

Growing Calf and Show Steer Feed Management¹

Matt Hersom and Todd Thrift²

Properly starting a calf on feed and maintaining the calf's feed intake is a key component to successful development of a quality show calf. Adequate nutrition of the growing calf is essential in order for the calf to grow frame, gain body weight, and achieve an acceptable final weight. A basic understanding of cattle nutrition, feedstuffs, and feed management is necessary to successfully reach your goals. The following discussion will detail feeds, feed management, and nutrient requirements for growing cattle.

Receiving and Starting Calves on Feed

Calves can come from a variety of sources with very different previous feed and nutritional management. Therefore, an appropriate receiving diet and adaptation period is important. Unless indicated by the person you purchased the calf from, cattle should be adapted gradually to growing rations rather than abruptly put on high-grain diets.

When the calf starts on feed, first provide high-quality grass hay for free choice consumption (3% of body weight; 15 lbs per day for a 500 lb calf). Also make sure the calf has access to plenty of clean, fresh, cool water. Water is the most important nutrient for all animals. Let the calf adapt to their new environment for approximately 3 days before introducing grain. After the initial 3 days, begin to slowly introduce grain to the calf. Hay should still be offered free choice during this time. Begin grain feeding by starting

with 2 lbs of grain per day. Continue this level of grain in the diet for 2 to 3 days; monitor the calf to make sure it handles the addition of grain and does not become sick or stop eating. After 2 to 3 days, increase the grain fed to 3 lbs, and follow the same observation period before increasing the grain amount to 4 lbs. After 14 days, the calf should be consuming 6 to 8 pounds of grain, and its total diet should be 50:50 grain:roughage (hay). After this initial receiving period, the calf can be transitioned to formulated or commercial growing and finishing diets that contain greater amounts of grains and concentrates. Table 1 presents a general timeline for feed adaptation.

Growing and Finishing Feeding

Once the calf has adapted to eating from a bunk and its rumen microbes have adjusted to digesting grain, the diet can be transitioned to a growing ration. The growing ration's purpose is to increase the size and muscularity of the calf without adding excessive fat cover to the calf early on. The amount of time the calf remains on the growing ration will depend upon how much time is available before the show. A calf should be on the finishing diet for no less than 100 days, and likely closer to 120 days, to reach an adequate level of finish for the show. During the growing period, the amount of feed consumed by the calf will increase, hay will be replaced by grain, and the energy content (total digestible nutrients [TDN]) of the diet will increase to support greater daily body weight gain (ADG). Table 2 and

1. This document is AN254, one of a series of the Department of Animal Sciences, UF/IFAS Extension. Original publication date October 2010. Reviewed March 2020. Visit the EDIS website at <https://edis.ifas.ufl.edu>.

2. Matt Hersom, associate professor; and Todd Thrift, associate professor, Department of Animal Sciences; UF/IFAS Extension, Gainesville, FL 32611.

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3 (Nutrient Requirements of Growing Cattle; NRC 1996) can provide guidance for the amount of feed and amount of nutrients that calves will require.

Transitioning from the growing to finishing ration likely requires an increase in feed intake and an increase in the proportion of grain in the calf's diet. Increasing the amount of grain in the diet should be accomplished by a step-up procedure. The proportion of grain in the diet should be increased by no more than 10% every 5 to 7 days. Transitioning from a 50:50 grain:roughage (hay) growing ration to an 80:20 grain:roughage (hay) finishing ration will require 15 to 21 days. Feeding a step-up diet will require planning because it will require feeding a diet with 60% grain for one week and then 70% grain for the second week before feeding 80% grain in the third week. During the step-up period, the calf should be monitored closely to avoid digestive upsets, acidosis, and bloat. Feeding an ionophore like Rumensin® can help prevent digestive problems on high-grain diets. Once the calf reaches the final diet formulation, feed changes should be only for amounts of the daily feed offered. During this period, feed amounts should only be altered by 1 to 2 lbs on any given day. Consistent feed intake prevents digestive upsets and promotes calf growth.

