## Ag & Natural Resources Of Cows and Plows FRANKLIN COUNTY COOPERATIVE EXTENSION AUGUST 2024 NEWSLETTER



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## MANAGING NITRATES AND PRUSSIC ACID IN FORAGES

Dr. Chris D. Teutsch, University of Kentucky Research and Education Center at Princeton

Nitrates can accumulate to toxic levels in commonly grown forages. This most often occurs when heavy nitrogen fertilization is followed by drought. Nitrates are taken up by the plant, but not utilized since plant growth is restricted by the drought. Any factor that slows plant growth in combination with heavy nitrogen fertilization can result in nitrate accumulation. Some plants tend to accumulate nitrates at greater rate; these include, but are not limited to commonly used summer annual grasses, corn, crabgrass, small grains, annual ryegrass, bermudagrass, Johnsongrass, tall fescue, and some annual and perennial weeds commonly found in pastures and hayfields.

In contrast to nitrates, prussic acid or hydrogen cyanide can be formed in commonly used sorghum species such as forage sorghum, sorghum-sudangrass hybrids, sudangrass, and Johnsongrass. Under normal conditions these forages contain little free cyanide. However, when freezing, drought stress, wilting, or mechanical injury damages plant tissue, an enzymatic reaction occurs and free cyanide is produced. Being aware of the factors that can result in accumulation of nitrates or the formation of prussic acid and using alternative forages during these periods will reduce chances of livestock losses.

### Nitrates

In cattle, nitrate is converted to nitrite in the rumen, and the nitrite is absorbed into the blood stream. Nitrite interferes with the blood's ability to carry oxygen. Symptoms of nitrate poisoning include trembling, staggering, rapid and labored breathing, rapid pulse, frequent urination followed by collapse, coma, and death. The onset of symptoms and death is rapid and usually occurs within one to two hours. Most often, animals are simply found dead. In animals affected by nitrate poisoning, the blood will take on a brownish chocolate color, giving the non-pigmented skin and mucus membranes a muddy brown color.

The following practices can help to reduce nitrate accumulation in forages and manage the risk associated with feeding high nitrate forages:

• **Split nitrogen applications.** Applying smaller applications of nitrogen throughout the growing season will reduce the risk of nitrate accumulation in forages.

• **Delay harvest or grazing after a drought ending rain.** Nitrates are often the highest just after plant growth resumes. Grazing or harvesting should be delayed for 7 days after a drought ending rain.

• Raise cutting or grazing height. Nitrates tend to accumulate at higher concentrations near the base of the plant. Raising your cutting or grazing height from 2-4 inches to 6-8 inches can significantly reduce nitrate concentrations in the forage tissue that is being conserved or ingested. For corn silage and forage sorghum, raising the cutting height even more (12-16 inches) can help avoid high levels of nitrates.

• **Test all suspect forages.** All forages that may contain high levels of nitrates should be tested at a qualified lab. Several labs are listed at end of this article.

• **Segregate all forages high in nitrates.** Once identified, forages high in nitrates should be clearly marked and separated from low nitrate forages if possible.

• **Harvest forage as silage if possible.** Ensiling high nitrate forage can reduce nitrates by 40 to 60%. Silage should be tested before feeding to confirm nitrate levels.

• **Nitrates are stable in hay.** Nitrates do NOT decrease over time in dry hay. This means that you can kill livestock months or even years later. If you suspect nitrates in your hay, make sure to test it.

• Avoid feeding high nitrate forage to susceptible animals. Feeding high nitrate forage to animals that are in poor condition and under stress, or are pregnant, lactating, or sick is especially risky and should be avoided.

• Limit the intake of high nitrate forages. Guidelines for feeding high nitrate forages can be found in Table 1. The best way to feed high nitrate forages is in a total mixed ration. This reduces the animal's ability to select individual components. If feeding a total mixed ration is not possible, then limit access to the high nitrate hay in a manner that allows livestock to consume 50% or less of their total daily dry matter requirement. A high energy supplement that is balanced for the ration should be fed PRIOR to hay feeding. Simply unrolling one bale of low nitrate hay and one bale of high nitrate hay is NOT an adequate way to feed high nitrate hay.

