

Nutritional Strategies for Bull Development and Maintenance

► Beef bulls must be developed properly after weaning to become productive herd sires. The following nutritional management guidelines are designed to help bulls achieve their growth potential and move toward the onset of puberty.

Goals and Management

Beef producers generally market bulls as yearlings (13 to 17 months old) or as 2-year-olds (20 to 24 months). To best design a bull nutritional development strategy, producers must first evaluate available resources. Necessary factors to consider include accessible acreage, labor, facilities, forages, and capital for bull development within the operation.

Overall goals for bull development will vary from one operation to another due to differences in management, marketing, and other factors. Once these specifics have been analyzed and a development strategy outlined, producers can carefully evaluate bull calves at weaning to select the ones to continue developing as potential herd sires.

Performance measurements, such as 205-day adjusted weaning weights, can be used as an evaluation tool to select bulls. Bull calves should be closely examined for structural and hoof soundness, conformation, ample muscular development, scrotal circumference, disposition, and genetic merit using breed association genetic evaluation tools, such as expected progeny differences (EPDs).



Nutrition Basics

As bulls mature, their nutritional requirements change. Mature bulls primarily use nutrients for maintenance, whereas younger bulls require nutrients to support both growth and maintenance. For example, a 700-pound bull calf gaining 2 pounds per day requires 16 pounds of dry matter intake daily, which includes 1.8 pounds of crude protein (CP) and 10 pounds of total digestible nutrients (TDN).

As bulls increase in body weight, they require a greater amount of daily dry matter intake to meet the same production goal. A 1,500-pound bull gaining 2 pounds per day requires a diet consisting of around 34 pounds per day of dry matter intake that includes 2 pounds of CP and 21 pounds of TDN. Daily nutrient requirements of growing bulls and 2-year-old bulls are presented in tables 1 to 5.

Nutritional Requirements from Weaning to Yearling

Nutritional requirements must be met to properly develop growing bulls from weaning to yearling. For example, the Alabama Beef Cattle Improvement Association requires a minimum 205-day adjusted weaning weight of 550 pounds and a weight per day of age (WDA) of 2.5 pounds for entry into the North Alabama Bull Evaluation

Center. Producers should consult with a veterinarian to develop an appropriate vaccination plan during this transition period (refer to *Vaccinations for the Beef Cattle Herd*, Extension publication ANR-0968). Following are nutritional factors to consider when developing bulls post-weaning to the yearling stage.

It is especially important to pay attention to both the quantity and quality of feed resources used during bull development. Most problems associated with slow growth and performance in growing bulls are related to lack of feed quality and insufficient feeding level (feeding too little of a forage or feed resource to meet daily dry matter requirements).

If nutritional needs of a bull from weaning to yearling are not met, bull growth rate will be reduced and pubertal development can be delayed.

Separating and managing bulls according to age groups (weaned bull calves, yearling bulls, 2-year-old bulls, etc.) may help prevent injury among younger and older bulls.

The desired rate of gain can be determined by evaluating weight at the beginning of the development period and at projected mature weight. Bulls generally should reach 75 percent of their mature weight at 2 years of age. For example, a 600-pound bull with a projected mature weight of 1,800 pounds should weigh 1,350 pounds as a 2-year-old (1,800 pounds \times 75 percent of mature weight = 1,350 pounds). In general, this requires a growth rate of 2 to 3 pounds per day during this time period from weaning to yearling stage.

Forage-based Development and Supplementation Options

Developing bulls at a moderate rate of gain (2.0 to 2.5 pounds per day) can be achieved using a combination of high-quality grazed forages, conserved forage resources, and supplemental feedstuffs. Most warm-season forage resources, such as bahiagrass, bermudagrass, and dallisgrass, can support gains of 1.0 to 1.5 pounds per day during the peak growing season but are insufficient to support moderate rates of gain alone. Cool-season annuals, such as small grains and ryegrass, can support gains up to 2.5 pounds per day when managed to keep forage in a vegetative stage of growth.

When using conserved forages, such as hay, baleage, or silage, in bull development rations, a forage analysis is needed. The Auburn Soil, Forage, and Water Testing Laboratory offers both forage and feed analysis services that can help producers understand the relative energy and protein value of feed resources.

