

OFF THE HOOF

KENTUCKY BEEF CATTLE NEWSLETTER JANUARY 6, 2025

Cooperative Extension Service
University of Kentucky
Beef IRM Team

Each article is peer-reviewed by UK Beef IRM Team and edited by Dr. Les Anderson, Beef Extension Specialist, Department of Animal & Food Science, University of Kentucky

This month's newsletter includes:

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Timely Tips

Dr. Les Anderson, Beef Extension Professor, University of Kentucky

Spring-Calving Cow Herd

- Study the performance of last year's calf crop and plan for improvement. Plan your breeding program and consider a better herd sire(s). Select herd sires which will allow you to meet your goals and be willing to pay for superior animals.
- Consider vaccinating the cows to help prevent calf scours.
- Keep replacement heifers gaining to increase the probability of puberty occurring before the start of the spring breeding season.
- Start cows on the high magnesium mineral supplement soon. Consider protein supplementation if hay is less than 10% crude protein. If cows are thin, begin energy (grain) supplementation now. Cows must reach a body condition score of 5 before calving to maximize their opportunity for reproductive success. Supplementation now allows adequate time for cows to calving in adequate body condition score.
- Get ready for the calving season! See that all equipment and materials are ready, including obstetrical equipment, record forms or booklets, ear tags, scales for obtaining birthweights, etc. Prepare a calving area where assistance can be provided easily if needed. Purchase ear tags for calves and number them ahead of time if possible. Plan for enough labor to watch/assist during the calving period.
- Move early-calving heifers and cows to pastures that are relatively small and easily accessible to facilities in case calving assistance is needed. Keep them in good condition but don't overfeed them at this time. Increase their nutrient intake after they calve.

Fall Calving Cow Herd

- Provide clean windbreaks and shelter for young calves.
- Breeding season continues. Keep fall calving cows on accumulated pasture as long as possible, then start feeding hay/grain/supplement. Don't let these cows lose body condition!
- Catch up on castrating, dehorning and implanting.

General

- Feed hay in areas where mud is less of a problem. Consider preparing a feeding area with gravel over geotextile fabric or maybe a concrete feeding pad. Bale grazing is an option for producers to help control mud while spreading nutrients across pastures.
- Increase feed as the temperature drops, especially when the weather is extremely cold and damp. When temperature drops to 15°F, cattle need access to windbreaks.
- Provide water at all times. Cattle need 5 to 11 gallons per head daily even in the coldest weather. Be aware of frozen pond hazards. Keep ice "broken" so that cattle won't walk out on the pond trying to get water. Automatic waterers, even the "frost-free" or "energy-free" waterers can freeze up in extremely cold weather. Watch closely.
- Consider renovating and improving pastures with legumes, especially if they have poor stands of grass or if they contain high levels of the fescue endophyte. Purchase seed and get equipment ready this month.

Scours Vaccines*: What are the Options?

Dr. Michelle Arnold – DVM, MPH UK Ruminant Extension Veterinarian

“Neonatal” calf diarrhea is defined as scours occurring within the first 3 weeks of a calf’s life. Viruses (rotavirus, coronavirus), certain bacteria (*E. coli* K99; *Clostridium perfringens* Types A and C, *Salmonella* spp.) and the protozoan parasite *Cryptosporidium parvum* are the most common causes in beef cattle operations. Controlling rotavirus, coronavirus, *Clostridium perfringens* Type C, and *E. coli* K99 scours through vaccination can significantly reduce calf sickness and death loss when given correctly. Scours vaccines are formulated to be given to pregnant cows and heifers during the third trimester of gestation so they will make the specific antibodies against the pathogens that cause diarrhea while colostrum is being formed. It is important to remember that scours vaccines given to pregnant cattle will only work if an adequate amount of good quality colostrum is consumed by her newborn calf within the first 12 hours (preferably the first 6 hours) of life. If unable to vaccinate the pregnant females in the herd, a variety of products can be given to newborn calves to help reduce the risk of sickness and death from scours as well.