• Supply free access to clean, nitrate- free water. In addition to clean water, make sure to provide access to high quality mineral and vitamin supplement.

Nitrate Concentration <sup>b</sup> For		Forage Status	Comments	
%	ppm			
0-0.25	0-2,500	SAFE	Generally considered safe.	
0.25-0.5	2,500-5,000	CAUTION	Generally safe for cattle. Be cautious with pregnant and young animals when nitrate concentrations approach 5,000 ppm and dilute with other feeds.	
0.5-1.0	5,000-10,000	DANGER	Dilute with other feeds and introduce slowly. Consider options to reduce nitrate in fresh forage (ensiling, delayed harvest, other). Limit to a maximum of 50% of the total dry matter in pregnant animals.	
Over 1.0	Over 10,000	TOXIC	Very dangerous; can cause acute nitrate poisoning and death in cattle. Do not feed.	

### **Prussic Acid**

A potential problem with sorghum, sudangrass, sorghum-sudangrass hybrids, and naturally occurring Johnsongrass is prussic acid or cyanide poisoning. Under normal conditions these forages contain little free cyanide. However, when plant tissue is damaged by freezing, drought or mechanical injury, an enzymatic reaction occurs, and free cyanide is produced. If forage is ingested during this period, cyanide is readily absorbed into the bloodstream where it interferes with normal cellular respiration. Symptoms of cyanide poisoning are like nitrate poisoning and include labored breathing, excitement, gasping, convulsions, weakness, prostration and death. The onset of symptoms and death is very rapid, occurring in minutes to several hours. In contrast to nitrate poisoning, the blood of animals affected by cyanide poisoning is fully oxygenated and bright cherry red in color.

Note: Pearl millet, corn, crabgrass and most other commonly used forages DO NOT form prussic acid. In most situations, Sorghum species (including Johnsongrass) pose little danger to grazing animals when properly managed.

The following guidelines will help to reduce the risk of prussic acid poisoning:

- •Avoid grazing young plants and new growth. Young plants or regrowth after grazing contain higher concentrations of prussic acid and should not be grazed until plants have reached a height of 20-30 inches.
- •Avoid grazing drought stressed plants. Drought stressed plants should not be grazed until growth has resumed after a drought breaking rainfall (usually 7 days).
- Avoid grazing frosted plants. Plants that have been frosted should not be grazed for 7-14 days or until the leaves are dead and dried out. Early frost may only affect certain portions of field, so additional frosts may result in toxic forage in other areas of the field.
- •Make sure hay is properly cured before baling. Cyanide does escape from plant tissue; therefore hay that has been properly cured is safe to feed. Properly ensiled forage is also safe to feed.
- •Feed green chop in timely manner. If the green chop is allowed to wilt or heat, cyanide is released, and the forage becomes toxic.
- •Feed good quality hay or silage BEFORE grazing questionable forages. Never turn hungry animals into questionable forage. Filling animals up with a good quality dry hay or silage before giving them free access to questionable forage can reduce rapid consumption of large quantities of potentially toxic forage.
- •Use tester animals to evaluate questionable forages. It may be advisable to allow several lower value animals to graze or consume questionable forage before allowing the entire herd to graze potentially toxic forage.

For more information on managing nitrates and prussic acid in forages contact your local extension office or veterinarian.

Additional information about nitrate and prussic acid poisoning can be found in the following references: Arnold, M. and M. Romano. 2022. ID-217, Forage-related Disorders in Cattle: Nitrate Poisoning. UK Cooperative Extension Service, Lexington.

Michelle Arnold and Cynthia Gaskill. 2022. ID-220, Cyanide Poisoning in Ruminants. UK Cooperative Extension Service, Lexington.





STATE FAIR IS THIS MONTH!



Kentucky Forage and Grassland Council

# KFGC Field Day-Makers Mark Farm August 13

The Kentucky Forage and Grassland Council and Marion County Extension Field Day will be held Tuesday August 13 at Star Hill Farm from 4:30-7:45EDT in Loretto Kentucky. Participants will see and learn about grazing warm season cover crops, rotational grazing, native warm season grasses and pollinator production as well as sorghum production for syrup and silage. UK Extension Specialists, Maker's Mark staff, and others will highlight forage production innovations at the farm at multiple tour stops.