Based on forage analysis results, a supplementation strategy can be developed to help growing bulls achieve moderate rates of gain. In general, a high-energy and moderate-protein feed source often is used to support these production goals. This is because energy tends to be the most limiting nutrient in forage-based diets in the southeastern United States. Feedstuffs should be evaluated based on the total cost per pound of nutrient. Feed supplements should contain a minimum of 65 to 70 percent TDN and 12 to 14 percent CP. See table 1 for an example.

A commercially available supplement can be purchased, or a custom feed can be blended on-farm or by a local feed mill. Developing a supplementation program for bulls using commercial or blended feeds should always begin with a forage analysis.

When hand-feeding supplemental feedstuffs to bulls, determine how much feed to offer bulls daily based on feed nutritional value and nutrient requirement tables (tables 2 to 5). Adjust supplementation levels periodically throughout the development phase to account for bull growth. Weigh bulls periodically to determine if the level of supplementation is supporting the desired level of gain. Contact your local animal science and forage regional Extension agent as a resource for guidance in developing bull rations.

A free-choice feeding program can reduce labor needs during bull development by reducing frequency of feeding required. Free-choice feeds are generally offered using self-feeders in pastures or drylot settings.

If using self-feed programs for bull development, consult a nutritionist to ensure proper formulation of feedstuffs that ease the transition of bulls from a more forage-based diet to a higher-concentrate feed ration. This generally includes the use of more digestible, fiber-based feedstuffs (i.e., pelleted soybean hulls) than starchy feed resources, such as corn.

Feeder blends used in self-feeders should either (1) be a complete feed source, which provides adequate roughage for rumen function, or (2) provide bulls access to at least 0.5 percent of animal body weight per day in long-stemmed fiber. An ionophore (Rumensin or Bovatec) can be included in free-choice feed blends to help reduce the incidence of bloat.

Performance Evaluation Options

Grain-based diets require a minimum of 0.5 percent of animal body weight per day in long-stemmed roughage. Developing bulls on high-grain diets for rapid weight gain is often used as part of performance evaluation, and it promotes the expression of genetic differences among bulls. There are three phases of diet adaptation in this system:

Phase 1 includes a transition onto a high-concentrate diet, which allows the rumen time to adapt and reduces the chance of acidosis or digestive problems. This step-up phase generally occurs over a period of 3 to 4 weeks.

Phase 2 encourages rapid growth where bulls are on full feed.

Phase 3 is a transition back to a more forage-based ration. This transition is important to help bulls better transition to on-farm management systems in the Southeast after coming out of performance bull evaluation programs.

Nutritional Management of Yearling Bulls After Purchase

Management of newly purchased yearling bulls is critical since yearling bulls are still growing and maturing. Proper management leading to acceptable growth in yearling bulls ensures that newly purchased bulls have a more productive future as a herd sire.

With on-farm arrival after purchase, many yearling bulls “fall off” nutritionally upon entering into a new herd. This is because (1) they are immediately put out with cows for breeding season and experience a natural drop in body condition, and (2) they are not maintained on the same plane of nutrition.

After the first breeding season, bulls may need to regain several hundred pounds of body weight depending on condition losses. Proper feeding and development of yearling bulls should continue following the breeding season in order to maintain bulls in good body condition and keep them on an increasing plane of nutrition.

Observe the bull body condition and make supplemental feeding adjustments as appropriate based on the stage of growth. In general, bulls should reach 75 percent of their mature weight by 2 years of age. To achieve this goal in most cases, yearling bulls may require 1.5 to 2.0 pounds per day gain following a 60-day breeding season.

2-Year-Old Bull Maintenance

As bulls mature, their daily energy and protein requirements are used more for maintenance. Nutrient requirements of mature bulls are presented in table 6.

In general, mature bulls can be maintained on moderate-quality pasture during the off-season. They should be maintained to enter the breeding season as a body condition score 6. Visually evaluate bulls at least 60 days prior to the breeding season, and make nutritional adjustments as needed for maintenance of body condition.

Bull fertility can be negatively affected if body condition scores are excessively high or low. During the breeding season it is not uncommon for bulls to lose condition. Even mature bulls may require supplemental feedstuffs to regain lost body weight following the breeding season if pasture quality is low.