Managing the Feed Bunk

Cattle perform better when they can consume frequent meals throughout the day. Cattle are also stimulated to eat when new feed shows up in their feed bunk. So it is recommended that the calf be fed at least 2 times a day. Ideally the 2 feedings would be at the same time from day to day, for example at 7 a.m. and 6 p.m. The total amount of the daily feed amount should be divided into equal portions and half offered in the morning and the other half in the evening. During particularly hot weather, cattle do not eat as much during the day. The daily feed amount can be adjusted to offer 60% of the ration in the evening and 40% in the morning.

Keep the feed bunk and water source clean. Feed intake is very closely associated with water consumption, especially during hot weather. Clean out old feed or manure from the bunk, and water prior to feeding. Feed that accumulates in the bunk should be removed after 1 to 2 days. This feed can mold and spoil, especially in warm, humid weather. This is also a sign that the calf is receiving too much feed or is not feeling well. If a large amount of feed is left over, remove it, and at the next feeding, decrease the amount of total feed by 2 to 5 lbs. After that, gradually increase the amount of feed offered to reach the previous amount. Never increase

the amount of feed by more than 1 lb at a feeding (2 lbs per day). Keeping records of the daily feed offered to the calf will track feed offered, consumption, and refusal.

Choosing the Right Feed

There are many options when it comes to growing-finishing and show cattle feed. Generally the decision is first made to use either a commercial feed product that is available from local feed manufacturers or a custom-blended ration. There are multiple companies to choose from when purchasing a premade calf feed. One drawback of commercial feeds is that TDN values are not listed on the feed tag. Knowing the TDN value of the feed makes prediction of ADG and cattle performance possible. Fortunately, TDN can be estimated using the guaranteed analysis of fiber, protein, fat, and ash that is on the feed tag. Table 4 provides the guidelines to determine TDN from feed tag guaranteed analysis (Sprinkle 1999). Commercial feeds generally include a vitamin/mineral premix in the formulation so additional supplementation is not necessary. Certainly some products are better than others, and all products have potential and can be used, but there is no perfect feed. Likewise there is no “magical ingredient” that will make cattle grow hair or their hair coat shine. Calf quality and showman knowledge, management skill, and effort are the ingredients that differentiate cattle in the show ring.

The second option is for calf owners to mix their own feed. To formulate and mix a custom feed blend requires some knowledge and experience in ration formulation. Often the custom mix will contain a roughage source, corn, protein pellet, vitamin-mineral premix, and some coproducts. A formulated ration can offer added flexibility to change the ration but requires additional knowledge and skill.

Regardless of the feed choice, the feed should have a good texture. This means that the particle sizes are a good mix—not too large and as little fine material as possible. Dusty or moldy feed should absolutely be avoided. Many commercial feeds include fat or molasses to “condition” the feed to decrease dust and increase the palatability of the feed.

Feed Components

It is important to meet the calf's nutritional requirements that are outlined in Table 2 and 3. The nutrient requirements are met through the feeds that are provided to the calf. The following are helpful discussions about different feed components and the nutrients they supply.

Grains and Concentrates

Cattle that have a high growth rate need energy to fuel their accelerated growth. Cereal grains and concentrates provide the required energy (TDN) to meet the growth requirement. Calves that are gaining at a moderate rate (2 to 3 lbs/day) need about 1.5% of their body weight as grains (800 lb calf = 12 lbs of grain), whereas calves gaining at a greater rate (+ 3 lbs/day) need more grain in their diet and should consume up to 2.0 to 2.25% of their body weight as grain (800 lb calf = 16 to 20 lbs of grain). Feeding grain at greater than 2.25% of a calf's body weight dramatically increases the risk for digestive upset, acidosis, and laminitis. Corn, oats, milo, and barley are the main cereal grains utilized to provide energy, with corn being the most popular. All of the grains are normally processed in some manner to improve the availability of the energy. Corn is normally cracked or rolled; oats are often crimped or rolled. Avoid ground cereal grains, as the grinding process makes the particles' size too small, which increases the risk of fines and digestive upset when fed at high levels in the diet. Ensure that the calf is consuming enough energy (TDN) to achieve the desired ADG to reach the final body weight.