The three most popular vaccines available for use in pregnant cattle are ScourBos®9 and 4 (Elanco), ScourGuard®4KC (Zoetis) and Guardian® (Merck). The first time scours vaccines are used, a two-shot series must be given in the third trimester of pregnancy consisting of a first or “primary dose” followed by a booster dose. After the first year, just one annual revaccination in late gestation is required every year throughout the cow’s reproductive life. Vaccination timing is critical to stimulating and optimizing antibodies in colostrum. If cows are vaccinated too early in pregnancy, the antibody response may start to fall off prior to the colostrum being made. Vaccinating too late and the colostrum may already be produced before an antibody response is mounted. Which product is chosen often depends on when cattle will be worked; Scour Bos® is administered earlier during pregnancy, ScourGuard® is used latest in gestation and Guardian® is in-between these two options. Obviously not all calves will be born the first week of calving season but plan to give the scours vaccine based on when the first calves of the season are expected. Consider administering an additional dose to those females who have not calved within 2 months of receiving their scours vaccine.

It takes some planning to vaccinate correctly; timing is critically important when selecting the correct product for your operation:

1) For pregnant heifers (or cows) receiving their first or “primary series” of scours vaccine, manufacturers give a date range for one dose and a set date for the other dose that varies depending on vaccine chosen. Note that Guardian is the only one administered subcutaneously.

- Scour Bos®9 – Administer the first dose (2 ml IM) 8-16 weeks prior to calving and booster with Scour Bos® 4 given 4 weeks prior to calving;
- Guardian®- Administer the first dose (2 ml SQ) 12 weeks before calving and the second dose 3-6 weeks later;
- ScourGuard® 4KC-Administer first dose (2 ml IM) 6-9 weeks before calving and give the second dose 3 weeks later.

2) Cows (Annual revaccination)-

- Scour Bos®9 –Administer 8-10 weeks prior to calving season
- Guardian®-Administer 5-7 weeks before calving season
- ScourGuard® 4KC-Administer 3-6 weeks prior to calving season

If the cow herd is not vaccinated and a calf scours problem develops, several products are available to administer to newborn calves. The First Defense® product line includes the Tri-Shield® gel tube, Dual-Force® gel tube, First Defense® bolus and First Defense Technology® bulk powder. These products are antibodies given by mouth as quickly as possible after birth.

First Defense® makes their products by collecting antibody-rich colostrum that is purified and concentrated, then standardized to guarantee antibody levels for each dose. These antibodies bind directly to bacterial and viral antigens, ideally before they can enter and harm cells in a calf’s gut. These are not vaccines, so the calves are not required to trigger an immune response for protection. Although these antibodies will provide immediate protection in the gut, they are much more effective when given at the same time as good quality colostrum. Be aware of the label claims when using First Defense products (see Table 1); not all pathogens are covered by every product. First Defense® Tri-Shield® gel offers the broadest coverage, specifically aiding in the reduction of mortality (death) and morbidity (sickness) from scours caused by *E. coli* K99 and coronavirus while also



First Defense®	First Defense® Bolus 5 or 30 Dose	First Defense Technology® 90-Dose Bulk Powder	Dual-Force First Defense® Single-Dose Gel Tube	Tri-Shield First Defense® Single-Dose Gel Tube
Pathogen Prevention				
<i>E.Coli</i>	✓	✓	✓	✓
Coronavirus	✓	✓	✓	✓
Rotavirus				✓

Table 1: Retrieved from : <https://firstdefensecalfhealth.com/dual-force-bolus-gel/>



Figure 1: Retrieved from <https://www.merck-animal-health-usa.com/species/cattle/products/bovillis-coronavirus>

reducing the severity and duration of scours caused by rotavirus. Interestingly, the First Defense® gels have an added blue dye that renders the calf feces green, allowing the producer to know the gel has gone through the calf's GI tract. For an economical option, First Defense® offers a nutritional supplement powder with the same ingredients as the boluses, and it is shelf stable in a resealable bucket. One level scoop is mixed with fresh or thawed colostrum until completely dissolved and then fed to the newborn calf.

