

BULL NUTRITION AND MANAGEMENT

Stephen Boyles
Ohio State University

GROWING OUT YOUNG BULLS

Young bulls should attain 1/2 their mature body weight by 14-15 months of age. Extremely low levels of energy intake early in life delays the onset of puberty. Feeding excess energy may reduce both semen quality and serving capacity. This is thought to be due to excess fat deposition in the scrotum, insulating the testes and increasing testicular temperature.

HOW MUCH GAIN IS ENOUGH? Debates continue with regards to grain-based tests versus pasture based tests. It is felt by some producers that bulls that do well on forage will relay this performance to their off-spring. The alternative argument for grain-based test programs is that we determine their maximum genetic potential for gain. For example, suppose a breeder has one bull that gained 3 pounds per day and another gained only 1.8 pounds a day on the same diet. Rate of gain in the feedlot is about 50% heritable (Massey, 1988). The difference in rate of gain between the bulls is 1.2 pounds. Multiply the 1.2 by the 50% heritability and the result is .6 pounds per day. Since 1/2 the inheritance comes from the dam and 1/2 from the bull, divide 0.6 by 2, which gives 0.3 pounds. Thus calves sired by the bull that gained 3 pounds a day should gain .3 pound more daily than calves sired by the bull that gained only 1.8 pounds a day (if bulls bred to same herd of cows).

DIETS FOR GROWING BULLS: There is no one single diet that will meet the requirement of all bulls. Requirements are based on bull age, frame, body condition, desired rate of gain, and environment. The following are a couple of examples of diets for growing bulls.

Example Diets for Growing Out Young Breeding Bulls

	Example 1	Example 2
Beginning Body Weight, lbs	600	800
Ending Body Weight, lbs	800	1000
Body Condition Score (1 = thin, 9 = fat)	5	7
Frame	Large	Large

Diet Composition, As Fed Basis:

Rolled or Cracked Corn, lbs	9.8	13.1
Alfalfa Hay, full bloom, lbs	7.2	----
Orchardgrass hay, late bloom, lbs	2.2	7.6
Soybean meal, lbs	0.2	0.9
Trace Mineralized Salt, lbs	0.03	0.03
Limestone, lbs	0.02	0.21
Selenium (90 g/lb), lbs	0.005	0.015
Dicalcium phosphate, lbs	0.001	-----
Vitamin ADE Premix	-----	0.012%
Copper Sulfate	-----	0.001%
Zinc Oxide	0.002%	0.001%

Animal Requirements:

Dry Matter Intake, lbs	17.5	19.7
Net Energy Maintenance, Mcal/lb	.754	.799
Net Energy Gain, Mcal/lb	.475	.515
Crude Protein, %	12.0	11.5
(NRC Crude Protein; 11.8 and 10.7, respectively)	.55	.48
Calcium, %	.27	.26
Phosphorus, %	.65	.65
Potassium, %	.20	.16
Magnesium, %	.08	.08
Sodium, %	.045	.045

Cobalt, mg/lb	3.629	3.629
Copper, mg/lb	0.227	0.227
Iodine, mg/lb	22.68	22.68
Iron, mg/lb	18.14	18.14
Manganese, mg/lb	0.091	0.091
Selenium, mg/lb	19.0	19.0
Zinc, mg/lb	1.0-2.0	1.0-2.0
Vitamin A, KIU/lb	.125	.125
Vitamin D, KIU/lb	0.133	0.097
Suggested Minimum Amino Acid Requirements:	0.091	0.078
Lysine, %		
Methionine, %		

Ohio Bull Test Program Feed Ration for Bulls

<u>Ingredients</u> ^{abcd}	<u>Percent</u>	<u>Pounds</u>
Corn (whole)	38	760
Oats (rolled or cracked)	25	500
Corn Cobs (coarse)	10	200
Alfalfa Meal (17%)	10	200
Wheat Middlings	5	100
Soybean Meal (44% CP, As fed)	10	200
Dicalcium Phosphate	0.5	10
Limestone	0.7	17

Trace Mineralized Salt	0.5	10
Selenium		(0.3 ppm)
Sodium Bentonite	0.3	6
Total	100%	2000 lbs

^a30 gm of Rumensin™ per ton of feed.

^bAll ration ingredients other than corn and oats are in a pellet.

^cBulls have access to grass hay via a rack (2-4 lbs/head/day).

^d1200-1500 IU Vitamin A, 100-150 IU Vitamin D, and 2-3 IU Vitamin D per pound of mix.