Proteins

Growing cattle have a greater requirement for protein than mature cattle, but protein is not nearly as important as energy to support body weight gain. Protein is mainly supplied by the inclusion of oilseed meals like soybean and cottonseed meals. Other protein sources include corn gluten feed, corn gluten meal, dried distillers grains, and other oilseed meals. Some commercially formulated feeds can include urea as a nonprotein nitrogen source to increase the formulated crude protein value. Urea can be an effective feed ingredient, but its use requires a greater level of feed management. Producers with little previous experience feeding grain diets to growing cattle would be suggested to feed natural sources of protein rather than nonprotein nitrogen because they provide protein, amino acids, and some energy.

Minerals

Growing calves need minerals to support accelerated growth. The macrominerals of primary importance are calcium, phosphorus, potassium, and magnesium. Often feeds in the diet can supply adequate levels of phosphorus, potassium, and magnesium, but calcium needs to be supplemented. An appropriate calcium to phosphorus ratio of 2:1 or 3:1 should be maintained to support growth. Feed-grade limestone is an acceptable source for additional calcium; other sources are acceptable but may increase the

cost of the feed. Most commercial cattle feeds have some amount of added calcium and other additional minerals. Additionally, many cattle feeds are fortified with numerous other trace minerals that are important to support growth and immune function for the growing calf. Custom-made feeds should balance calcium and phosphorus and include a trace mineral supplement to meet the needs of the calf.

Vitamins

Vitamins are important components to many of the functions in a growing calf. Most often, commercial show feeds are fortified with a vitamin A-D-E supplement. Vitamin A is of primary importance because growing-finishing and most show cattle are consuming conserved forages and high-grain diets that are low in vitamin A. Dietary levels should be in the range of 20,000 to 30,000 international units. Vitamin D is not an issue because most calves have some exposure to sunlight and will make their own vitamin D. Vitamin E is included in feeds because of its antioxidant properties and anecdotal benefit on hair coat quality.

Calculating Desired Average Daily Gain (ADG)

To calculate the ADG needed to grow your steer to an adequate final and/or show body weight, several pieces of information are needed. First, obtain an accurate and current body weight of the calf; second, determine the frame score (Table 5; medium or large) of the calf (Kunkle et al. 1996). Next, determine the desired final or show weight of the calf and the number of days until finish point or the show. Below is an example to demonstrate the ADG calculation.

Example.

Information	What this tells us
6-month-old calf (Oct 1 st)	
43 inch hip height	Medium frame calf (see Table 2 for nutrient requirements)
Starting body weight of 650 lbs	
Desired final body weight 1,100 lbs	(1,100 final wt—650 initial wt) = 450 lbs to gain
Show date March 1st	450 lbs / 150 days = 3.0 lbs/day ADG required

Referring to Table 2 indicates that this calf should consume 13.8 lbs of dry feed; the total diet should contain 83% TDN and 15.7% crude protein for the calf to gain adequately.

Conclusion

Feeding a growing-finishing or show calf correctly is an important aspect to successfully reach the desired final product. Correctly feeding the calf requires planning, knowledge, and dedication. However, feeding the calf can provide a great learning environment for cattle nutrition, management, finance, and cattle handling. Be sure to consult with a person knowledgeable about feeding show calves when you have questions.

Literature Cited

Kunkle, W. E., R. W. Lee, and R. S. Sand. 1996. *Selecting and Showing Show Steers*. Circular AS42. Gainesville: University of Florida Institute of Food and Agricultural Sciences.

Nutrient Requirements of Beef Cattle. 1996. 7th Edition, National Research Council, Washington DC.

Sprinkle, J. 1999. *Feeding Management for Show Steers*. Univ. of Arizona, Coop. Extension Circular, AZ1054.