Commercially available vaccines have also been designed to be administered to the newborn calf for protection from certain viruses. Calf-Guard®, manufactured by Zoetis, is an older product that contains attenuated (modified live) strains of bovine rotavirus and bovine coronavirus. It can be administered either by injection to a pregnant cow within four weeks of calving or to newborn calves by mouth before nursing to help protect calves from scours caused by rotavirus or coronavirus. A brand-new product, Bovilis® Coronavirus (Merck), is an intranasal vaccine administered to healthy calves 3 days of age and up to reduce the duration and severity of diarrhea due to bovine coronavirus (Figure 1). To protect against *Clostridium perfringens* Type C, Colorado Serum Company produces a *C. perfringens* Types C & D antitoxin (Figure 2) labeled for prevention lasting approximately 3 weeks after 10 ml administration SQ at birth. However, there is limited availability of this product because of stringent testing requirements in equine donor animals as this product is made from equine serum.



Figure 2: Retrieved from <https://colorado-serum-com.3dcartstores.com/cd-antitoxin>

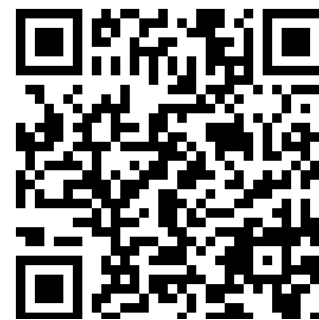
Preventing calf scours is much more about management than simply administering a vaccine. Cow nutrition during and after gestation, careful monitoring of the calving process, and environmental factors all contribute to a successful start. The cows' diet must provide adequate energy, protein and trace minerals to meet her needs during gestation and lactation, especially during winter. Remember up to 80% of fetal growth occurs in the last 50 days of gestation and colostrum production ramps up during the final 4-6 weeks of pregnancy. Monitor body condition scores and be ready to offer supplemental feed to maintain a BCS at calving of 5 in mature cows and 6 in heifers. A nutritionally deprived dam will produce poor quality and quantity of colostrum, have less energy to deliver a calf quickly, and will be slow to rebreed. Calves born to energy deficient dams will be slow to stand and nurse.

Monitor and be ready to assist with calving early as necessary, especially with heifers. Make sure calves start nursing as soon as possible after calving, keeping in mind that calves should stand within 30 minutes of delivery and nurse within 30 minutes of standing. If in doubt, use a good quality colostrum replacer and feed the calf at least twice during the first 6 hours of life. Once the calf has received colostrum, it is still important to prevent the "bad bugs" (pathogens) in the environment from overwhelming the calf's immune system. Over time, calves infected earlier in the calving season are "pathogen multipliers" and become the primary source to younger calves. Calf scour pathogens will build up exponentially in the environment as the calving season progresses.

Poor sanitation, cold, wet weather and overcrowding all contribute to a higher risk of disease, especially conditions in calving and maternity areas. Exposure to bacteria, viruses, and protozoa occurs through direct entry of manure to the mouth of a calf by contact with manure-contaminated teats, soiled bedding, and through self-grooming. Calving in the same area for an extended period of time greatly increases the disease risk to the youngest calves, especially in wet or muddy conditions. If possible, pregnant cows close to calving should be rotated onto clean pastures while cow-calf pairs remain on the old pasture. If

calving in a barn or shed, the calving area should be kept as clean and dry as possible with frequent changes of bedding to remove the build-up of organisms. Make every effort to get the cow and newborn calf out of the barn quickly to lessen the chances of infection. Even the best calving management practices will have no effect if the first thing a calf ingests is manure from the calving area. Consult with your veterinarian on ways to address a calf scours problem and the best choice of vaccines for your operation.

The UK Veterinary Diagnostic Laboratory has an excellent test to diagnose the cause of calf diarrhea. A small sample of scours (in a leakproof container) from a calf that has not been treated for diarrhea with antibiotics is the best sample to run the test. The “Calf Diarrhea Panel” is a PCR assay that detects the nucleic acids in bovine coronavirus, rotavirus, *E. coli* K99, Salmonella and Cryptosporidium. Results are available within 2-3 days and costs \$62.75 + \$10 Accession Fee. Visit the website at <https://vdl.uky.edu/> for more information or call (859) 257-8283.



