 0.21 |
| | 2.5 | 18.0 | 1.88 | 10.5 | 67.5 | 0.40 | 0.22 |
| | 3.0 | 18.0 | 2.01 | 11.1 | 72.0 | 0.45 | 0.23 |
| | 3.5 | 17.5 | 2.10 | 12.0 | 78.5 | 0.52 | 0.26 |
| | | | | | | | |
| 800 | 0.5 | 17.1 | 1.31 | 7.7 | 52.5 | 0.21 | 0.18 |
| | 1.0 | 18.2 | 1.51 | 8.3 | 56.0 | 0.24 | 0.18 |
| | 1.5 | 19.0 | 1.68 | 8.8 | 59.5 | 0.28 | 0.19 |
| | 2.0 | 19.6 | 1.82 | 9.3 | 63.5 | 0.32 | 0.20 |
| | 2.5 | 19.9 | 1.96 | 9.8 | 67.5 | 0.35 | 0.21 |
| | 3.0 | 19.9 | 2.07 | 10.4 | 72.0 | 0.40 | 0.22 |
| | 3.5 | 19.3 | 2.15 | 11.1 | 78.5 | 0.45 | 0.24 |

Nutrient Requirements of Beef Cattle
Table 2. Nutrient requirements for growing and finishing cattle
(nutrient concentration in diet dry matter, avoirdupois system).

| Weight (lb) | Daily Gain (lb) | Dry Matter Intake (lb) | Protein Intake (lb) | Protein (%) | TDN (%) | CA (%) | P (%) |
|---|-----------------|------------------------|---------------------|-------------|---------|--------|-------|
| <i>Large-frame steer calves and compensating medium-frame yearling steers</i> | | | | | | | |
| 900 | 0.5 | 18.6 | 1.40 | 7.6 | 52.5 | 0.20 | 0.18 |
| | 1.0 | 19.8 | 1.60 | 8.0 | 56.0 | 0.23 | 0.18 |
| | 1.5 | 20.8 | 1.77 | 8.5 | 59.5 | 0.27 | 0.18 |
| | 2.0 | 21.4 | 1.90 | 8.9 | 63.5 | 0.29 | 0.20 |
| | 2.5 | 21.8 | 2.03 | 9.3 | 67.5 | 0.31 | 0.20 |
| | 3.0 | 21.7 | 2.13 | 9.8 | 72.0 | 0.36 | 0.21 |
| | 3.5 | 21.1 | 2.19 | 10.4 | 78.5 | 0.40 | 0.23 |
| 1000 | 0.5 | 20.2 | 1.49 | 7.5 | 52.5 | 0.20 | 0.17 |
| | 1.0 | 21.5 | 1.69 | 7.8 | 56.0 | 0.23 | 0.17 |
| | 1.5 | 22.5 | 1.85 | 8.2 | 59.5 | 0.25 | 0.18 |
| | 2.0 | 23.2 | 1.98 | 8.6 | 63.5 | 0.27 | 0.18 |
| | 2.5 | 23.6 | 2.09 | 8.9 | 67.5 | 0.29 | 0.19 |
| | 3.0 | 23.6 | 2.19 | 9.3 | 72.0 | 0.32 | 0.20 |
| | 3.5 | 22.8 | 2.24 | 9.8 | 78.5 | 0.35 | 0.21 |
| 1100 | 0.5 | 21.7 | 1.58 | 7.4 | 52.5 | 0.19 | 0.18 |
| | 1.0 | 23.1 | 1.77 | 7.7 | 56.0 | 0.21 | 0.18 |
| | 1.5 | 24.1 | 1.93 | 8.0 | 59.5 | 0.23 | 0.18 |
| | 2.0 | 24.9 | 2.05 | 8.3 | 63.5 | 0.25 | 0.18 |
| | 2.5 | 25.3 | 2.16 | 8.5 | 67.5 | 0.26 | 0.18 |
| | 3.0 | 25.3 | 2.25 | 8.9 | 72.0 | 0.29 | 0.19 |
| | 3.5 | 24.5 | 2.28 | 9.3 | 78.5 | 0.32 | 0.21 |