Summary

Nutritional management is essential for proper bull development and maintenance. For bulls to achieve their full growth potential and successfully perform as a breeding bull, nutritional requirements must be met. Evaluate available resources to best provide appropriate nutrition as bull requirements change from development to maturity.

Table 1. Example Bull Development Ration Targeting 2.5 Lb Gain/Day When Fed at 1.5% of Animal Body Weight for a Projected Bull Mature Weight of 1,800 Lb

Ingredients	% in mix, as fed
Cracked corn	25
Dried distiller grains	25
Soybean hulls	50
Complete mineral*	Free-choice

* A complete mineral containing 12% calcium and 4% to 6% phosphorus should be fed free-choice with an expected consumption rate of 4 oz per head per day.

Table 2. Daily Dry Matter Intake and Nutrient Requirements of Growing Beef Bulls Less Than 12 Months of Age; Mature Weight 1,800 Lb

Projected Mature Weight (lb)	Current Weight (lb)	Projected Gain (lb/d)	Dry Matter Intake (lb/d)	TDN	CP	Ca	P
				% Dry Matter	% Dry Matter	% Dry Matter	% Dry Matter
1,800	500	1.0	11.3	60.5	10.1	0.38	0.20
		1.5	11.5	64.3	11.8	0.49	0.25
		2.0	11.6	68.4	13.6	0.61	0.29
		2.5	11.5	73.1	15.5	0.73	0.34
		3.0	11.4	74.3	17.4	0.89	0.40
600		1.0	13.0	60.6	9.5	0.35	0.19
		1.5	13.2	64.4	10.9	0.44	0.23
		2.0	13.3	68.6	12.3	0.54	0.26
		2.5	13.1	73.3	13.9	0.64	0.31
		3.0	13.1	74.5	15.6	0.77	0.36
700		1.0	14.6	60.4	9.0	0.32	0.18
		1.5	14.8	64.2	10.2	0.40	0.21
		2.0	14.9	68.3	11.4	0.48	0.24
		2.5	14.8	73.1	12.7	0.57	0.28
		3.0	14.7	74.3	14.2	0.68	0.33
800		1.0	16.1	60.4	8.6	0.30	0.17
		1.5	16.4	64.2	9.6	0.37	0.20
		2.0	16.4	68.3	10.7	0.44	0.23
		2.5	16.3	72.9	11.8	0.51	0.26
		3.0	16.3	74.2	13.2	0.62	0.30
900		1.0	17.6	60.4	8.3	0.29	0.17
		1.5	17.9	64.2	9.2	0.35	0.19
		2.0	18.0	68.3	10.1	0.41	0.22
		2.5	17.8	73.0	11.1	0.47	0.24
		3.0	17.8	74.2	12.3	0.56	0.28

**Table 3. Daily Dry Matter Intake and Nutrient Requirements of Growing Beef Bulls
Less Than 12 months of age; Mature Weight 2,200 Lb**

Projected Mature Weight (lb)	Current Weight (lb)	Projected Gain (lb/d)	Dry Matter Intake (lb/d)	TDN % Dry Matter	CP % Dry Matter	Ca % Dry Matter	P % Dry Matter
2,200	500	1.0	11.3	59.6	10.2	0.39	0.21
		1.5	11.5	62.8	11.9	0.51	0.25
		2.0	11.6	66.3	13.6	0.63	0.30
		2.5	11.5	70.1	15.4	0.76	0.35
		3.0	11.4	74.3	17.4	0.89	0.40
600	600	1.0	12.9	59.7	9.5	0.36	0.19
		1.5	13.2	62.9	10.9	0.46	0.23
		2.0	13.3	66.4	12.4	0.56	0.27
		2.5	13.2	70.2	13.9	0.66	0.31
		3.0	13.1	74.5	15.6	0.77	0.36
700	700	1.0	14.5	59.6	9.1	0.33	0.19
		1.5	14.8	62.7	10.3	0.42	0.22
		2.0	14.9	66.2	11.5	0.50	0.25
		2.5	14.9	70.0	12.8	0.59	0.29
		3.0	14.7	74.3	14.2	0.68	0.33
800	800	1.0	16	59.5	8.7	0.31	0.18
		1.5	16.3	62.7	9.8	0.37	0.21
		2.0	16.4	66.1	10.8	0.46	0.24
		2.5	16.4	69.9	11.9	0.54	0.27
		3.0	16.3	74.2	13.2	0.62	0.30
900	900	1.0	17.5	59.5	8.5	0.30	0.18
		1.5	17.8	62.7	9.3	0.36	0.20
		2.0	18	66.1	10.3	0.43	0.23
		2.5	17.9	69.9	11.2	0.49	0.25
		3.0	17.8	74.2	12.3	0.56	0.28