Scan QR code to go to UK Beef Cow Forage Supplementation Tool.

*The products described are for educational purposes only and should not be considered an endorsement by the University of Kentucky.

Hay Quality Lower in 2024

Dr. Chris Teutsch, Forage Extension, UK Grain and Forage Center of Excellence at Princeton

Last fall we analyzed 1,127 hay samples as part of the Eastern, Central, and South-Central Kentucky Hay Contests. A summary of the results can be found in Table 1. Nutrient requirements of various livestock classes can be found in Table 2. So here is what we found:

- Crude protein (4.6 to 26.7%) and total digestible nutrients (39 to 76%) varied widely
- 3% of the hay samples contained less than 50% TDN
- 1.4% of the hay samples contained less than 8% crude protein
- 283 samples or 25% contained enough energy to meet the requirements of a beef cow at peak lactation
- 777 samples or 69% would meet the protein requirements of a beef cow at peak lactation
- 1111 samples or 99% contained enough protein to meet the needs of a dry pregnant cow
- 1091 samples or 97% contained enough energy to meet the requirements of a dry pregnant cow

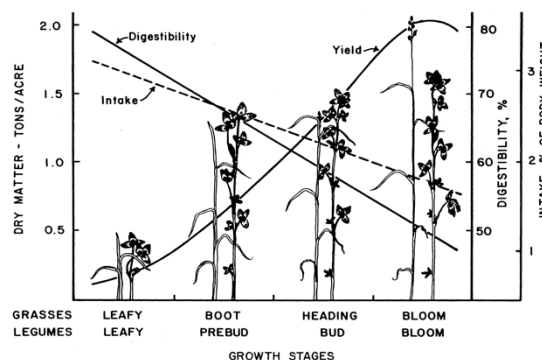


Figure 1. Impact of stage of maturity at harvest on forage quality (Blaser et al., 1986).

In general, a higher percentage of hay samples required supplementation to meet the energy needs of a lactating beef cow (75% in 2024 versus 40% in 2023). This was most likely due to rain delays in harvest, allowing forages to become more mature and therefore lower in forage quality (Figure 1). I guess the biggest take home from the 2024 samples is that we still have a way to go in terms of improving hay quality!

So, what don't these results tell us? Since there is still wide variation in both crude protein and energy for the hay samples in this dataset, the average or median of the results CANNOT be used to make recommendations on what or how much to supplement. To make this type of recommendation, you will need to sample individual hay lots (one cutting from one field) that you will be feeding (see [AGR-257 Hay Sampling Strategies for Getting a Good Sample](#)). Once you have the results in hand, then a supplementation strategy can be designed by either working your local extension agent, nutritionist or veterinarian or by using the [UK Beef Cow Forage Supplementation Tool](#).

NEW YEAR'S RESOLUTION: Improve Hay Quality in 2025

A good New Year's Resolution for 2025 would be to improve hay quality! Making just a few small tweaks to your hay production program can make a big difference in hay quality. Below is a short list of things that you can implement to improve hay quality and production on your farm.