Table 1. Feeding system adaptation timeline

Timeline	Roughage-Hay	Grain-Concentrate, lbs	Predicted Total Intake, lbs
Arrival at home Day 0 to 3	All calf will consume	0	15
Adaptation			
Day 3	All calf will consume	2	15
Day 5 to 6	All calf will consume	3	15
Day 7 to 8	All calf will consume	4	15
Day 9 to 10	All calf will consume	5	15
Day 11 to 12	All calf will consume	6	15
Day 13 to 14	All calf will consume	7	15
Growing-Finishing Step-up	Roughage-Hay, lbs (% of diet)	Grain-Concentrate, lbs (% of diet)	Predicted Total Intake, lbs
1 – 5 days	7 (50%)	7 (50%)	14
2 – 5 days	6 (40%)	9 (60%)	15
3 – 5 days	5 (30%)	11 (70%)	16
4 – 5 days	4 (20%)	13 (80%)	17
5 – remaining days	20%	80%	Increase daily feed amount

Table 2. Nutrient requirements of growing and finishing medium-frame beef calves¹

Body weight (lbs)	Average daily gain (lbs/day)	Dry matter intake (lbs)	TDN (%)	Protein (%)	TDN (lbs)	Protein (lbs)	Calcium (%)	Phosphorus (%)
300	0.5	7.9	54	9.2	4.3	0.73	0.31	0.20
	1.0	8.4	59	11.4	5.0	0.95	0.45	0.24
	1.5	8.6	64	13.6	5.5	1.17	0.58	0.28
	2.0	8.6	69	16.2	5.9	1.39	0.72	0.32
	2.5	8.5	75	18.9	6.4	1.61	0.87	0.37
	3.0	8.2	83	22.2	6.8	1.83	1.13	0.47
400	0.5	9.8	54	8.7	5.3	0.85	0.27	0.18
	1.0	10.4	59	10.4	6.1	1.08	0.38	0.21
	1.5	10.7	61	12.1	6.8	1.30	0.47	0.25
	2.0	10.7	69	14.1	7.4	1.51	0.56	0.26
	2.5	10.6	75	16.3	8.0	1.72	0.68	0.30
	3.0	10.2	83	19.0	8.5	1.94	0.86	0.37
500	0.5	11.6	54	8.4	6.3	0.97	0.25	0.17
	1.0	12.2	59	9.8	7.2	1.19	0.32	0.20
	1.5	12.6	61	11.2	8.1	1.41	0.40	0.22
	2.0	12.7	69	12.8	8.8	1.63	0.47	0.24
	2.5	12.5	75	14.7	9.4	1.84	0.56	0.27
	3.0	12.1	83	16.9	10.0	2.05	0.69	0.32
600	0.5	13.2	54	8.2	7.1	1.08	0.23	0.18
	1.0	14.0	59	9.4	8.3	1.31	0.28	0.19
	1.5	14.4	61	10.6	9.2	1.53	0.35	0.21
	2.0	14.6	69	11.9	10.1	1.74	0.40	0.22
	2.5	14.4	75	13.6	10.8	1.95	0.46	0.24
	3.0	13.8	83	15.7	11.5	2.17	0.57	0.29
700	0.5	14.9	54	8.0	8.0	1.19	0.22	0.18
	1.0	15.8	59	9.0	9.3	1.42	0.27	0.18
	1.5	16.2	61	10.1	10.4	1.64	0.31	0.20
	2.0	16.3	69	11.4	11.2	1.85	0.34	0.21
	2.5	16.1	75	12.8	12.1	2.06	0.40	0.22
	3.0	15.5	83	14.6	12.9	2.27	0.49	0.26
800	0.5	16.4	54	7.7	8.9	1.27	0.22	0.17
	1.0	17.5	59	8.3	10.3	1.44	0.24	0.19
	1.5	18.2	61	8.8	11.1	1.58	0.28	0.19
	2.0	18.6	69	9.2	12.8	1.72	0.31	0.20
	2.5	18.5	75	9.8	13.9	1.81	0.35	0.21
	3.0	16.8	83	10.8	13.9	1.81	0.42	0.25
900	0.5	17.9	54	7.6	9.7	1.36	0.21	0.18
	1.0	19.1	59	8.0	11.3	1.52	0.23	0.18
	1.5	19.9	61	8.4	12.1	1.66	0.25	0.19
	2.0	20.3	69	8.8	14.0	1.79	0.28	0.20
	2.5	20.2	75	9.3	15.2	1.84	0.31	0.20
	3.0	18.3	83	10.1	15.2	1.85	0.37	0.23

