

Nutrition Edition

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* Feeding bulls with high protein and energy rations during the preweaning phase improves fertility.

Feeding for Fertility



Prewaning feed for young bulls affects future fertility.

by Heather Smith Thomas

Young bulls need to be adequately fed for proper growth, development and future fertility, but nutritionists are still learning about the best avenue to do so. John P. Kastelic, DVM, Ph.D., professor of cattle reproductive health (Theriogenology) at the University of Calgary, has done a multitude of research on nutrition in bulls.

“We started many years ago with research on beef bulls, and more recently with dairy bulls,” he explains. “In beef bulls, historically, people focused on nutrition after weaning.”

Many of those studies date back to the 1970s. In that time, seedstock producers fed their young bulls practically a feedlot ration to achieve gains up to 4 lb. per day in an effort to see how rapidly they could gain. Kastelic says there is quality evidence indicating that if bulls are fed high-energy diets after weaning, there is very rapid weight gain. However, a high-energy diet also lends itself to excessive fat in the scrotum, reduction in semen quality, more risk for laminitis/founder, liver abscesses, rumenitis and other problems.

Opposing overconditioning

Kastelic says overfeeding is counterproductive. Producers are recognizing this and realize a bull should be fed for a long life of

breeding rather than being fed like a steer destined for slaughter. Kastelic emphasizes a bull needs to be athletic — not fat.

“It is very detrimental to feed bulls high energy rations post-weaning for rapid gains, resulting in over-conditioned bulls,” he explains. “The thinking used to be that if a bull is not fat, he must be a hard keeper or poor doer. Sale bulls were always fat, but producers thought they could just take them home and put them on a diet before they put them out with cows.”

Producers predicted this diet would get bulls into breeding shape. Unfortunately, some of the damage in an overconditioned young bull can be permanent. These bulls can end up with liver abscesses, damaged claws and feet and, in some cases, a permanent reduction in the number of sperm produced and poor semen quality.

“There is no sense or justification in overfeeding bulls in the post-weaning period,” Kastelic says. Yet many people feed too much during feed trials to see which bulls have the best rate of gain and feed efficiency. If bulls are fed post-weaning on a mostly forage diet, the bulls with genetic potential for rapid and efficient gain will still gain the fastest. Kastelic does recognize the difference between the top and the bottom is smaller, but the top-performing bulls are still identifiable.

“Thus there is no excuse to push them with a feedlot ration, because you can do permanent damage,” he notes. “It’s a waste of feed resources.”

The significant phase

The second important thing breeders need to understand is the importance of the preweaning phase of the young bull’s life.

“For most beef bulls, that’s when they are still on their mothers,” Kastelic says. “We just assumed that she is going to look after him and feed him adequately.”

He references work in the 1970s at Colorado State University looking at scrotal circumference in yearling bulls, which came up with an adjustment formula. The formula indicated if the bull had a heifer for a mother, 1.5 cm was added to the yearling scrotal circumference. For a mature cow, there was no adjustment, but if he had an aged dam, a small amount of correction was added for maternal nutrition.

“The work in dairy bulls showed very clearly the bulls that were really well fed early in life reached puberty quicker, had larger testes and produced more sperm,” Kastelic explains. “This was also



Calves born to mature cows often experience elevated growth and performance later.

PHOTO BY ABBEY YATES

our finding with beef bulls. If we fed them very well prior to about 25 weeks of age, we could hasten puberty a little, but more importantly, we could increase testis size and increase the number of sperm produced.”

To prove this, they used a feeding trial with several groups of young bulls. One group received 100% of protein and energy requirements as a baseline. Another group received only 70% of those requirements, and the third group received about 130% of requirements. The three groups for comparison were, thus, getting 70%, 100% and 130% of the necessary energy and protein, but all bulls had adequate minerals and vitamins. Those rations were fed from about 6 weeks to 25 weeks of age.

“We found that the bulls on the 130% ration – compared to the bulls that were on 70% – reached puberty about a month earlier and had testes that were about 20% to 30% bigger and produced 20% to 30% more sperm than the bulls on the 70% ration.”

