OFF THE HOOF

KENTUCKY BEEF CATTLE NEWSLETTER DECEMBER 2, 2024

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This month's newsletter includes:

Timely Tips

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

Spring Calving Herd

- Be sure that weaned heifer calves are on a feeding program that will enable them to reach about 65% of their mature weight before the start of the breeding season. Rations should be balanced to achieve gains sufficient to get heifers from their current weight to that "target" weight. Heifers should reach their target weight approximately 30 days before the start of the breeding season.
- Body condition is important, plan an adequate winter program for cows to be at least body condition score 5 (carrying enough flesh to cover the ribs) before the calving and breeding season. This will help them to breed early in the spring. Thin cows should be fed to regain body condition prior to winter. Don't let cows lose weight/condition. Supplementation will most likely be needed. Find low-cost supplemental feeds to meet the nutrient needs of cattle.
- Divide the herd into groups for winter feeding:
  - weaned heifer calves
  - first-calf heifers, second-calvers and thin mature cows
  - the remainder of the dry cows which are in good body condition
  - herd sires
- Begin feeding the lowest quality forage to dry cows which are in good condition during early winter and save the best hay for calving time or for weaned calves.
- Order and number ear tags for next year's calf crop this winter. It is also a good time to catch up on freeze branding and replacing lost ear tags.

Fall Calving Herd

- The fall breeding season has started. Breeding can best be accomplished on stockpiled fescue pasture; otherwise, cows with calves should be fed 25-30 pounds of good quality hay or its equivalent. Supplement with grain, if needed, and minimize hay waste. DON'T ALLOW THESE COWS TO LOSE BODY CONDITION PRIOR TO OR DURING THE BREEDING SEASON. It is easy to wait too long to start winter feeding.
- If you haven't turned bulls out yet, have a Breeding Soundness Evaluation (BSE) performed on them (even if you used them this spring). A BSE is a risk management tool as BSE's accurately identify infertile bulls.
- Observe performance of bulls during breeding season. Watch cows for return to estrus, if you see several in heat, try to determine the cause and consider changing bulls.

General

- Complete soil testing pastures to check for fertility and pH.
- Consider putting down geotextile fabric and covering with gravel in feeding areas before you begin hay feeding to minimize waste of expensive hay. Or, perhaps, construct concrete feeding pads for winter feeding areas.
- Another option to consider for winter feeding is bale grazing. Bale grazing helps spread nutrients across the pasture and can have regenerative effects on your pastures.
- Monitor body condition and increase feed, if needed, for all classes of cattle. It often gets cold in December and the nutrients needs of cattle increase as temperatures fall below their comfort level. Be especially mindful of cold, wet conditions and increase energy availability. Consult your nutritionist to ensure that your rations are meeting the nutrient requirements during stressful weather.

Ionophore Toxicosis in Beef Cattle – Frequently Asked Questions

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

Ionophores - what are they and why are they used?

Ionophores are feed additives utilized in the beef industry since 1975 as growth promoting agents and for control of coccidiosis. The approved ionophores for use in cattle in the US include monensin (Rumensin® - Elanco Animal Health; Monovet®90 - Huvepharma), lasalocid (Bovatec® - Zoetis) and laidlomycin propionate (Cattlyst® - Zoetis). Although all ionophores act similarly, this article will focus primarily on monensin as far more information is available due to its longstanding and widespread use in the beef industry.

Technically, monensin is a "monovalent carboxylic polyether ionophore antibiotic" produced by the fungus *Streptomyces cinnamonensis*. Ionophores are so named because they carry (the Latin root "phor" means carry) "ions" across normally impervious biological membranes, leading to disruption of normal cellular functions and cell death. When properly fed, ionophores beneficially alter the normal rumen microflora (bacteria, protozoa and fungi), resulting in increased efficiency of energy metabolism and improved nitrogen metabolism. In addition, monensin changes the ratio of volatile fatty acids in the rumen, increasing propionic acid production and reducing butyric and acetic acids, a change that ultimately provides more energy through increased production of glucose. Monensin is specifically labeled in beef cattle for 1) improved feed efficiency in mature beef cattle and cattle fed in confinement for slaughter; 2) increased rate of weight gain in stockers, feeders and replacement heifers; and 3) the prevention and control of coccidiosis in all classes of cattle (except veal calves) caused by *Eimeria bovis* and *Eimeria zuernii*. In addition to its label claims, feeding monensin to cattle is known to reduce the incidence of bloat, rumen acidosis, and acute respiratory distress syndrome. More information on the use of Rumensin in beef cattle may be found at the following link: https://farmanimal.elanco.com/us/beef/products/rumensin .