Body weight (lbs)	Average daily gain (lbs/day)	Dry matter intake (lbs)	TDN (%)	Protein (%)	TDN (lbs)	Protein (lbs)	Calcium (%)	Phosphorus (%)
1,000	0.5	19.3	54	7.5	10.4	1.45	0.21	0.18
	1.0	20.7	59	7.8	12.2	1.60	0.21	0.18
	1.5	21.5	61	8.1	13.1	1.74	0.24	0.18
	2.0	22.0	69	8.4	15.2	1.85	0.25	0.19
	2.5	21.9	75	8.8	16.4	1.92	0.27	0.19
	3.0	19.8	83	9.5	16.4	1.88	0.32	0.22

¹ Adapted from the 1996 Nutrient Requirements of Beef Cattle.

Table 3. Nutrient requirements of growing and finishing large-frame beef calves¹

Body weight (lbs)	Average daily gain (lbs/day)	Dry matter intake (lbs)	TDN (%)	Protein (%)	TDN (lbs)	Protein (lbs)	Calcium (%)	Phosphorus (%)
300	0.5	8.2	52.5	9.5	4.3	0.77	0.30	0.19
	1.0	8.7	56.0	11.3	4.9	0.99	0.46	0.23
	1.5	9.1	59.5	12.9	5.4	1.19	0.58	0.27
	2.0	9.4	63.5	14.6	6.0	1.37	0.70	0.30
	2.5	9.6	67.5	16.3	6.5	1.55	0.85	0.34
	3.0	9.6	72.0	18.0	6.9	1.73	0.99	0.39
	3.5	9.3	78.5	20.3	7.3	1.88	1.16	0.45
400	0.5	10.1	52.5	8.9	5.3	0.89	0.26	0.17
	1.0	10.8	56.0	10.2	6.0	1.10	0.37	0.20
	1.5	11.3	59.5	11.4	6.7	1.30	0.47	0.23
	2.0	11.7	63.5	12.7	7.4	1.47	0.57	0.26
	2.5	11.9	67.5	13.9	8.0	1.64	0.65	0.30
	3.0	11.9	72.0	15.2	8.6	1.81	0.76	0.33
	3.5	11.5	78.5	16.9	9.0	1.94	0.90	0.36
500	0.5	12.0	52.5	8.5	6.3	1.0	0.24	0.17
	1.0	12.8	56.0	9.5	7.2	1.21	0.33	0.19
	1.5	13.4	59.5	10.4	8.0	1.40	0.39	0.21
	2.0	13.8	63.5	11.4	8.8	1.57	0.46	0.24
	2.5	14.0	67.5	12.4	9.5	1.73	0.55	0.25
	3.0	14.0	72.0	13.4	10.1	1.88	0.63	0.28
	3.5	13.6	78.5	14.7	10.7	2.00	0.73	0.32
600	0.5	13.8	52.5	8.2	7.2	1.11	0.22	0.18
	1.0	14.6	56.0	9.0	8.2	1.31	0.29	0.18
	1.5	15.3	59.5	9.7	9.1	1.5	0.35	0.20
	2.0	15.8	63.5	10.5	10.0	1.66	0.40	0.22
	2.5	16.1	67.5	11.3	10.9	1.81	0.47	0.23
	3.0	16.1	72.0	12.1	11.6	1.95	0.52	0.26
	3.5	15.6	78.5	13.2	12.2	2.05	0.61	0.28
700	0.5	15.4	52.5	7.9	8.1	1.21	0.21	0.17
	1.0	16.4	56.0	8.6	9.2	1.41	0.27	0.19
	1.5	17.2	59.5	9.2	10.2	1.59	0.31	0.19
	2.0	17.8	63.5	9.8	11.3	1.74	0.36	0.21
	2.5	18.0	67.5	10.5	12.2	1.88	0.40	0.22
	3.0	18.0	72.0	11.1	13.0	2.01	0.45	0.23
	3.5	17.5	78.5	12.0	13.7	2.10	0.52	0.26