He reported no difference in semen quality, so there was no indication that feeding the bulls extra at an early age harmed sperm quality. It is concluded that bulls fed well prior to 25 weeks of age may reach puberty a month or so earlier than they would otherwise – with testes 20% to 30% bigger, with 20% to 30% more epididymal sperm reserve. Further, sperm quality is adequate, and quantity increases.

Analyzing what may change due to the extra feed, the researchers found it involved the hormone LH (luteinizing hormone). “This hormone is released from the pituitary, a small gland at the base of the brain, and goes to the testes and causes release of testosterone,” Kastelic says. “What happens in a bull’s life, starting at about 6 to 8 weeks of age, is an increase in this hormone, and it stays relatively high until about 20 to 25 weeks and then it decreases. The nature of that increase, how high it gets, and how often it is released has a big impact on what happens later in the bull’s life.”

The researchers found when the bulls were fed really well, LH also increased. There were profound differences in those bulls in the very early phase of growth. At that age, testosterone levels are really quite low, but what happens at that time actually sets the bull up for the rest of his life. “By feeding really well during those weeks, we bumped that LH up, and saw all the other changes thereafter,” Kastelic says.

It was interesting to note that if the bulls were fed really well for the first 25 weeks and then were backed off on the feed, the results changed.

“We put the profile of testicular development – measured either as scrotal circumference or testicular volume – on a completely different trajectory,” he explains. “By feeding young bulls very well until about 25 weeks of age and then backing off, their testes continued to grow rapidly, even though they were on a normal diet of 100% of requirements.”

He also notes it was interesting that if bulls were held back in growth through the first 25 weeks and then supplemented, giving them 130% of their nutrients, there were different results. “We found that even with the additional supplement, we could not rescue those bulls. The future course of testes development was already set.”

They were on a trajectory to be underachievers, so those bulls could not reach their genetic potential for testes development. Thus, the key to optimizing a bull’s future fertility is to provide extra nutrition early in life and then from that point on to feed them a balanced diet for growth.

Practical implications

On a practical basis for beef cattle, however, bull producers need to do some sort of creep feeding, especially for young bulls out of first-calf heifers.

“This would help all bulls with the potential to become breeding bulls, but especially for young bulls that might not have a high-milking dam,” Kastelic says.

Interestingly enough, this concept is opposite of what has been learned about heifer development. The young heifer with a high-milking dam or eating creep feed may put too much fat in her young udder and never milk as well in adulthood as a heifer that was not allowed to get so bloomy fat as a calf.

All of the work with beef bulls was done with early weaning, so the exact amount of protein and energy in their diets could be calculated for the various groups in the studies.

“The bulls with heifer dams were weaned at about 6 weeks of age, for instance, and we were a bit worried about taking them off their mothers that early and putting them on dry feed,” Kastelic says. “But we didn’t



Beef producers should employ creep feeding young bulls, especially those without a high-milking dam.

lose any calves during that early weaning and transition phase, and this was over a 4-year period with more than 150 calves.”

The early weaned calves were put on a silage-based diet, adding various amounts of grain and canola or soy meal to bump up the energy and protein. That ration was the easiest way to have complete control over what the various groups of bulls ate. A practical method would be to leave the calves on their mothers and to supplement with both energy and protein – not just straight energy – and to boost their growth prior to about 25 weeks of age and then to back off.

He says the target is to have them gaining close to about 3 lb. per day during that time frame and to back off at weaning, and then the bulls are fine.

He emphasizes the importance of not feeding heifer calves that same way. Separating them allows breeders to achieve full genetic potential for testes development in young bulls.

“There have been many studies looking at scrotal circumference, how it is highly heritable, and that by selecting for bulls with large testes we can make rapid genetic progress and also get earlier puberty in the daughters of those bulls,” Kastelic recognizes. “In addition, there is quite a bit we can do just with management. The key is to supplement them prior to weaning and then just back off and grow them.” **HW**

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— John P. Kastelic



Feeding bulls well in the first 25 weeks of development can enhance their fertility later.