Is ionophore intoxication (poisoning) a frequent occurrence?

Not at all! Ionophores are considered safe and effective when used in the approved species receiving the recommended amounts per label directions. Monensin has a relatively wide margin of safety in cattle after a short acclimation period to the drug. Poisoning mostly occurs either from accidental contamination of feed and feed supplements for the wrong species (horses, for example) or errors in feed mixing or product selection resulting in excessively high concentrations in the diets of cattle. At high doses, ionophores affect the heart and skeletal muscle cells, causing cellular degeneration and death. An overdose may cause symptoms ranging from anorexia to severe heart and skeletal muscle damage or sudden death. There is no antidote or specific treatment for ionophore toxicosis except general supportive care. Of primary importance is the recognition of the clinical signs in multiple animals within a group of cattle as potentially feed-related, and to remove suspect feeds or minerals until testing can confirm or deny exposure.

What are the maximum approved feed concentrations of monensin for different classes of beef cattle?

Confusion can easily arise when looking at dosages and units used for ionophores. In general, feedlot cattle dosages are given in grams monensin/ton of complete feed (g/ton) since feedlot cattle in confinement are fed a total ration delivered daily. Feedlot cattle should receive 5-40 grams monensin/ton of complete feed to provide 50-480 mg monensin per head per day. The pasture or dry lot cattle dosage is 50-200 mg monensin per head per day. The methods used to deliver the ionophore include mixed in as a complete feed, mixed and used as a top dress, or offered "free-choice" in a loose mineral, protein or mineral block form. The label concentrations may be expressed in grams/ton or parts per million (ppm) and may include additional instructions to mix the drug with grain.

What are the symptoms of an ionophore overdose?

In cattle, the onset and severity of symptoms depends on the animal's weight, the amount consumed and if this was the animals' first time to consume feed containing an ionophore. Symptoms may develop quickly or may be delayed for days to weeks after exposure and include:

1. Sudden death; cattle are found dead with no symptoms noted previously;
2. Feed refusal, reduced feed intake or complete anorexia (off feed), usually within 24 to 36 hours after consuming a high dose (this is considered the most consistent symptom observed); water intake may also be negatively affected;
3. Dullness, lethargy, depression;
4. Diarrhea, signs of abdominal pain (24-48 hours post-consumption);
5. Weakness, ataxia (stumbling, incoordination, loss of balance), muscular stiffness (associated with higher dosages), muscle tremors;
6. Difficult, rapid and/or labored breathing, especially with higher dosages;
7. Recumbency (Down) and death within 3 to 14 days of ingestion of the contaminated feed but potentially 30 days or more after poisoning;

Cattle that appear to recover from the initial overdose may develop heart failure due to the death of heart muscle cells. Heart failure looks similar to pneumonia with difficult, labored breathing due to fluid buildup in the lungs and calves may die suddenly if exercised or stressed. Deaths and/or poor performance can occur for extended periods after exposure depending on the severity of the heart damage and scarring of the heart muscle. Producers with death losses due to a known mixing error should delay filing insurance claims for at least 30 days after a deadly exposure. In addition, the Food Animal Residue Avoidance Databank (FARAD) should be contacted (www.FARAD.org) by a veterinarian for meat witholding information to determine when the remaining animals may be legally sold.

How much monensin is required for intoxication?

The adverse effects of monensin for cattle and other species are well-documented and known to be dose dependent. In addition, *the greatest risk of poisoning occurs in cattle not acclimated to an ionophore-containing ration*. The monensin LD_{50} for cattle (the amount of monensin expected to cause the death of 50% of exposed animals) is not firmly established but has a published range by the manufacturer of 21.9-35.8 mg monensin/kg BW (Elanco, 1978). Cattle that survive an acute overdose will generally develop anorexia for several days following the incident so repeated daily intake of a high level of monensin is unlikely. However, the presence of a toxic amount of monensin in feed does not deter consumption when it is first offered.

How much lasalocid does it take for intoxication to occur?

There is relatively little information regarding the toxicity of lasalocid. The recommended dose is 1 mg lasalocid/kg BW and clinical signs of anorexia and diarrhea develop at 10-25 mg/kg BW. Deaths from lasalocid have occurred at 50 mg/kg BW and above. At 50-100 mg/kg BW, muscle tremors have been noted within 3 hours of a toxic dose. Lasalocid deaths occurred between 2-22.5 days after a 50 mg/kg BW dose and within 1-2 days after a 100 mg/kg BW dose.

