# Management Considerations for the Beef Cow Herd in Drought Conditions

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## Introduction

Drought has occurred somewhere in Nebraska for as long as I can remember. This year it seems to be more wide-spread than in the past. The challenge for cow/calf producers is to implement a plan in a timely fashion so that the grazed resource is not compromised. In some areas of Nebraska, because the soils are fragile, mismanagement one year may require a number of years to reestablish more normal productivity. A management strategy may be to depopulate/destock. Producers have taken many years to develop genetic combinations that fit their environment and resources, and now they may have to cull some of those genetics. Not having a drought management plan means that you are hoping for the best and likely will not make management decisions on a timely basis, and this may be costly to the cattle enterprise.

## Drought Management Plans

Keep the plan flexible. If there is some moisture received and relocation is part of the drought management plan, maybe you don't have to relocate the whole herd. If weather conditions do change, total implementation of the drought plan may not be needed. In Nebraska, it is important to identify when (dates) to begin implementation of the drought plan. In the Sandhills of Nebraska, if we get "w" inches of rain by "x" date, then "y" amount of forage will be produced and generate enough forage for "z" AUMs. Ask your university pasture/forage specialist or person at NRCS for that information. An example, if we don't get a certain amount of moisture by May, we are probably looking at reduced forage production in our pastures, at least in the Sandhills of Nebraska. In the drought management plan, include options of relocation and depopulation.

If you don't have a drought plan, you typically wait too long to react. For instance, this year is a little bit different in regard to cull cow prices. They are pretty good, but not as good as last year. It wasn't that long ago when cull cows sold for $.28/lb and now they are in the $0.70 to $0.80 per pound range. Have in the drought management plan the date to begin to depopulate, if it comes to that management strategy, prior to the time everyone else is sending cull cows to market. As more cows enter the market and are sold, price will decrease.

A primary objective for the cow/calf enterprise is to stay profitable during a drought. This is usually a challenge as harvested forages are in low supply, causing the cost of these forages to be expensive. In addition, fuel cost to get forages transported adds cost to the forages, especially if the forages need to be hauled any distance.

Some of the soils that we manage are fairly fragile, especially when you think about soils similar to those in the Sandhills of Nebraska that are sand. These pastures cannot be overgrazed because of the number of years it takes to get them back to be productive after over-grazing.

## Strategies to Reduce Grazing Needs: Depopulating/Destocking Strategies

Depopulating/destocking and relocating all or part of the herd will reduce the need for pasture. Before considering relocation, there are management strategies that could reduce the need for pasture enough that cows would not need to be relocated.

### Early weaning

Early weaning does impact forage availability. The 2000 NRC model indicates when comparing a non-lactating cow vs. a lactating cow, there is about a 4.6-5.9 lb savings in dry matter intake between them. That would be about a 1200 lb cow eating 2% of her body weight. Forage intake of a 250 to 300 lb calf is about 5.3 lb per day. If the two forage saving numbers are added, it's about 10 lb of dry matter per head per day. So for each 2.5 days the calf is weaned, there is about enough grass savings for one more day of grazing for a 1,200 lb cow.

Calves can be weaned at 45 to 90 days of age. The older the calves are, the more likely the feeding accommodations better fit the calf. Feed bunks and water sources need to be at a height that small calves can access the water and feed. Diets will need to include high quality feed. Feed straw and corn stalks don't fit in these diets.

To free up enough pasture, the whole calf crop may not need to be early weaned. If that is the case, consider early weaning calves from females raising their first calf, old cows, cows that were identified at calving as being culled after weaning their calf.

Consider retaining early weaned calves for some time after weaning to generate enough money to pay for the cow costs. Light weight calves sell at a higher price ($/lb), but usually the light weight calf doesn't generate enough total dollars to pay for the annual cow costs. In addition, early weaned calves are very efficient at converting feed to gain and if retained into the feedlot, if grown for a short period of time (two weeks) and then fed a high-starch diet, a high proportion grade USDA average choice or better.

Consider creep feeding the calves before early weaning. This management practice will get the calves used to eating a ration out of a feeder. Using creep feeding in this manner is bunk breaking the calves. This will help reduce morbidity and mortality of early weaned calves if they are drylotted.