Body weight (lbs)	Average daily gain (lbs/day)	Dry matter intake (lbs)	TDN (%)	Protein (%)	TDN (lbs)	Protein (lbs)	Calcium (%)	Phosphorus (%)
800	0.5	17.1	52.5	7.7	9.0	1.31	0.21	0.18
	1.0	18.2	56.0	8.3	10.2	1.51	0.24	0.18
	1.5	19.0	59.5	8.8	11.3	1.68	0.28	0.19
	2.0	19.6	63.5	9.3	12.4	1.82	0.32	0.20
	2.5	19.9	67.5	9.8	13.4	1.96	0.35	0.21
	3.0	19.9	72.0	10.4	14.3	2.07	0.40	0.22
	3.5	19.3	78.5	11.1	15.2	2.15	0.45	0.24
900	0.5	18.6	52.5	7.6	9.8	1.40	0.20	0.18
	1.0	19.8	56.0	8.0	11.1	1.60	0.23	0.18
	1.5	20.8	59.5	8.5	12.4	1.77	0.27	0.18
	2.0	21.4	63.5	8.9	13.6	1.91	0.29	0.20
	2.5	21.8	67.5	9.3	14.7	2.03	0.31	0.20
	3.0	21.7	72.0	9.8	15.6	2.13	0.36	0.21
	3.5	21.1	78.5	10.4	16.6	2.19	0.40	0.23
1,000	0.5	20.2	52.5	7.5	10.6	1.49	0.20	0.17
	1.0	21.5	56.0	7.8	12.0	1.69	0.23	0.17
	1.5	22.5	59.5	8.2	13.4	1.85	0.25	0.18
	2.0	23.2	63.5	8.6	14.7	1.98	0.27	0.18
	2.5	23.6	67.5	8.9	15.9	2.09	0.29	0.19
	3.0	23.6	72.0	9.3	17.0	2.19	0.32	0.20
	3.5	22.8	78.5	9.8	17.9	2.24	0.35	0.21

¹ Adapted from the 1996 Nutrient Requirements of Beef Cattle.

Table 4. Estimating TDN of commercial feed (base: 13% crude protein, 2% crude fat) using fiber and ash content¹

% Crude Fiber on feed tag	% Ash on the feed tag					
	2	4	6	8	10	12
2	86.9	85.1	82.3	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

¹For 16% protein feed, deduct 0.5% TDN from the estimate in the table.

For 10% protein feed, add 0.5% TDN to the estimate in the table.

For each 1% fat over 2%, add 2.25% TDN to the estimate in the table.

Adapted from J. Sprinkle, 1999, Univ. of Arizona Coop. Extension bulletin AZ1054.

Table 5. Estimating calf frame size from hip height measurement

Age of Calf	Inches measured at hook bones	
	Medium Frame Calf	Large Frame Calf
5 months	Less than 43	Greater than 45
6 months	Less than 44	Greater than 46
7 months	Less than 45	Greater than 47
8 months	Less than 46	Greater than 48
9 months	Less than 48	Greater than 50
12 months	Less than 50	Greater than 52

Adapted from Kunkle et al., 1996, Univ. of Florida Coop. Extension bulletin AS42.
 Adapted from J. Sprinkle, 1999, Univ. of Arizona Coop. Extension bulletin AZ1054.