- *Fertilize and lime according to soil test.* A balanced fertility program is essential for optimizing hay yield and quality. Phosphorus, potassium, and lime should be applied according to soil test results. Avoid using "complete" fertilizers such as 10-10-10. These fertilizers commonly over apply phosphorus and under apply potash.
- *Apply nitrogen early to promote rapid spring growth.* Applying 80 lb N/A in mid- to late March will promote early growth in hay meadows, resulting in higher first harvest yields with improved crude protein values. Recent research at the University of Kentucky has shown that fall nitrogen fertilization promotes hay growth in the spring. In fact, 80 lb N/A applied in the fall was equivalent to more than 100 lb N/A applied in the spring.
- *Harvest at the boot stage.* The single most important factor impacting forage quality is stage of maturity at harvest. Hayfields should be mowed as soon as the grass reaches the late boot-stage. The boot stage occurs when the sheath of the flag leaf swells just prior to the emergence of the seed head. By making the first cutting in a timely manner, we will have time to make a leafy second cutting just prior to the summer months.
- *Mow early in day.* Some studies have shown that sugars tend to be highest in late afternoon, making this the optimal time of day to cut. However, in high rainfall environment like Kentucky, maximizing curing time is the highest priority. Therefore, hay should be mowed in mid to late morning after the dew has dried off.
- *Use mower-conditioner.* Conditioning the stems allows moisture to escape at a faster rate. This shortens curing time and improves your chances of avoiding rain. Conditioning is especially important for first cutting grasses, summer annual grasses, and legumes, all of which tend to have larger stems.
- *Set swath on mower-conditioner to the widest possible setting.* Maximizing the swath width decreases curing or wilting time by exposing a larger portion of the forage to direct sunlight.
- *Rake or ted at 40-50% moisture content.* Raking and tedding the forage while it is still pliable helps to reduce leaf loss and maintain forage quality. Once the moisture content is below 40%, leaf loss increases, especially in 1
- *Legumes such as alfalfa and clover.*
- *Bale at 18-20% moisture.* Baling in this moisture range inhibits mold growth and reduces heating. Avoid baling hay that is excessively dry due to high levels of leaf loss and hay that is above 20% moisture due to heating and potential hay fires.

- *Store dry hay under cover and off the ground.* Protecting hay from weathering helps to reduce dry matter losses and maintain forage quality. Much of the weathering damage is a result of the hay bale wicking moisture up from the ground. So, storing hay off the ground can greatly reduce deterioration.
- *Consider using baleage.* The biggest advantage of baleage is the shortened period between mowing and baling. In many cases, hay can be mowed one day and baled the next. This facilitates harvesting hay at the correct stage of growth, the NUMBER ONE factor impacting forage quality. To learn more about baleage see [AGR-235 Baleage: Frequently Asked Questions](#).

If you need help with hay sampling or interpreting your hay testing results, make sure and contact your local extension agent.

Forage testing is available from several commercial labs and the Kentucky Department of Agriculture. The Kentucky Department of Agriculture offers a standard forage analysis to Kentucky producers for a reduced cost.

Table 1. Summary of 2024 Hay Contest forage quality results. Samples (n=1127) were collected by extension agents, dried in a forced air oven, ground to pass through a 1 mm screen, and predicted using a near infrared spectroscopy.

Constituent	Min	Max	Average	Median	Standard Deviation	Constituent Description
Crude Protein (%)	4.6	26.7	12.9	12.0	3.4	Estimate of protein calculated by Total N x 6.25.
Acid Detergent Fiber (%)	19.9	54.8	38.3	38.7	4.2	Chemical estimate of forage digestibility. Used to calculate energy.
Neutral Detergent Fiber (%)	23.2	82.0	58.0	59.6	7.9	Chemical estimate of indigestible and slowly digestible fiber. Used to estimate DM intake.
Ash (%)	2.1	20.2	7.3	7.3	1.5	Measure of total mineral content. Used as an indicator of soil contamination.
IVTDMD-48 Hr (%)	48.8	90.9	71.6	71.2	5.3	Amount of forage material digested after 30-hours in ruminal fluid.
NDFD-48 hr (%)	22.8	76.7	51.7	50.8	7.1	Digestible fraction of NDF expressed as percentage of Neutral Detergent Fiber.
Total Digestible Nutrients (%) -based on ADF	39.0	76.9	57.5	57.1	4.5	Estimate of energy. Calculated using ADF. Used to balance rations.
Total Digestible Nutrients (%) -based on fiber digestibility	41.9	73.7	60.0	59.9	4.5	Estimate of energy. Calculated using SUMMATIVE equation. Based on actual fiber digestibility.
Relative Forage Quality (%)	39	343	126	124	26	Relative comparison of forage quality to alfalfa harvested at full bloom. RFQ is a better ranking tool for grass than RFV.
Dry Matter Intake-NDF (% Body Wt)	1.5	5.2	2.1	2.0	0.4	Estimate of how much of given forage can be consumed. Based on neutral detergent fiber.
Dry Matter Intake-Fiber Digestibility (% Body Wt)	1.1	5.7	2.6	2.5	0.3	Estimate of how much of given forage can be consumed. Based on ACTUAL fiber digestibility.