Star Hill Farm is the home of Maker's Mark Distillery. Star Hill consists of approximately 1200 acres near Loretto in Marion County Kentucky. Approximately 300 acres of the farm is utilized to grow wheat and barley for use in Maker's Mark innovation products. Additionally, the farm is home to production of vegetables, fruit, lamb, Wagyu beef, sorghum, honey, mushrooms and truffles for use at the Distillery's restaurant.

Makers Mark has a strong commitment to the environment and sustainability. An important part of this is practicing regenerative agriculture to improve and restore soil and capture carbon. The principles of regenerative agriculture includes utilization of no-till planting, planting cover crops on fields after harvest, and grazing the cover crops to cycle nutrients back into the soil. Star Hill Farm has been certified by "Regenified," an international organization that conducts on-site audits to determine that an entity is meeting all of the standards for Regenerative Agriculture.

Come learn more about grazing strategies and regenerative agriculture! A meal will be provided for participants at the end of the field day at the restaurant. Field day cost is \$20 per person. Register for the Field Day on the link below: <a href="https://KFGCMakersMark.eventbrite.com">https://KFGCMakersMark.eventbrite.com</a>

Registered participants can also sign-up for the 'Whisky Creek Walking Tour' of the distillery at the link below (limited spots available): <u>https://app.anyroad.com/tours/kfgc-whisky-creek-walking-tour-loretto/s-57b4f029</u>

Address: Star Hill Farm at Maker's Mark, 3350 Burks Spring Road, Loretto, KY, 40037

For more information phone the Marion County extension office at 270-692-2421.

# 2024 CENTRAL KENTUCKY HAY CONTEST

# **TEST YOUR HAY!**

Testing provides nutritional value of hay to assist in balancing rations, and can result in reduced feed cost, increased animal performance, and information to improve forage stands.

Free analysis to determine hay quality and livestock needs.

Call the Franklin County Extension Office to sign up. 502-695-9035



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presented by: Franklin County Farm Bureau, Franklin County Extension Office, Franklin County Conservation District, & Frankfort Area Chamber of Commerce

## Special THANK YOU to our farm host:



# THANK YOU to our 2024 sponsors:



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# 64th Annual Farm City Field day was a great success!

Farm City Field Day had it's start in 1958 at the Smith Farm in Bridgeport. From what I understand, it began as a way to share cutting edge research with local farmers and demonstrate new practices. It has continued and evolved over time.

Not that many years ago the Field Day educational tour reached a milestone – tobacco production was not on the agenda. Burley used to be a main stay for our county. It was a high value crop that every farm could grow a bit of to pay the bills and some years maybe have a little extra. In it's heyday of the 1980s there were over 600 farmers growing burley tobacco. This year, to my knowledge, there is 1.

The Jones' family, our 2024 Farm City Field Day hosts, saw the writing on the wall several decades ago and decided to diversify. They added vegetable production to their farm enterprises.

Now, while they no longer grow tobacco, they do still have beef cattle, forages and some row crops as well as other satellite agricultural enterprises to supplement the three generations that farm today.

This year's Field Day was fairly unique as it focused solely on large scale vegetable production, highlighting the roughly seven acres in production. Stops included: History & Evolution of Happy Jack's, Ecological Benefits of Farming, Vegetable Disease Management, Economics of Plasticulture and a Restaurateur's POV on serving Local Products. A major benefit from this year's host was that all the sides came from the farm! Truly a farm to fork experience.





## WHEN WILL THERE BE AN ANSWER FOR PINKEYE?

### By Dr. Michelle Arnold, DVM

Pinkeye or IBK (infectious Bovine Keratoconjunctivitis) is a costly disease for cattle producers. The cost of treatment coupled with the fact that affected calves wean off on average 15-30 pounds lighter and bring less at the market due to corneal scarring make this disease a significant economic consideration. Despite all we know about how pinkeye develops, control programs are often only partially successful. In particular, pinkeye vaccines seem marginal at best in preventing outbreaks during the summer. It is important to understand that many factors are involved in the development of pinkeye including environment, season of the year, concurrent disease, the strain of bacteria involved, and the animal's immune system. Once pinkeye begins, it is highly contagious and can spread rapidly within the herd. Careful attention to control of contributing factors and prompt treatment in the face of an outbreak are necessary to reduce the spread and limit the damaging effects of the disease.