### Cow Culling Strategies

This is a challenge for most producers, especially in drought conditions. Depopulation means that you are going to decrease cow herd numbers to get though the drought. Producers have likely spent a lot of years building the genetics in the herd to fit their environment. Producers need to inventory the cow herd. Pregnancy check cows early in

drought years, and develop a marketing plan for the non-pregnant females. Wait until about 40 days after the end of the breeding season to preg-check. Waiting 40 days after the breeding season to preg-check will be long enough to not possibly abort any late-bred females. Any feeds that are purchased need to be fed to productive cows. Keep only pregnant cows or cow/calf pairs. If cows need to be culled, this is where records are handy.

Cull female list:

- Non-pregnant females
- Bad teats, udders, eyes, feet and legs
- Old cows
- Cows with poor disposition
- Poor performing cows
    - Cows that consistently wean calves in the bottom ¼ or 1/3 of the herd every year over a two- to three-year period
        - If they are in the bottom for two to three years in a row, they are probably telling you something; the genetics don't quite fit the environment that you are asking them to perform in.

Using individual cow records in drought conditions comes in handy. It's difficult to cull on production in a commercial cow-calf operation. Once you cull open cows, those with bad udders, bad teats, feet and legs, or poor disposition, you don't have a lot of room to cull on the quality of calf that the cow raises. Drought is a situation to cull cows on performance. Again, if depopulation is a management strategy, make the decision prior to the time that everyone else culls cows so you don't have to market when there is a high supply of cull cows entering the market, causing a depression in price.

**Cow/calf – Yearling Operations**

Cow/calf – yearling operations have a "built-in" drought management plan. In these operations, when drought occurs, the yearlings can either be sold or retained into the feedlot to reduce the need for pasture. This may free up enough grass to have all cows remain at location and early weaning and cull strategies may not need to be implemented.

## Relocating Cows to Reduce Pasture Needs

Relocation may include all or part of your herd. If there are guidelines based on moisture received by a certain time of the year as it relates to forage production in pastures, use this information to help make relocations decisions. Using this information will give a pretty good idea if it is necessary to relocate all or part of the herd. Relocation would include securing pastures elsewhere, securing/building pen space on your location (make sure the pasture used as a sacrifice pasture can be easily renovated), or securing pen space in a feedlot (in the summer time, the numbers in the feedlot go down and there may be an opportunity to bring cows into a feedlot).

**Relocation of Cows to Pasture Within or Out of State**
When relocating the cow herd to another location within the same state or another state, producers need to go through a checklist:

- Who is responsible for checking on the cattle?
- Who is responsible for checking on the water?
- Who is responsible for checking the mineral/salt?
- Who is responsible for checking and repairing fence?
- Who is responsible for doctoring sick cattle?
- If cattle are transported across state lines, are there any restrictions or health information needed before they can be transported?

Have a biosecurity plan for cattle that leave your location, especially if part of the herd is relocated and part of the herd remains on your location. Consult with your veterinarian to develop this plan. The diseases that were once regional now appear to be more wide-spread. When cattle are relocated, are they going to be co-mingled with another group of cattle? If you relocate part of your herd, when they are brought back to the ranch, can they be quarantined from the rest of the herd for some period of time from a biosecurity standpoint to make sure they are free of disease?

**Relocating Cows to a Feedlot**
Feedlots may be an option to relocate cows during a drought for spring and summer. Before relating to a feedlot, cow-calf producers need to know:

- Diet that will be fed and cost.
- When and how often they will receive and when they need to pay their feed bill.
- What other costs will they be charged?
    - What is yardage?
- Who determines health treatment?
- Biosecurity – will there be other cows fed with their cows? How will your cows be separated from their feeder cattle?

It is a challenge for feedlot managers not to try to "fatten" the cows. Cows fed in a drylot need to be fed to achieve or maintain a body condition score of 5 (1= very thin; 9 = obese).

Conducting a breeding season in a drylot can be a real challenge. Try to get the breeding accomplished before the cows relocate to the feedlot. If this is not possible, AI may be an option. If AI is used, there will still need to be a natural service component, as not all cows will conceive to AI. Corner off a portion of the pen with an electric fence to allow calves to walk under the fence and to an area where they can get away from the breeding activity and not get hurt.

**Relocating Cows to a Sacrifice Area at Your Location**
Cows could be drylotted at the owner's location. A pasture could be sacrificed as a drylot for the cows. If the sacrifice area is a pasture, make sure it can be easily renovated. Sometimes summer annuals are planted as a feed source, and this field would

be a logical place to temporarily drylot some cows, as it would be easily renovated. Feed cows to a body condition score of 5.