How much laidlomycin does it take for intoxication to occur?
The Freedom of Information (FOI) summary for laidlomycin (NADA 141-025, 1994) provides some toxic dosage information for laidlomycin in cattle. Cattle offered a dosage 10-50X higher than the approved dosage developed anorexia within 12 hours of the first dose, profuse watery diarrhea within 24 hours of the first dose, weight loss, decreased to absent rumen motility, slow heart rate by day 3, and depression. One animal died four days after the last dose due to cardiac (heart) muscle damage.

How is ionophore toxicosis diagnosed?
A full postmortem examination or "necropsy" at a veterinary diagnostic laboratory is recommended. Cattle that die quickly within the first few days after an overdose may not have obvious abnormalities on necropsy that can be seen with the naked eye but the damage to the heart muscle cells can be seen microscopically. Typical findings include heart and skeletal muscle degeneration that look like pale or yellow areas within the muscle. Secondary problems that develop from heart failure such as wet, heavy lungs, and an enlarged, pale liver are frequently found. In addition to necropsy, samples of the suspected feeds and all feed labels and delivery tickets should be collected and submitted for ionophore analysis. Samples should be taken of all sources of feed and mineral as soon as a problem is suspected and, if possible, from the exact location where the animals were fed. Ionophore intoxication usually involves a recent change in feed or mineral supplementation and generally affects more than one animal. This "change in feed" may be a new batch of feed delivered, new ration formulation, new method of mixing, same ration fed to new group of animals, same ration made by a different feed mill, same ration but in a different form (such as pelleted), or new bag of minerals offered. Unfortunately, samples of feed taken for testing may not represent what the cattle actually ate, especially in cases of incomplete mixing of ingredients or if the suspected feed was from the bottom of the feed bin and new feed has been delivered. It is imperative to interview everyone involved in feeding and mineral supplementation for the past week. Ask what was fed and when, and if any feed refusal was noticed or unusual amount of feed was left in the bunk. Gather as much evidence as possible, fully document this information, and provide it to the veterinary diagnostic laboratory to help guide the investigation. Although it is nearly impossible to determine individual monensin exposure, the heavier and more aggressive animals tend to consume the largest amount of feed and receive the highest doses.


Heart and lungs from a cow with heart failure due to ionophore toxicosis. The lungs have a wet appearance compatible with pulmonary edema. Photo courtesy of Dr. Jennifer Janes, UKVDL.

One consistent mistake made by cattle producers is offering a medicated mixing mineral to cattle free-choice. "Mixing minerals" containing ionophores are designed to be mixed in at least 1 pound of non-medicated feed before offering to cattle daily to control intake. In addition, the label clearly states cattle should receive no more than 100 mg/head/day contained in not less than 1 pound of feed for the first 5 days of feeding. "Free choice" products, on the other hand, are formulated specifically to limit intake and reduce the risk of overconsumption. The feeding directions on the label should be followed carefully and all cautions observed. Cattle can eat enough medicated mineral to cause intoxication, especially when offered concurrently with ionophore-medicated feeds. The potential also exists for overconsumption of monensin when a new bag of medicated mineral is offered if cattle are salt-deprived, either due to prolonged periods without access to minerals or if the available mineral has hardened due to excess moisture and is difficult to consume. Additionally, excessive rain on exposed mineral can dissolve and leach away salt, increasing the concentration of the remaining ionophore. Careful use of the correct product, reading label ingredients and recommendations, and feeding in weather-protected feeders will help prevent problems.

Will analysis of rumen contents for ionophores prove an overdose?
Definitive diagnosis of ionophore toxicosis is not a simple task. Diagnosis is based on a history of exposure to an excessive dosage of ionophore and either sudden death or evidence of heart damage and failure on necropsy.

The ionophore concentrations in rumen contents and other tissues are difficult to interpret and, if several days passed between exposure and death, concentrations can be too low to detect. Information about when the animal last ingested monesin and prior daily monensin intake are necessary to interpret the data. Otherwise, the presence of ionophores simply proves it was consumed but does not confirm an overdose.

What if all findings point to ionophore toxicosis but no overdose is found?