It is widely accepted that the most important risk factor in pinkeye is the bacteria Moraxella bovis or M. bovis.

It attaches to the eyeball (cornea) by hairlike projections called "pili" and produces toxins that cause the eye to ulcerate and melt (liquefy). It is against this Moraxella organism that we vaccinate with commercial pinkeye vaccine products such as Piliguard, Vision 20/20, Alpha 7/MB-1, I-Site XP, Pinkeye Shield, Ocuguard and SolidBac. One reason for vaccine failure is a recently discovered second strain of bacteria, *Moraxella bovoculi*, that is now being isolated from pinkeye



cases but is not included in any commercial vaccine preparation. Consequently we are not getting full protection against the bacterial causes with commercial vaccines. The two most important contributing factors to pinkeye following bacteria are UV light (sunlight) and face flies, both of which can damage the corneal surface and allow the Moraxella species to attach to the surface of the eyeball and grow. Face flies also serve as vectors to spread the bacteria throughout the herd. One study found the Moraxella bacteria can survive on the legs of face flies for up to three days. Other risk factors that can initiate infection by eye irritation include dust, trauma or injury, wind, tall grass, thick stemmed hay, high ammonia levels and stress. Many different combinations of these factors can occur within one herd at one time. For example, a combination of *M. bovis*, face flies and sunlight may cause pinkeye in one group of cattle in one pasture while tall grass with seed heads, *M. bovoculi*, and sunlight may combine to cause problems in another group on a different pasture. In this situation, good fly control and vaccination will significantly decrease the cases of pinkeye in the first group of cattle, but the second group will not show much improvement. This explains why in some years control measures seem to work well and in others they seem to be completely ineffective. Vaccination may reduce the incidence of disease but seldom stops it completely, especially in herds where pinkeye is associated with both *Moraxella bovis* and *Moraxella bovoculi*.

As producers, what can you do to prevent pinkeye? The best plan is to reduce or remove as many risk factors as possible in order to keep the eyes healthy and better equipped to fend off disease. An overall good level of nutrition, adequate trace mineral intake, a comprehensive vaccination program, and parasite control are all exceptionally important in improving cattle's ability to fight off any disease process (not just pinkeye). Prevent eye irritation with good face fly control, mow tall grass, and reduce sources of stress (such as overcrowding/ overgrazing) if possible. Control face flies with ear tags impregnated with insecticide and topically administered insecticides by way of back and face rubbers or dust bags they must walk under to get to water or mineral. Provide shade to protect from UV rays. Clean drinking water (instead of stagnant pond water) is critical because the precorneal tear film is essential in eye defense mechanisms. Intake is greater with clean water and this helps provide plenty of fluid in the eye, especially in dry, dusty, and/or windy conditions.

### AG & NATURAL RESOURCES

Vaccination may prove beneficial, depending on the bacteria involved. In the face of a pinkeye outbreak, preventing transmission is the single most important factor in controlling the disease. Immediate detection and isolation of affected animals coupled with prompt treatment are necessary to reduce the spread and limit the damage to the eye. Long acting antibiotics such as LA-200, Draxxin, Nuflor, and Excede are recommended to treat the infection and can often be effective with a single dose. Treatment also reduces the duration of the carrier stage when recurrence and transmission most often occur. Your veterinarian can take cultures from affected eyes and send the swabs to one of several laboratories that can create a vaccine tailor-made for your farm (known as an "autogenous vaccine"). All cultures must be taken early in the course of disease, preferably when the eye is just beginning to tear (water) excessively.

Pinkeye is a tremendous summertime headache in Kentucky. The keys to prevention of an outbreak are maximizing your herd's immune status, minimizing the concentration of the Moraxella bacteria, and maintaining an irritant-free environment. Work with your veterinarian to devise an appropriate program for your farm.



# Jr. Cattlemen's Corner

The Franklin County Jr. Cattlemen have had a fun filled summer! They volunteered at Farm City Field day serving the meal, helped the Cattlemen serve at the Franklin County Fair and while at the fair participated in all the fair activities!