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## Rations for Drylotted Beef Cow in Drought Conditions

Because forages are usually limited and expensive during drought, consider limit feeding the cows when they are drylotted. Limit feeding means that cows are fed a ration daily but the ration quality is such that a full-feed of the ration doesn't have to be fed to meet their nutrient requirements. As an example, a 1,200 lb cow being fed a ration that is average quality will consume 2-2.2% of her body weight daily on a dry matter basis. For ease of calculation, if she eats 2% of her body weight daily, that's 24 pounds of feed daily on a 100% dry matter basis. In a limit-fed ration, the density of the nutrients may mean that we can feed only 17 to 18 pounds of the ration on a dry matter basis to meet her nutrient needs. Forage cannot be totally eliminated from the diet. Data suggest that at least 0.5% of a cow's body weight on a dry matter basis be forage to maintain rumen health. If a cow weighed 1,200 lb, then the minimum amount of forage on a dry matter basis would be 6 lb/hd/da dry matter basis. If the forage is 90% dry matter, 7 lb/hd/da (6l b/hd/da divided by 0.90 = 6.67) of this forage needs to be in the diet.

The forages in these rations are needed to reduce rumen function problems, maintain rumen integrity, and keep the rumen healthy. Lactating cows with high milk ability will need more grain compared to cows that give less milk. Distillers grains and distillers grains mixed with forage combinations can be used in limit-fed diets. Limit-fed diets that include distillers grains and forage are in the 2009 (pg 11) and 2012 (pg 13) Nebraska Beef Report.

If you feed a limit-fed diet, some considerations are:

- The machinery to deliver it.
- If you set yourself up at your place, leave plenty of bunk space -- about 24-36" per head.
- Be consistent with the amount of feed delivered daily. If the rations calls for 12 lb/hd/da of corn, that doesn't mean that you feed 6 lb one day and 12 lb the next. Be consistent in regard to the amount and energy source you deliver.
- If a supplement is needed, include an ionophore, which is helpful for acidosis and increases feed efficiency.
- Do not finely grind the forage or grain. Long-stem hay will slow down rate of passage and limit-fed cows will feel fuller for a longer period of time.
- Consider sorting young cows from older cows.

Limit-fed diets are hard to balance for nutrients using low quality forages and grains such as corn without adding a protein supplement. Limit-fed diets with low quality forages are easy to balance using grain byproducts like distillers grains.

Cows being fed a limit-fed diet will act hungry and gaunt for the first week. For that first week, consider splitting the total ration in half and feeding cows twice daily. Thereafter, feed once daily. The limit-fed diet is designed to meet nutrient requirements without the cows consuming all that they eat in a day. Usually after about a week to 10 days cows adapt to this feeding regiment. If it takes longer for them to adapt, put a bale of straw in the pen. Feed salt and mineral free choice. Cow-calf producers aren't used to including calcium in the diet. When feeding high grain diets or distillers grains, some calcium will need to be added to the diet.

Feeds for cow rations would include CRP hay, straw, corn stalks, corn, silage (droughted corn would work), byproducts (distillers, gluten, wheat mids, soy huls) and milo. Do not finely grind the grains; this may cause them to be digested too rapidly in the rumen and cause acidosis or founder.

## Feeding/Forage Options for Drought-damaged Corn Fields

Corn that has been affected by drought can be used as a feed for cattle. Before harvesting for something other than the grain, check with your crop insurance person to determine what needs to be considered to make sure that the field can be put up as a forage crop and still receive any insurance that is possible. The drought-damaged corn plant will likely contain nitrates. Data indicates that the nitrates reside in the bottom 6 to 8 inches of the stalk. Use management strategies to reduce cattle losses due to high nitrates in feed.

### Silage

A drought-damaged corn field can be salvaged as corn silage. Harvesting the drought-damaged corn field as silage will reduce nitrates by 30 to 60%. To reduce the nitrates through the ensiling process, allow the silage to go through the 21-day fermentation process before opening the bunker to feed. Ideal moisture content of the silage for packing into a bunker is 65% (35% dry matter), with a range of 62 to 68% moisture. This is critical when making silage. If the silage is too wet, there will be excessive seeping and spoilage, and proper fermentation will not occur. If the silage is too dry, it will be difficult to pack and create the anaerobic (with oxygen) conditions necessary for the fermentation process.

It is difficult to determine when to chop a drought-damaged corn field for silage. The green chop may be as high as 80% moisture, which is too wet to pack into a bunker. At this moisture content, let it continue to dry in the field or windrow the field, and let it wilt in the field until the desired moisture content is achieved for chopping and packing into the bunker.