More information on this program can be found at <http://www.kyagr.com/marketing/forage-program.html>. Make sure and use a lab that has been certified for accuracy and precision by the National Forage Testing Association. A list of certified labs can be found at [NFTA Certified Labs](#).

Animal Class	Total Digestible Nutrients (%)	Crude Protein (%)
Growing steer @ 1.5 lb/day	65	12
Growing steer @ 1.7 lb/day	68	11
Lactating beef cow	60	11
Dry beef cow	50	8
Lamb finishing	70	12
Lactating ewe	65	13
Dry ewe	55	9

Table 2. Nutritional requirements of various livestock classes. *Adapted from Southern Forages, Fifth Edition.*

Keep Them Fit!

Dr. Les Anderson, Beef Extension Specialist, University of Kentucky

While reading some industry information, I was reminded about an article Dr. Burris wrote for Cow Country News a few years ago. The focus of his article was to treat your herd bulls like an athlete; keep them fit and in great working shape. As always, it was a super article and is still relevant. Recently, more research has been done on bull fitness and fertility that is quite interesting.

We have known for years that over-conditioning bulls is detrimental to their fertility. When bulls are over fed and their body condition score get excessive (> 7), fat begins to build up in the scrotum and in the spermatic cord. Fat is an excellent insulator and this buildup of fat in the neck of the scrotum leads to an increase in scrotal temperature. For optimum sperm production, the testis needs to be about two degrees cooler than body temperature and this buildup of fat especially in the neck of the testis (around the spermatic cord) can lead to abnormal sperm development. When these fatter bulls are subjected to a breeding soundness exam, they are more likely to fail due to an increase in abnormalities with sperm morphology and motility. More work from Dr. Pedro Fontes at the University of Georgia also indicated that bulls with more backfat were more likely have defects in the development of sperm and to fail a breeding soundness exam.

Dr. Fontes has completed some fascinating work extending our knowledge on the impact of bull condition on fertility. He recently used IVF to exam the ability of sperm from moderately- and over-conditioned bulls to fertilize an oocyte resulting in the proper development of an embryo. His research demonstrated that if an oocyte was fertilized by an over-conditioned bull the resulting embryo was less likely to continue to develop. His work suggests that bull diet and condition can negatively impact the ability of an embryo to grow and may lead to increases in early embryonic mortality. His studies examined both mature and young, developing bulls and the results did not vary. Interestingly, in this work sperm morphology and motility were similar between over-conditioned bulls and moderately-conditioned bulls suggesting the reduced embryonic survival may run deeper than simple changes in sperm development. Truly fascinating work.

Over-conditioning not only impacts sperm production, but it also reduces the bull's interest in breeding cows. Research from Australia indicated that over-conditioned bulls also have lower libido, and their serving capacity was significantly lower than moderately-conditioned bulls.

Research from Canada clinched the nail on the head. The goal of this research was to identify factors associated with the male that impacts pregnancy in pasture situations. Considerable data on the bulls was collected including scrotal circumference, a wide variety of sperm traits, and back fat thickness. These 277 bulls of British and Continental breeds were turned out with over 9,000 cows and pregnancy was assessed after the end of a 70-day breeding season. Of all the measurements taken, backfat thickness of the bull had the highest significant correlation with failure to breed. Basically, fatter bulls got fewer cows pregnant.

So, as Dr. Burriss advised years ago, keep your bulls fit and think of them like athletes. Also, we are entering bull buying season so find bulls that not only meet your herds genetic needs but also are in proper body condition. If a bull's BCS exceeds 6, check to see if his scrotum looks blocky and full of fat and avoid purchasing him. Once you get your bull home, manage his diet and exercise to keep him in a BCS of 5-6. The pregnancy rate of your herd may depend on it!