Table 4. Daily Dry Matter Intake and Nutrient Requirements of Growing Beef Bulls Greater than 11 Months of Age; Mature Weight 1,800 Lb

Projected Mature Weight (lb)	Current Weight (lb)	Projected Gain (lb/d)	Dry Matter Intake (lb/d)	TDN % Dry Matter	CP % Dry Matter	Ca % Dry Matter	P % Dry Matter
1,800	900	1.0	20.9	55.2	7.4	0.24	0.14
		1.5	21.1	58.5	8.3	0.29	0.16
		2.0	21.2	61.9	9.3	0.34	0.18
		2.5	21.1	65.7	10.3	0.40	0.21
		3.0	20.8	69.9	11.4	0.45	0.23
		3.5	20.4	74.7	12.6	0.52	0.26
1,000	1,000	1.0	22.6	55.2	7.2	0.23	0.14
		1.5	22.9	58.5	8.0	0.28	0.16
		2.0	22.9	62.0	8.8	0.32	0.18
		2.5	22.8	65.8	9.7	0.37	0.19
		3.0	22.5	70.0	10.6	0.42	0.22
		3.5	22.1	74.8	11.7	0.47	0.24
1,100	1,100	1.0	24.2	55.1	7.0	0.22	0.14
		1.5	24.6	58.4	7.7	0.26	0.15
		2.0	24.6	61.9	8.4	0.30	0.17
		2.5	24.5	65.6	9.1	0.34	0.19
		3.0	24.2	69.8	10.0	0.39	0.20
		3.5	23.7	74.6	11.0	0.43	0.22
1,200	1,200	1.0	25.9	55.2	6.8	0.22	0.14
		1.5	26.2	58.5	7.4	0.23	0.15
		2.0	26.3	62.0	8.0	0.29	0.16
		2.5	26.2	65.8	8.7	0.32	0.18
		3.0	25.9	70.0	9.5	0.36	0.20
		3.5	25.3	74.8	10.3	0.40	0.21
1,300	1,300	1.0	27.5	55.1	6.6	0.21	0.14
		1.5	27.8	58.5	7.2	0.24	0.15
		2.0	27.9	61.9	7.7	0.27	0.16
		2.5	27.8	65.7	8.3	0.30	0.17
		3.0	27.5	69.9	9.0	0.34	0.19
		3.5	26.9	74.7	9.8	0.38	0.20
1,400	1,400	1.0	29.0	55.1	6.5	0.21	0.14
		1.5	29.4	58.4	7.0	0.23	0.15
		2.0	29.5	61.9	7.5	0.26	0.16
		2.5	29.4	65.7	8.0	0.29	0.17
		3.0	29.0	69.8	8.6	0.32	0.18
		3.5	28.4	74.7	9.3	0.35	0.20

Table 5. Daily Dry Matter Intake and Nutrient Requirements of Growing Beef Bulls Greater Than 11 Months of Age; Mature Weight 2,200 Lb