To determine the moisture of the standing crop, select some stalks and cut them at the same height that the chopper will be set. Cut the stalks into small pieces (about 1 inch)

using a cleaver or heavy knife, mix the sample and then analyze the sample for dry matter using the microwave. Take a sample from some of the chopped material, weigh the sample then dry it down in a microwave. Reweigh the sample to determine the moisture. Microwave slowly so as not to "burn" the sample. Microwave and weigh until there is no change in weight of the sample after microwaving. This process requires a scale that can accurately weigh small amounts of material and changes in weight due to water.

A quick-and-dirty method of estimating time to harvest a drought-damaged corn field is to use the "squeeze test." Select a few stalks (like described in the previous paragraph) and chop them into pieces about the same size that the silage chopper would using a heavy knife or cleaver. Grab a hand full of the chopped material and squeeze it for 30 seconds. If the juices drip from the material, it is too wet. In this situation, wait to chop in a couple of days or test again in a couple of days. If the sample doesn't drip any juices from the squeezed material, slowly open your hand:

- If the stalk material remains compacted and doesn't fall apart, the moisture level is acceptable for ensiling.
- If your hand is not wet and the stalk material falls apart when you open your hand, the material is too dry to ensile.

If the chopped silage is too wet:

- Stop chopping and allow the field to dry; OR
- Add whole corn, dried distillers grains, or ground dry forage.

To avoid the nitrates, the chopper head could be set to leave 8-inch stubble. This will result in a reduction in yield. The ensiling process will reduce nitrate 30 to 60%, so a compromise is leaving 6-inch stubble.

Droughted corn silage will be 85 to 95% the energy value of regular corn silage. The protein content will be slightly greater than regular corn silage. Before feeding, sample and test for moisture, energy (TDN), crude protein, and nitrates.

Pricing droughted corn silage is a bit of a challenge. Rule of thumb has been that each ton of 65% moisture corn silage in the bunker is priced at 9 to 10 times price of a bushel of corn (normal, well-eared corn). Pricing the standing crop is a little more difficult to determine. Some have priced it in the field at:

1. 5 times price of a bushel of corn (earless corn).
2. 7 to 8 times price of a bushel of corn (low grain corn – less than 100 bu/A).

Harvest costs on a per ton basis from drought-damaged corn undoubtedly will be higher than normal due to lower tonnage yields per acre. NebGuide Resources: Estimating Corn and Sorghum Silage Value; The Use and Pricing of Drought-Stressed Corn.

**Green Chop**

The droughted corn field could be salvaged as green chop. The field is chopped daily and fed daily. Set the chopper head to leave at least an 8-inch stubble to avoid some of the nitrates. Nitrates will be a concern. Do not allow the green chop to heat in the wagon. This will cause nitrates to be converted to nitrites and nitrites are 10 times more toxic than nitrates. Observe cattle frequently while they are eating the green chop.

**Baling**
The droughted corn field can be salvaged as hay. Nitrates are still a concern; consider leaving an 8-inch stubble, as a major portion resides in the bottom part of the stalk. One of the challenges is to get the hay dried down enough to make a good bale. Leaving an 8-inch stubble will allow air movement around the underneath side of the windrow close to the ground to help the drying process. Crimping the stems will help in the drying process. Before feeding, take a sample and test for moisture, energy (TDN), crude protein, and nitrates.

**Grazing**
Grazing the droughted corn field is a way to extend the grazing season. Introduce livestock slowly to this new forage by feeding them hay before turning in to reduce the chances of digestive problems. Nitrates are still a possible problem, so don't force cattle to consume the bottom part of the stalk. Acidosis could be a concern depending on the amount of ear development. Adapt cows and access may need to be limited depending on the amount of ear development and grain. Reduce losses due to trampling by cross-fencing and allowing cattle access to only enough feed for a couple of days of grazing. A watering source or system will need to be developed.

**Windrow Grazing**
Windrow the droughted field and leave windrows in the field for winter grazing. Nitrates are still a concern; consider leaving an 8-inch stubble, as a major portion resides in the bottom part of the stalk. Leaving an 8-inch stubble will allow air movement around the underneath side of the windrow close to the ground to help the drying process. Nitrates can still be a concern, so fill cattle up with a forage low in nitrates before allowing access to the windrows. Acidosis could be a concern depending on the amount of ear development. Adapt cows and access may need to be limited depending on the amount of ear development and grain. When feeding the windrows, fence off enough for a couple of days feeding to avoid wasting a lot of the forage.