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Table 3. Composition Of Feeds

| Dry Basis (Moisture-free) | | | | | | |
|------------------------------------|----------------|-------------|---------|-----------------|-------------|----------------|
| Feedstuff | Dry Matter (%) | Protein (%) | TDN (%) | Crude Fiber (%) | Calcium (%) | Phosphorus (%) |
| Alfalfa, fresh | 27.2 | 19.3 | 63 | 27.4 | 1.72 | 0.31 |
| Alfalfa hay, prebloom | 84.5 | 19.4 | 60 | 28.5 | 1.25 | 0.23 |
| Alfalfa hay, midbloom | 89.2 | 17.1 | 58 | 30.9 | 1.35 | 0.22 |
| Alfalfa hay, full bloom | 87.7 | 15.9 | 52 | 33.9 | 1.28 | 0.20 |
| Alfalfa hay, mature | 91.2 | 13.6 | 50 | 37.5 | 1.33 | 0.24 |
| Alfalfa haylage | 55.0 | 17.9 | 55 | 32.4 | 1.61 | 0.38 |
| Alfalfa meal, dehydrated | 93.0 | 19.2 | 61 | 26.1 | 1.43 | 0.26 |
| Alfalfa silage | 30.4 | 17.8 | 56 | 30.4 | 1.61 | 0.38 |
| Alfalfa-brome, fresh | 21.6 | 19.6 | 62 | 25.3 | 1.52 | 0.37 |
| Barley, grain | 89.0 | 13.0 | 84 | 5.6 | 0.09 | 0.47 |
| Barley, straw | 88.2 | 4.1 | 40 | 42.4 | 0.34 | 0.09 |
| Beet molasses | 77.0 | 8.7 | 89 | - | 0.21 | 0.04 |
| Beet pulp, dried | 91.0 | 10.0 | 74 | 20.9 | 0.75 | 0.11 |
| Beet pulp, wet | 10.0 | 9.0 | 72 | 20.0 | 0.90 | 0.10 |
| Beet pulp with molasses, dried | 92.0 | 9.9 | 76 | 17.4 | 0.61 | 0.11 |
| Beet tops, ensiled | 20.7 | 12.7 | 51 | 13.3 | 2.32 | 0.20 |
| Bermuda grass hay | 91.1 | 8.9 | 46 | 29.6 | 0.46 | 0.20 |
| Bluegrass, fresh | 30.5 | 17.3 | 63 | 25.1 | 0.56 | 0.47 |
| Bluestem, fresh, immature | 31.6 | 11.0 | 57 | 28.9 | 0.63 | 0.17 |
| Brome, fresh, immature | 32.5 | 20.3 | 63 | 23.9 | 0.30 | 0.26 |
| Brome, fresh, mature | 56.1 | 6.4 | 50 | 33.0 | - | - |
| Brome hay | 89.7 | 11.8 | 52 | 32.0 | 0.30 | 0.26 |
| Buffalo grass, fresh | 47.7 | 9.2 | 56 | 27.7 | 0.52 | 0.16 |
| Cactus, prickly pear | 17.1 | 5.0 | 59 | 13.3 | 6.29 | 0.08 |
| Canarygrass, fresh | 25.8 | 13.2 | 56 | 26.8 | 0.40 | 0.30 |
| Citrus molasses | 65.0 | 10.9 | 77 | - | 2.01 | 0.25 |
| Citrus pulp, dehydrated | 90.0 | 7.3 | 82 | 14.4 | 2.18 | 0.13 |
| Clover, red, hay | 87.7 | 14.9 | 59 | 30.1 | 1.61 | 0.22 |
| Corn and cob meal | 87.0 | 9.3 | 90 | 9.2 | 0.50 | 0.31 |
| Corn cobs, ground | 90.4 | 2.8 | 47 | 35.8 | 0.12 | 0.04 |
| Corn distillers' grains dehydrated | 92.0 | 29.8 | 88 | 9.8 | 0.10 | 0.40 |
| Corn gluten feed | 90.0 | 28.1 | 82 | 8.9 | 0.51 | 0.86 |
| Corn gluten meal, dehydrated | 91.0 | 47.1 | 84 | 4.4 | 0.18 | 0.44 |
| Corn grain, No. 2 Dent | 89.0 | 10.0 | 91 | 2.2 | 0.02 | 0.35 |
| Corn silage, dough stage | 27.9 | 8.4 | 70 | 26.3 | 0.28 | 0.06 |
| Corn silage, mature | 55.0 | 7.8 | 68 | 23.0 | 0.27 | 0.19 |
| Corn stover, dry | 87.2 | 5.9 | 59 | 37.1 | 0.49 | 0.09 |
| Corn stover, silage | 27.2 | 7.2 | 58 | 32.1 | 0.38 | 0.19 |