RECENT TOPICS OF BULL NUTRITION

ZINC LEVELS: It has been known for some time that a deficiency of zinc can reduce male fertility. Zinc plays a role in the production, storage, and secretion of individual hormones as well as in the effectiveness of receptor sites (McDowell et al., 1993). Zinc affects the production and secretion of testosterone, insulin and adrenal corticosteroids. Spermatogenesis and the development of the primary and secondary sex organs in the male are impacted by dietary zinc levels.

There are commercially available sources of organic zinc. Some studies suggest that organic sources of minerals are more biologically available than inorganic sources of minerals.

Arthington et al. (1995) investigated elevated levels of zinc and different sources of zinc. The three treatment diets were 40 ppm of zinc supplied by an inorganic source (Zinc Sulfate), 40 ppm of zinc with 1/3 supplied by an organic source of zinc (Zinc Proteinates) and 2/3 supplied by zinc sulfate, or 60 ppm of zinc supplied by zinc sulfate.

Bulls fed 60 ppm of zinc had higher liver zinc concentration than bulls fed 40 ppm of zinc supplied by zinc sulfate but had similar zinc liver concentrations to bulls fed 40 ppm zinc supplied by 1/3 zinc proteinates and 2/3 zinc sulfate. No differences in average daily gain or scrotal circumference were detected. Percent normal sperm cells was highest for the 40 ppm of zinc supplied by 1/3 zinc proteinates and 2/3 zinc sulfate (68.9%). Percent normal sperm cell levels for the 60 ppm zinc levels and 40 ppm zinc level supplied by zinc sulfate were 62.5% and 55.8%, respectively.

The use of organic zinc in growing bull diets may improve subsequent fertility measures. However, inorganic zinc at an increased level (60 ppm) also improved fertility. For growing bulls, the NRC-recommended level of 30 ppm (13.6 mg/lb) in the diet may be too low.

Zinc must be present in the diet at all times because animals have only small amounts stored in the body. A combination of zinc concentrations in plasma (<0.6-0.8 ppm) and feed (<40 ppm) would be good indicators of status (McDowell et al., 1984).

COTTONSEED PRODUCTS AND BULL FERTILITY: Gossypol is a naturally occurring substance found in the pigment glands of cottonseed that can be toxic (Lusby et al., 1991). Whole cottonseed has a significantly higher level of free gossypol than meal or hulls. Concern about feeding gossypol-containing products to bulls arose when Chinese researchers discovered that gossypol is a potent male contraceptive in humans.

Gossypol appears to be more damaging to reproductive function in young males near puberty than to older, mature males. Studies where bull fertility has been hindered have involved feeding cottonseed products at high levels and/or for long periods of time (Chase et al., 1989).

In routine feeding practices, the use of 3-5 lbs of cottonseed meal is most unlikely to expose the breeding animals to the levels of gossypol needed to cause reproductive problems (Martin, 1990).

Beef cows and Mature Bulls: Feeding "normal" levels of cottonseed meal (2 lbs/head/day of direct solvent extracted; 4 lbs/head/day of expander processed; 4 lbs/head/day of screw press processed meal; or 4-6 lbs/head/day of whole cottonseed) should not pose any practical problems for fertility (Lusby et al., 1991).

Young bulls: Young developing bulls or show bulls may be kept on concentrate-based diets for many months where cumulative effects of gossypol may build up (Lusby et al., 1991). Whole cottonseed should be limited to 15-20% of the total diet for most cattle and to 10% or less for young developing bulls. Although little high free gossypol meal is now being produced, when used, it should be limited to 5% of the total diet. Cottonseed meal from the screw press method and the more common expander process can be used at levels up to 15% of the total diet.

Embryo Transfer and Very Young Calves: Given the monetary expense embryo Transfer, it may be safer to utilize other protein sources instead of cottonseed products. Preruminant calves (less than 8 weeks of age) should not be fed gossypol containing products.

POST-TEST MANAGEMENT OF YEARLING BULLS

The yearling bull deserves some special attention as he begins his breeding career in order to assure that he will settle as many females as promptly as possible during his first working summer. *You probably should not immediately turn him out with the cows.*

EXERCISE AND FACILITIES: The ideal condition for the young bull at the start of the breeding season is thrifty but not fat, hard and trim but not thin. He should be like a football player in mid-season. Bulls that are physically fit when they are turned out will breed more cows because they will retain a higher level of libido longer. Exercise prior to the breeding season will also reduce injuries from fighting and riding during the breeding season.