## Grazing Summer Annuals

Sometimes during drought, summer annuals such as millets, sudangrass, and canes are available as feed for cows. There may be the opportunity to harvest them as a forage crop. Some of these forages may have been grown under drought conditions. **If summer annuals are going to be grazed, use the following "thumb rules:"** fill cows up with hay prior to the turnout on the summer annual; don't force cattle to eat the base of the stalk (nitrates are going to accumulate in the lower 4-8" of the stalk); wait to graze until it's at least 18-24" tall to avoid problems with prussic acid. If summer annuals go through freezing temperature, wait for about 5-7 days after freeze so you get around prussic acid. Be aware that there is a greater concentration in new growth. The wilting process will reduce the prussic acid content of the annuals.

**Substituting Pasture with Feed for Cows Grazing Pasture**

There has been very little interest in replacing pasture with another feed during the spring/summer while cows are grazing pastures, other than supplementing cows with salt and minerals/vitamins, and rightfully so because the nutrient quality of cool- and warm-season pastures, in most cases, is high enough to meet the energy and protein needs of lactating cows. However, if forage production in a pasture is limited due to drought or availability of pasture is limited due to high price or high demand, replacing pasture with feed may be an economical alternative. For producers to consider using feed to replace pasture while cows are still grazing the pasture:

1. They must have the labor and equipment to deliver the feed.
2. To reduce feeding losses, consider feeding in bunks. However, providing the forage replacement on the ground would allow producers to move the cattle around the pasture to improve grazing utilization of the pasture while reducing erosion due to trampling around a single feeding location.
3. It must be cost effective and feeds must be relatively cheap compared to total pasture costs.
4. The feeds used as the substitute for pasture must not have a negative effect on forage digestion because part of the diet is forage from the pasture.

The thought process of replacing pasture with feed for cows grazing pasture would be to replace (substitute) some of the forage/pasture daily intake by the cow with an economical feed that doesn't have a negative effect on forage digestion. If this could be done, stocking rate could be increased on the pasture resource, which would spread pasture costs over more cows or the available pasture could be "stretched" and used for a longer period of time. In theory, the rumen has a certain capacity, and once filled, cattle will stop eating. So part of the rumen would be filled with feed other than grass from the pasture they are grazing. This management strategy cannot have a detrimental effect on pasture longevity and sustainability.

Harvested forages such as alfalfa, grass hay and summer annuals could be used in a grazing situation to replace grazed forage and not have a negative impact on the total digestibility of the diet. The challenge using harvested forages to replace pasture is that harvested forages are usually expensive, especially in drought conditions. A second challenge is to get cows to eat the harvested forage instead of vegetative grass in the pasture. Cows likely won't consider eating the harvested forage until grass in the pasture is depleted. If there is daily access to a loafing area where the cattle could be gathered and fed the harvested forage before turning them out to pasture, then consumption of the harvested forage may be possible. This practice would take labor and fuel in addition to the feed and equipment to deliver the feed.

Grains, such as corn, are not a good choice, even if they were cheap as a feed substitute for cows grazing pasture. Data suggest that grains have a negative associative effect on forage digestion. Grains are high in starch, and feeds that are high in starch tend to lower the pH of the rumen and make it an acid environment, which promotes an increase in

microbes that digest grains, not forages. The consequence of this is a decrease in forage digestibility.

We have studied supplementing mixtures of wet distillers grains mixed with low quality hay or crop residue to grazing cattle in an attempt to replace grazed forage, without removing the cattle from the pasture. Corn distillers byproducts are very palatable, and mixing them with low quality forage or crop residues has been shown to increase consumption of low quality roughage, and when fed to cows grazing pasture, will replace pasture consumed. The amount of the pasture replacement has been variable. In one study, each pound of the 45:55 ratio of WDGS:grass hay mix consumed by cows replaced 0.22 lb of the grazed forage. This is lower than the targeted goal of 50% pasture replacement that was planned. This potentially could have negative impacts on native range health if it were stocked at a rate with cows with an assumed 50% replacement rate. The fiber content of the mix may not have been high enough to provide enough bulk to limit grazed forage intake as desired. In another study, cow/calf pairs grazed pasture and received either 50:50, 40:60, or 30:70 WDGS:wheat straw supplementation at 50% of the estimated dry matter intake. The 30:70 WDGS:wheat straw treatment almost replaced grazed forage on a 1:1 basis. As the amount of WDGS increased in the supplement, the amount of replaced grazed forage decreased. For producers with crop residues in close proximity to their cattle, the 30:70 WDGS:residue combination may be a viable option to reduce grazed forage intake. Studies indicate that a blend of 30:70 WDGS:roughage appears to be the optimum blend to get the most forage replacement. Using this combination of byproduct:forage, producers could plan that for every dry matter pound of the combination fed, 0.5 to 1.0 lb of forage in a pasture on a dry matter basis could be replaced. Resources: Crop Residues or Low Quality Hay Combined with Byproducts as a Forage Substitute, NebGuide G2099; Byproducts with Low Quality Forage to Grazing Cattle and research results in the 2012 NE Beef Report (page 53).