Table 3. Composition Of Feeds

| Dry Basis (Moisture-free) | | | | | | |
|--------------------------------------|----------------|-------------|---------|-----------------|-------------|----------------|
| Feedstuff | Dry Matter (%) | Protein (%) | TDN (%) | Crude Fiber (%) | Calcium (%) | Phosphorus (%) |
| Corn, sweet, cannery refuse, ensiled | 29.4 | 8.8 | 72 | 26.8 | - | - |
| Cotton burrs | 92.0 | 9.6 | 45 | 39.0 | 1.13 | 0.12 |
| Cottonseed | 92.7 | 24.9 | 94 | 18.2 | 0.15 | 0.73 |
| Cottonseed hulls | 90.3 | 4.1 | 41 | 47.5 | 0.16 | 0.10 |
| Cottonseed meal, expeller | 94.0 | 43.6 | 78 | 12.8 | 0.17 | 1.28 |
| Cottonseed meal, solvent | 91.5 | 44.8 | 75 | 13.1 | 0.17 | 1.31 |
| Fescue hay | 88.5 | 10.5 | 54 | 31.2 | 0.50 | 0.36 |
| Gramma grass, fresh, immature | 41.0 | 13.1 | 64 | 27.2 | 0.53 | 0.19 |
| Gramma grass, fresh, mature | 63.4 | 6.5 | 58 | 32.7 | 0.34 | 0.12 |
| Grass-legume silage | 29.3 | 11.8 | 56 | 31.4 | 0.78 | 0.28 |
| Johnson grass hay | 91.0 | 7.6 | 55 | 33.3 | 0.81 | -0.31 |
| Lespedeza, fresh | 25.0 | 16.4 | 60 | 32.0 | 1.35 | 0.21 |
| Linseed meal, expeller | 91.0 | 38.8 | 81 | 9.9 | 0.48 | 0.98 |
| Linseed meal, solvent | 91.0 | 38.6 | 76 | 9.8 | 0.44 | 0.91 |
| Milk, dry, skim | 94.0 | 35.6 | 80 | 0.2 | 1.34 | 1.09 |
| Milk, whole | 12.0 | 25.8 | 130 | 0.0 | - | - |
| Molasses, sugarcane | 75.0 | 4.3 | 72 | - | 1.19 | 0.11 |
| Oat hay | 88.2 | 9.2 | 61 | 31.0 | 0.26 | 0.24 |
| Oat silage | 31.7 | 9.7 | 59 | 31.6 | 0.37 | 0.30 |
| Oat straw | 90.1 | 4.4 | 45 | 41.0 | 0.78 | 0.10 |
| Oats, grain | 89.0 | 13.2 | 76 | 10.0 | 0.11 | 0.39 |
| Orchard grass, fresh | 23.8 | 18.4 | 65 | 23.6 | 0.58 | 0.55 |
| Orchard grass hay | 88.3 | 9.7 | 57 | 34.0 | 0.45 | 0.37 |
| Prairie hay, midbloom | 91.0 | 8.1 | 57 | 32.1 | 0.34 | 0.21 |
| Prairie hay, late bloom | 91.3 | 6.6 | 53 | 32.5 | 0.36 | 0.13 |
| Prairie hay, overripe | 91.5 | 4.0 | 48 | 35.4 | 0.52 | 0.08 |
| Rice bran | 91.0 | 14.8 | 66 | 12.1 | 0.07 | 2.00 |
| Rye grain | 89.0 | 13.4 | 85 | 2.2 | 0.07 | 0.38 |
| Ryegrass, Italian, fresh | 24.3 | 16.3 | 62 | 21.8 | 0.64 | 0.41 |
| Safflower meal, solvent | 90.5 | 49.1 | 76 | 9.4 | 0.26 | 1.83 |
| Sorghum grain, milo | 89.0 | 12.4 | 80 | 2.2 | 0.04 | 0.33 |
| Sorghum silage, sorgo | 26.0 | 6.3 | 58 | 26.8 | 0.35 | 0.20 |
| Sorghum stover, milo, silage | 29.4 | 7.3 | 57 | 26.3 | 0.25 | 0.18 |
| Sorghum stover, milo, sun-cured | 85.1 | 5.3 | 57 | 32.6 | 0.40 | 0.11 |
| Soybean hay | 89.2 | 16.3 | 52 | 32.1 | 1.29 | 0.23 |
| Soybean hulls, flakes | 91.3 | 13.7 | 64 | 38.9 | 0.59 | 0.17 |
| Soybean meal, solvent | 89.0 | 51.5 | 81 | 6.7 | 0.36 | 0.75 |