One complicating factor that is poorly understood is the interaction of monensin with other compounds (such as tiamulin, oleandomycin, chloramphenicol, erythromycin, sulfonamides, or furazolidone) that can result in clinical monensin toxicosis, despite using the feed additive within the approved range. One hypothesis proposed to explain this increased toxicity is certain antibiotics may delay clearance of monensin by the liver, resulting in its accumulation to toxic levels. In an unusual case published in 1999, macrolide antibiotic residues found in dried distiller's grains within the feed appeared to affect the otherwise safe levels of monensin, leading to clinical ionophore poisoning. In any case, it is critical to obtain a thorough history regarding all other drugs the animals received concurrently with the suspect feed to make this diagnosis.

Important take-home points:

1. The greatest risk for intoxication is when cattle receive a feed containing an ionophore for the first time because the rumen microflora are not adapted to the new ingredient. Many products containing monensin require an acclimation period during which cattle should receive no more than 100 mg per head per day for the first 5 days of feeding.

2. Feed ingredients must be monitored when they are delivered and initially fed, especially when a ration change has been implemented. Rapid recognition of anorexia and diarrhea within 24 hours of the introduction of a new feed or mineral, followed by the prompt removal of the new feed may help avoid more severe consequences and losses.

3. Implement standard operating protocols for feeding cattle on the farm to reduce the risk of mistakes. Employee training is essential. Do not assume that employees new to feeding cattle know the differences in feed ingredients and the importance of correctly measuring them. Communicate what employees need to do, why it is important, and then follow-up, follow-up, and follow-up to ensure it is done correctly.

4. Thorough mixing is necessary to ensure the ionophore is evenly distributed throughout the feed. In addition, minimizing the sorting of feed ingredients by cattle is critical to ensure consistent intakes since cattle will pick out (or "sort") the ingredients they like best and eat those first if given the opportunity.

5. When offering feed containing ionophores, make sure a free-choice medicated mineral is not available at the same time.

6. Follow label mixing directions for correct drug delivery when using a medicated mixing mineral rather than offering it free-choice.

7. It is the producer's responsibility to read the feed label ingredients to ensure purchase of the correct product prior to offering it to cattle

Example of Mixing Instructions for a Medicated Feed Supplement:
"Feed at rate of 440 ppm monensin mixed in 0.45 kg of feed"
Conversion: 440 mg monensin/kg supplement * 0.45 kg/pound
= 200 mg monensin in 1 lb feed
The Electronic Code of Federal Regulations regarding all types of drugs in animal feeds may be found at the following website: https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=1219f1e875dbdd97d2eed1d4e2069116&mc=true&n=sp21.6.558.b&r=SUBPART&ty=HTML#se21.6.558_1311

In summary, ionophores are an excellent supplement in beef cattle and very safe when fed appropriately according to label directions. There are other possible causes of symptoms resembling ionophore toxicosis in cattle such as from consumption of cardiotoxic (heart damaging) plants (*Cassia occidentalis* or Coffee senna, Taxus spp., some milkweed species, white snakeroot, mountain laurel, and others), gossypol, and selenium-toxicosis or deficiency (nutritional myopathy) that cause skeletal and cardiac muscle degeneration and necrosis. Work with your veterinarian to arrive at an appropriate diagnosis.

Getting the Most Out of Your Stockpiled Grass

Dr. Chris Teutsch, UK Research and Education Center, Princeton

Stockpiling tall fescue is the is the most economical way feed cows during the winter months. Once stockpiled growth has accumulated, how you choose to utilize it can dramatically impact how may grazing days you get per acre. Research in Missouri showed that giving cows access to only enough forage for 3-days versus 14-days resulted in a 40% increase in grazing days per acre. The following tips will help to get the most out of your stockpiled forages.

Figure 1. Strip grazing stockpiled grass can extending grazing by as much as 40%.

Graze pastures that contain warm-season grasses first. Although we often like to think of pastures as monocultures, they are often complex mixtures of cool- and warm-season grasses, legumes and weedy forbs. If pastures contain warm-season grasses, use these first since their quality will decline rapidly as we move into winter.

Graze pastures containing clover next. We are always happy to see clover in pastures. However, in a stockpiling scenario it does not hold up to freezing and thawing as well as tall fescue. So graze grass-cloves mixtures before pure stands of tall fescue.

Save pastures with primarily tall fescue for later grazing. Tall fescue is by the best grass for stockpiling in terms of maintaining its nutritive value as you head into winter. So graze pure stands last.