## Secure Feeds for Fall and Winter

Sampling and testing forages for quality should be an annual management practice. In years of drought, forage quality can be much different than in the past from the same hay fields. Before feeding forages or silage, test them for moisture, energy (TDN), crude protein, and NITRATES. Knowing the nitrate content allows the use of other forages to be included to dilute the nitrates to safe levels before feeding if needed. Avoid livestock losses due to nitrates by managing around high levels.

### CRP Hay

CRP hay will vary in quality depending on the type of grass (warm- or cool-season grass) and the amount of dead material in the field. Nitrates will typically be of minimal concern.

### Corn Stalk Bales

Corn stalk bales can vary in quality. If husk and leaf are the primary components of the bale, the bales will be 82-85% dry matter 52-54% TDN, and almost 5.5-6.5% crude protein. This is almost as good as some average quality grass hays. As the amount of

stalk increases in the bale, quality decreases. Drought-damaged corn fields can be swathed and baled. Quality and nitrate level will vary. Quality will depend on the amount of leaf and corn in the bale.

**Straw**
Straw will typically be 4% crude protein and 40% TDN. For cows, it will work in diets that include distillers grains or corn silage. If straw is fed with corn, a protein will likely need to be included.

**Soybean Stubble**
Soybean stubble is a challenge to work into cow diets. It can be used to stretch a high quality forage such as alfalfa. Remember that soybeans are a legume, and as legumes mature, they increase in lignin content. Lignin is not digested in the rumen.

**Grazing Crop Residues**
Crop residues are a good feed for beef cows. In drought years, dry-land corn fields are likely harvested as silage, hayed, green chopped, or grazed. In Nebraska, there are more than enough irrigated corn fields for cattle to graze in the late fall and winter. Securing corn stalks for winter grazing should be considered early and arrangements made with the row crop producer. Stocking rate when a corn field is grazed is a function of grain yield. There is a nice spreadsheet to help determine stocking rate on our beef website: http://beef.unl.edu/learning/cornStalkGrazingCalc.shtml

## Forage Feeding Losses

If you do get into feeding harvested forages, make sure hay waste is minimal because hay is expensive. Waste is a function of how tightly the bale is wrapped and how the bale is presented: loose on the ground, in a windrow, bale processor, in a bale feeder with skirts, or in a bunk. There can be 5-35% waste depending on how the hay is fed. Losses need to be accounted for when rations are developed. Management strategies to reduce hay feeding waste/losses can increase the need for equipment.

## Nitrates

Usually cattle die from nitrates when they are hungry and get exposed to hay with high nitrates. Cattle can be adapted to nitrates in feeds/forages. Giving cows time to establish microbes that convert nitrites to ammonia by feeding small portions of the moderate/high nitrate feed over a week to 10-day period will help them adapt to nitrates in feed. Nitrates in the blood stream convert hemoglobin to methemoglobin, and methemaglobin will not carry oxygen.

**Nitrite change hemoglobin to methemoglobin**

- Methemoglobin can't carry oxygen.
- Blood is chocolate brown.
- Bluish coloration of unpigmented skin, mucus membranes.
- Animal dies due to lack of oxygen.

Treatment of cows with nitrate toxicity includes: Methelene blue IV (converts methemoglobin back to hemoglobin) or purge the rumen with saline or Epson salts.

Understand how the nitrates are reported in an analysis and the potentially toxic levels:

- Nitrates ($NO_3$) – 10,000 ppm, potentially toxic
- Nitrate Nitrogen ($NO_3N$) – 2,200 ppm, potentially toxic
- Potassium Nitrates ($KnO_3$) – 16,300 ppm, potentially toxic

High-nitrate feeds need to be combined with low-nitrate feeds to dilute nitrates to a safe level to reduce the risk of cattle losses to nitrates.

Editor's Notes: Referenced Beef Reports are available at http://beef.unl.edu/reports. Other Institute of Agriculture and Natural Resources publications available at http://www.ianrpubs.unl.edu.