Projected Mature Weight (lb)	Current Weight (lb)	Projected Gain (lb/d)	Dry Matter Intake (lb/d)	TDN % Dry Matter	CP % Dry Matter	Ca % Dry Matter	P % Dry Matter
2,200	900	1.0	20.7	54.3	7.4	0.25	0.15
		1.5	21.0	57.2	8.3	0.31	0.17
		2.0	21.2	60.1	9.3	0.36	0.19
		2.5	21.2	63.3	10.2	0.42	0.21
		3.0	21.1	66.6	11.2	0.48	0.24
		3.5	20.8	70.4	12.3	0.54	0.26
1,000	1,000	1.0	22.5	54.4	7.2	0.24	0.15
		1.5	22.8	57.2	8.0	0.29	0.16
		2.0	22.9	60.2	8.8	0.34	0.18
		2.5	22.9	63.3	9.7	0.39	0.20
		3.0	22.8	66.7	10.6	0.44	0.22
		3.5	22.5	70.4	11.5	0.49	0.25
1,100	1,100	1.0	24.1	54.3	7.0	0.23	0.14
		1.5	24.5	57.1	7.7	0.28	0.16
		2.0	24.6	60.1	8.4	0.32	0.18
		2.5	24.6	63.2	9.2	0.36	0.19
		3.0	24.5	66.5	10.0	0.41	0.21
		3.5	24.2	70.3	10.9	0.46	0.23
1,200	1,200	1.0	25.7	54.4	6.9	0.23	0.14
		1.5	26.1	57.2	7.5	0.27	0.16
		2.0	26.3	60.2	8.1	0.30	0.17
		2.5	26.3	63.3	8.8	0.34	0.19
		3.0	26.1	66.7	9.5	0.38	0.20
		3.5	25.8	70.4	10.3	0.43	0.22
1,300	1,300	1.0	27.3	54.3	6.7	0.22	0.14
		1.5	27.7	57.2	7.3	0.26	0.15
		2.0	27.9	60.1	7.8	0.29	0.17
		2.5	27.9	63.3	8.4	0.33	0.18
		3.0	27.7	66.6	9.1	0.36	0.20
		3.5	27.4	70.3	9.8	0.40	0.21
1,400	1,400	1.0	28.9	54.3	6.6	0.22	0.14
		1.5	29.3	57.1	7.1	0.25	0.15
		2.0	29.5	60.1	7.6	0.28	0.16
		2.5	29.5	63.2	8.1	0.31	0.18
		3.0	29.3	66.6	8.7	0.34	0.19
		3.5	29.0	70.3	9.4	0.38	0.20
1,500	1,500	1.0	28.9	54.3	6.6	0.22	0.14
		1.5	29.3	57.1	7.1	0.25	0.15
		2.0	30.9	57.1	6.9	0.24	0.15

Table 5. Daily Dry Matter Intake and Nutrient Requirements of Growing Beef Bulls Greater Than 11 Months of Age; Mature Weight 2,200 Lb

Projected Mature Weight (lb)	Current Weight (lb)	Projected Gain (lb/d)	Dry Matter Intake (lb/d)	TDN % Dry Matter	CP % Dry Matter	Ca % Dry Matter	P % Dry Matter
2,200		2.5	31.1	60.1	7.4	0.27	0.16
		3.0	30.9	66.6	8.4	0.33	0.18
		3.5	30.5	70.3	9.0	0.36	0.20
1,600		1.0	31.9	54.3	6.4	0.21	0.14
		1.5	32.4	57.1	6.8	0.24	0.15
		2.0	32.6	60.1	7.2	0.26	0.16
		2.5	32.6	63.2	7.6	0.29	0.17
		3.0	32.4	66.6	8.1	0.31	0.18
		3.5	32.0	70.3	8.6	0.34	0.19
1,700		1.0	33.4	54.3	6.3	0.21	0.14
		1.5	33.9	57.1	6.6	0.23	0.15
		2.0	34.1	60.1	7.0	0.25	0.16
		2.5	34.1	63.2	7.4	0.28	0.16
		3.0	33.9	66.6	7.8	0.30	0.17
		3.5	33.5	70.3	8.3	0.33	0.19
1,800		1.0	34.9	54.3	6.2	0.21	0.14
		1.5	35.4	57.2	6.5	0.23	0.15
		2.0	35.6	60.1	6.9	0.25	0.15
		2.5	35.6	63.3	7.2	0.27	0.16
		3.0	35.4	66.7	7.6	0.29	0.17
		3.5	35.0	70.4	8.1	0.31	0.18

Table 6. Daily Dry Matter Intake and Nutrient Requirements of Mature Beef Bulls

Mature Weight (lb)	Dry Matter Intake (lb/d)	TDN % Dry Matter	CP % Dry Matter	Ca % Dry Matter	P % Dry Matter
1,800	33	48.9	5.7	0.16	0.12
2,200	38	48.9	5.7	0.17	0.13



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