Strip graze tall fescue. At this point in time, strip grazing is probably the most important tool that you have for extending grazing. As mentioned above, limiting access to stockpiled forage can significantly increase grazing days per acre. Strip grazing usually starts at the water source and then uses a single strand of electrified polywire to allocate only enough forage for the predetermined time period. It could 1, 2, 3, or more days. The shorter the time period the better utilization you will get. Since pastures are not actively growing during the winter months, you can start at your water source and no back fencing is needed.

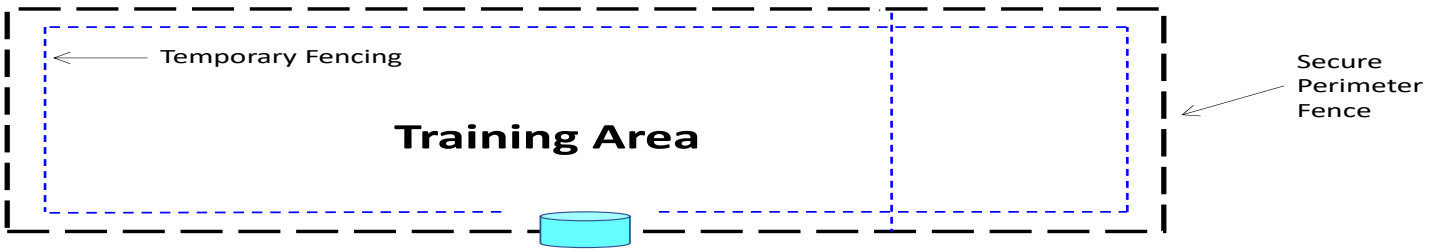
Bonus Tip: When strip grazing, never take your forward fence down until the back fence (new one) is up. If you do, the cows will be on the other side of the pasture!

You will need the following items to strip graze with:

1) Two reels with polywire with dual purpose handles
2) Temporary fence posts, one every 25 or 30 feet depending on the terrain
3) A small solar charger if you do not have ready access to an existing electric
4) A temporary grounding rod for the solar charger
5) A good fault finder to check your voltage.
6) Cattle trained to electric fence! If your cattle are not used to electric fencing and polywire, it is essential to train them prior to strip grazing.

Training Animals to Electric Fencing

- Expose animals in a secured area
- Setup temporary fence around perimeter
- First experience should be safe, but memorable
- Usually trained in 1 to 2 days



To many producers that have not stripped grazed, the idea of moving a temporary fence two of three times a week or even once a week can seem overwhelming. However, once you are set up it really goes pretty fast and the pay back is huge—a free day of feed every time you move the fence. Is it less work than feeding hay? Probably not less, but just different and the pay back is much better!

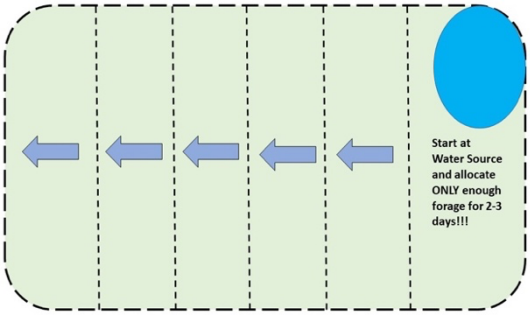


Figure 2. Strip grazing stockpiled grass is accomplished by starting at the water source and allocating only enough pasture for 2 to 3 days of grazing using temporary electric fencing.

Stretch pasture with hay. In most cases, stockpiled pastures will be higher in forage quality than most of the hay that we make. Feeding some hay while grazing stockpiled pasture can help stretch your remaining pasture and at the same time the stockpiled or winter annual pasture can act as a supplement for the lower quality hay.

The last thing that I want to mention about utilizing strip grazing is that how often you move the fence needs to fit your schedule. Many producers work off the farm and it is dark when they leave and dark when they get home. So, for them it makes sense to move the fence once a week on Saturdays or Sundays. It is important to remember that grazing systems need to benefit not only the pasture and cows, but also you!

Winter Annuals and Winter Feeding Field Day

Dr. Chris Teutsch, Dr. Katie VanValin, UK Research and Education Center, Princeton

We will have a short winter-feeding program on Saturday December 14 from 10 am to 12 pm at UK Research and Education Center in Princeton. The program will feature various winter annuals including oats, wheat, cereal rye, barley, triticale, and annual ryegrass all mixed with a hybrid rape and berseem and crimson clovers. We will also look at a stockpiling study that is evaluating several nitrogen sources and rates. We will wrap the day looking at the "Purple" Cattle Systems Hay Feeder.