Anna Moore competed in the Fair Sheep show!



4-H Tractor and Lawn Mower contest! Congratulations to Brayden Roberts for winning both the county and area contest! He will compete at the state fair!



Three juniors competed in the doughnut eating contest. Brayden Roberts won in his age division and Jude Quarles won in his. Landon Moore just showed up for the free doughnuts.



The Master Cattleman program is the flagship educational program for Kentucky cattle producers. This program incorporates all aspects of beef production into a mid-level educational program developed to provide foundational knowledge to allow Kentucky beef producers to be competitive and successful. Participates will receive up to 40 hours of classroom instruction. \$100 per person \$125 per couple

5:30-9:00 PM	Location	Date	Topic
	Woodford	Spetember 3	Facilities
Limited	Jessamine	September 10	Breeding
Spots!	Jessamine	September 24	Nutrition
RSVP Today at	Woodford	October 1	Health
502-695-9035	Jessamine	October 22	Handling
	Woodford	October 29	Genetics

# **Going Solar!**

The Franklin County Extension District Board voted to take advantage of the Solarize Frankfort process and federal government rebates. We will be installing a solar photovoltaic (PV) and battery back-up system to supply nearly 100% of the office's net annual electricity needs.

The 45 kilowatt (AC) project will use 164 solar PV panels and four Tesla Powerwall batteries and is expected to save the Extension office over \$10,000 annually in electricity costs. Our office expects to receive a \$66,000 "Direct Pay" rebate from the Federal government for the \$165,000 project, enabling the project to break even in less than 10 years.

The 164-panel solar array is expected to supply 98% of the Extension office's net annual electricity needs, using a net metering agreement with Kentucky Utilities. The battery back-up system will supply critical loads during grid outages, enabling the Extension office to continue operations and offer community services during potential community emergencies.

We expect installation during the month of August. Please be patient with us during this process. Much of the rear parking lot will be restricted due to staging and access will be limited. If you're interested in the solar process, stop by and visit us along the way. Once completed we'll have a public monitor that will show how our panels are performing and real time status of the system. To learn more about Solarize Frankfort, visit <u>www.kyses.org/solarize</u>.





REMINDER!

### 5 free soil samples in the month of October!

## Start planning and watch for the coupon in the September and October newsletters!

Check out extension publication AGR- 16 to learn more about soil samples! <u>https://publications.ca.uky.edu/files/agr16.pdf</u>



## Broccoli and Beef Stir-Fry

4 tablespoons canola

1 medium red onion,

oil, divided

**1 pound** lean beef steak, sliced diagonally across the grain into thin strips

1 tablespoon plus ½ cup stir-fry sauce 1 clove minced garlic

- 1. Combine 1 tablespoon stir-fry sauce and minced garlic in a bowl. Add the beef strips. Let stand 15 minutes.
- Heat 1 tablespoon canola oil in a large skillet or wok.
  Return beef to skillet.
  Add beef and stir fry for
  Add the remaining ½
- one minute. **Remove** beef from skillet.

cut into ½ inch dice 1 sweet red pepper. cut into ½ inch dice 1 medium yellow 4. Heat the remaining 3

tablespoons canola oil in the skillet or wok. Add vegetables. Stir-fry for four minutes or until vegetables are crisp-tender. 5. Return beef to skillet. 6. Add the remaining ½

cup stir-fry sauce and red pepper flakes. **Cook** and

Buying Kentucky Proud is easy. Look for the label at your grocery store, farmers' market, or roadside stand.

squash, cut into ¼ inch slices 2 cups fresh broccoli florets 1 cup cauliflower florets ½ teaspoon crushed red pepper flakes

stir 1 to 2 minutes longer, until heated through. Yield: 8, 1 cup servings Nutrition Analysis: 180 calories; 10g fat; 1.5 g saturated fat; 0 g trans fat; 25 mg cholesterol; 630 mg sodium; 9 g carbohydrate; 2 g fiber; 3 g sugar, 15 g protein.

90% recommended allowance for vitamin C.

Keener Bisty

Keenan Bishop, County Extension Agent for Agriculture and Natural Resources Education



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Disabilities accommodated with prior notification.

Lexington, KY 40506