Young bulls can be very active and will exercise themselves if the bull pasture is of adequate area (about 2 acres/bull). Long, narrow paddocks may also be used. It is a good idea to locate supplemental feeding areas and water sources as far as possible apart to further encourage walking activity. The pasture or paddock should be a natural surface. The worst surface is a mud-and-manure lot outside the barn, with it's many possibilities for hoof injuries. It is important to have a well drained surface to get young bull's hooves hardened and accustomed to walking

NUTRITION: Bulls are a troublesome group of cattle to provide proper nutrition. They are a relatively small group but can take up a lot of space. The tendency is to run all bulls together and hope that they won't do much damage to the facilities or each other. But, nutritional needs vary due to age and condition, so if young and old bulls are run together some bulls may not get the nutrition they need and others may get too much.

Yearling bulls on performance tests have usually been on high energy diets. These bull need to be "let down" from the time they are purchased until they are turned out with cows. A mistake made occasionally is to turn the bulls that have been on a high grain ration out on very lush pasture or place them on straight high-quality alfalfa hay. This can lead to digestive upsets or imbalances, thus leading to potential reproductive problems. Research shows that it takes 60 days for sperm development.

The gain for yearling bulls prior to the breeding season should be about 2 pounds per day. This would require a diet containing 10-11% protein and 60-70% TDN (dry matter basis) which could be supplied by 6-10 lbs. of grain per day and full-feed of medium quality hay. Any hay fed should be free from molds and green in color, if possible. No ergot can be tolerated at this time, so inspect any grain screenings closely before feeding (look for dark purple to black spots).

A mineral and vitamin mix should be offered that contains adequate calcium, phosphorus, and vitamin A. A standard mineral mix would be 40% dicalcium phosphate, 20% limestone, 30% trace mineral salt, and 10% selenium 90 (mg/lb) premix. Quality green forages should provide enough vitamin A. If forages are weathered and/ or of low quality, an intramuscular injection of 3 million IU of vitamin A is advisable. A vitamin A injection might also be considered with corn silage-based diets.

Approximate Nutrient Requirements for 1250 lb Bull Gaining 2 lbs.

Dry Matter Intake, lbs.	26	Sodium, %	.080
Net Energy Maintenance, Mcal/lb	.659	Sulfur, %	.100
	.392	Cobalt, mg/lb	.045
Net Energy Gain, Mcal/lb	62.4	Copper, mg/lb	3.629
or	10	Iodine, mg/lb	.227
Total Digestible Nutrients, %			

Crude Protein, %	.60	Iron, mg/lb	22.68
Calcium, %	.30	Manganese, mg/lb	18.14
Phosphorus, %	.65	Selenium, mg/lb	0.091
Potassium, %	.10	Zinc, mg/lb	19
Magnesium, %		Vitamin A, IU/lb	2000
		Vitamin B, IU/lb	125

PASTURE: The young bull should be acclimated to grazing pasture for 7-10 days prior to the date he will be turned onto pasture with his cows, if at all possible. Several days are required for the rumen microflora to fully adjust from harvested feeds to fresh spring grass. This transitional stress should be accomplished prior to turning him into the herd.

HOOF TRIMMING: A skeletally sound, correct yearling bull should not require any foot care. Occasionally, excessive hoof growth may require a foot trimming. All hoof trimming should be completed 3-6 weeks prior to the breeding season. Bulls that are trimmed later than this may have sore hooves and will not feel like breeding many cows.

THE PREBREEDING SEASON

Because spermatogenesis requires 60 days for completion, this is the minimum period allocated for preparing bulls for the breeding season and 90 days would be better. Bulls that will be working together should be exposed to each other prior to the breeding season to establish the "pecking order." This does not need to be done as soon as newly purchased bulls arrive on your operation. To reduce that "sense of isolation" newly arrived bulls can be maintained with a steer or a pregnant cow or two. It is a good idea for the bull pasture to be somewhat isolated to avoid excessive fighting activity. A pasture with adequate area will also encourage exercise and reduce confrontations between bulls. If you still feel that a bull is too fat at breeding time, consider reducing the number of cows he is initially exposed to until his condition score moderates. Bulls should be able to get out of the wind of possible spring blizzards to avoid possible frostbite of the scrotum.

Some feel silages should be restricted or not be fed to bulls ahead of the breeding season. Basis for this is arguable, but holding daily silage allowance to not over 20 lbs. daily is a workable compromise.

THE BREEDING SEASON

The physical and semen evaluation done at the Ohio Bull Test Station indicates whether the young bull is capable of settling females. He also must have the desire or libido to do the job. This is difficult to evaluate. Providing him the chance to breed some cull cow or dry cow prior to

breeding season not only gives him the sexual experience but provides the producer a chance to observe his willingness to work.

Flies bother bulls more than cows. Double tagging with insecticide ear tags can greatly help minimize this distraction from this work. Fly tags should be placed in the ears just prior to expected fly strikes rather than in the spring to have maximum effect and removed in the fall to reduce fly resistance problems. If a corral is available for treating him, using one of the pour-on insecticides at 2-week intervals can also help keep fly problems down. However, observe label restrictions.