Table 3. Composition Of Feeds

| Dry Basis (Moisture-free) | | | | | | |
|----------------------------|----------------|-------------|---------|-----------------|-------------|----------------|
| Feedstuff | Dry Matter (%) | Protein (%) | TDN (%) | Crude Fiber (%) | Calcium (%) | Phosphorus (%) |
| Soybean seeds | 90.0 | 42.1 | 94 | 37.9 | 0.28 | 0.66 |
| Soybean straw | 87.6 | 5.5 | 38 | 44.1 | 1.59 | 0.06 |
| Sudan grass, fresh | 17.6 | 16.8 | 70 | 23.0 | 0.43 | 0.41 |
| Sudan grass, hay | 88.9 | 8.0 | 56 | 36.0 | 0.55 | 0.30 |
| Timothy, fresh, midbloom | 28.1 | 9.6 | 66 | 33.7 | 0.50 | 0.35 |
| Timothy, hay, late bloom | 88.0 | 8.3 | 58 | 32.4 | 0.38 | 0.18 |
| Trefoil, birdsfoot, fresh | 20.0 | 21.0 | 66 | 24.7 | 1.91 | 0.22 |
| Turnips, roots, fresh | 9.3 | 9.0 | 85 | 11.5 | 0.64 | 0.26 |
| Vetch, hay | 88.2 | 20.0 | 62 | 28.5 | 1.36 | 0.34 |
| Wheat, fresh, immature | 21.5 | 28.6 | 73 | 17.4 | 0.42 | 0.40 |
| Wheat bran | 89.0 | 18.0 | 70 | 11.2 | 0.16 | 1.32 |
| Wheat grain | 88.0 | 18.0 | 87 | 2.9 | 0.06 | 0.41 |
| Wheat middlings | 90.0 | 19.1 | 69 | 8.9 | 0.16 | 1.01 |
| Wheat straw | 90.1 | 3.6 | 45 | 41.5 | 0.17 | 0.08 |
| Wheatgrass, crested, fresh | 30.8 | 23.6 | 67 | 32.6 | 0.46 | 0.35 |
| Whey, dried | 94.0 | 13.9 | 81 | - | 0.93 | 0.84 |
| Yeast, brewers', dried | 93.0 | 47.9 | 78 | 3.2 | 0.14 | 1.54 |
| Yeast, Torula, dried | 93.0 | 51.9 | 80 | 2.2 | 0.61 | 1.81 |

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Originally published: 1999

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, College of Agriculture Life Sciences, The University of Arizona.

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