Use a 45-60 day breeding season for yearling bulls. If this is not possible, use some type of rotation to provide for a resting period. Bulls can wear out from heavy service and lose interest. When this happens, the bull needs rest. Spend time observing young bulls in the pasture to detect any problems.

Good bull managers observe the bulls during the breeding season. Early detection of injured bulls is required for getting cows bred early in the breeding season.

Moving from a 90 day breeding season to a 45 or 60 day breeding season in one year can be risky if open cows is of concern. Producers should probably leave bulls with the cows at least 10 days to 2 weeks past the optimum breeding season. Producers should only go with a rigid 45 or 60 day breeding season if they feel there will only be a few open cows.

POST-BREEDING MANAGEMENT

It is not uncommon for yearling bulls to lose from 100 to 300 lbs during their first breeding season. In addition to gaining this weight back, the bull must gain approximately 400 lbs. so he weighs 75% of his mature weight by the time he is 2 years old. A gain of approximately 2 lbs per day should be adequate during the 9 months before the next breeding season. Producers should strive for a 6-7 condition score for 2-year-olds prior to breeding. The following table is for condition scoring yearling bulls after the breeding season (Strohbehn, 1988).

Condition Scoring System for Yearling Bulls Score

1. No fat anywhere. Very sucked up in flanks. Complete skeleton is visible. Muscle atrophy is evident. Winter survival doubtful.	600-800 lb. 9 mo. ADG=2.6 6 mo. ADG=3.9
2 Very thin. Slight amount of shoulder and back fat. Some muscle atrophy. Hooks very prominent. Sucked up in flanks.	500-700 lb. 9 mo. ADG=2.2 6 mo. ADG=3.3
3. Thin over backbone with highly visible shoulder muscle movement. Slight amount of shoulder and rib fat. Slight degree of muscle atrophy	400-600 lb. 9 mo. ADG=1.9 6 mo. ADG=2.8
4. Thin looking, some fate over shoulder and front ribs. Backbone visible, but	300-500 lb. 9 mo. ADG=1.5

not prominent.	6 mo. ADG=2.2
5. Spongy fat over front rib and back. Backbone is slightly evident. Slightly smooth shoulder. Hooks blend in with topline.	200-400 lb. 9 mo. ADG=1.1 6 mo. ADG=1.7
6. Spongy fat over all ribs, hooks and pins. Shoulder muscle movement is slightly visible. Fat deposits appear in brisket.	100-300 lb. 9 mo. ADG= .8 6 mo. ADG=1.1
7. Spongy fat over all ribs, smooth back, fat very evident about tailhead and in brisket and shoulder.	50-150 lb. 9 mo. ADG= .4 6 mo. ADG= .6
8. Excess condition. Large fat deposits over ribs, back, hooks, pins, brisket, shoulder and scrotal region. reproductive impairment.	0-50 lb. Best to convert Some fat to muscle
9. Extremely fat all over and has appearance of fat feedlot animal. loss. This much condition would impair reproductive performance	0 to some weight Best to convert fat to muscle

Winter Pasture or Facilities: Winter storms with excessive wind chill can freeze the lower part of the scrotum. The result is a high incidence of poor semen and scrotal damage. A severe freezing of the scrotum will be evidenced by a hard frozen scrotum during and just after the storm. There may be a discoloration on the sac. This is generally followed by a scab and then sloughing off of the lower portion. This may prevent the scrotum from lowering which regulates the temperature)sperm can be damaged or killed by high temperatures and therefore needs to be about 4°F lower than core body temperature) during warm weather.

Bulls can recover if there are no adhesions in the scrotal tissue and if the sperm tract is not damaged. Since sperm production takes about 60-800 days, you should wait to have a suspected bull tested.

Cattle have a natural tendency to face away from the strong cold winds. Therefore, prevention is accomplished by good bedding, indbreaks or simply providing access to a barn or other shelter. Caution is advised for transport in open trailers during very cold weather due to "Man Made" wind chills.

ADDING VALUE TO CULL BULLS

Just as with cull cows, it may be advantageous with bulls to add flesh and weight at the end of the breeding season and put the bulls on the market (Corah, 1995). Just as with cull cows, there tends to be seasonality in the price of bulls. Remember, most residues and condemnations occur in cull breeding cattle.

Another opportunity is that even though the bull may have out-lived his usefulness in your cow herd, he may have value as a herd sire in another cow-calf operation. Don't overlook the potential of marketing your cull bulls as herd sires. However, there are some health concerns that should be considered.

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