

March 2022

THE PANOLA EXTENSION

A Monthly Newsletter by the Panola County AgriLife Extension office



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UPCOMING EVENTS:

2/28-3/4: Panola County Junior Livestock Show, Expo Hall
3/1-4: First Annual 4-H Project Fair, Carthage Civic Center
3/1: Farm Bureau Scholarships Deadline
3/4: District 5 4-H Photography Contest Registration Due
3/3: Do Well, Be Well with Diabetes, 9:30am-12:00, Sammy Brown Library
3/10: 4-H Food Challenge practices begin, 5:30pm, Sammy Brown Library
3/11: Panola County Roundup Entries Due
3/15: Panola County 4-H Photography entries due
3/15: The Ronald Barlow Memorial 3-D Archery Meet registration opens
3/26: Panola County Roundup, 9:00am, Panola College
3/31: D5 Come Alive Entries Due
4/1: Panola County Jr. Livestock Show Scholarship Application Due
4/28-30: Come Alive in District 5, Tyler, TX
4/29: Mid-Sabine Cattlemen Conference, Carthage Civic Center, 8am
4/30: Spring Flowers ID & Photography 4-H Contest Registration Due
5/1: Registration for Fishing Skill-a-thon Summer Tournament open
5/14: The Ronald Barlow Memorial 3-D Archery Meet, San Augustine

In This Issue:

- National Nutrition Month: Eat a Rainbow
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- Management of Internal Parasites
- Timing is Everything
- Dealing With High Fertilizer Costs in Forage Production Systems

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TEXAS A&M
AGRI LIFE
EXTENSION





NATIONAL NUTRITION MONTH

Eat a Rainbow!

By Clarissa Moon

Why are fruits and vegetables in different colors?

“The color of fruits and vegetables is an important indicator of their nutrient content and their underlying health benefits” says Dr. Sumathi Venkatesh, a Health Specialist with Texas A&M AgriLife Extension Service. Each color implies specific phytonutrients present in them. Phytonutrients are natural compounds produced by plants that are present in foods such as fruits, vegetables, beans, and grains. Phytonutrients have antioxidant and anti-inflammatory properties. Consuming a diet rich in phytonutrients will improve blood circulation and heart health, promote bone and joint health, and strengthen the immune system to fight against infections and diseases.

There are five main color groups:

1) Red e.g., tomatoes, pink grapefruit, red peppers, watermelon, strawberries, cranberries, raspberries, cherries, red cabbage, apples, beets, red grapes, and red onions.

2) Orange and yellow e.g., carrots, yellow pears, yellow peppers, corn, winter squash, sweet potatoes, oranges, peaches, cantaloupe, and apricots.

3) Green e.g., asparagus, zucchini, artichokes, broccoli, avocado, green peppers, green beans, spinach, kale, kiwi, brussels sprouts, cabbage, green tea, and green herbs.

4) Blue and purple e.g., eggplant, purple cabbage, black beans, blueberries, blackberries, purple grapes, plums, prunes, figs, and raisins.

5) White and brown e.g., cauliflower, mushrooms, onions, parsnip, radish, garlic, leeks, black-eyed peas, and bananas.

Include a variety of colored fruits & vegetables in your diet!

For a 2000 calorie diet, you should eat at least 2 cups of fruits and 2½ cups of vegetables including dark green, red-orange, beans, peas, and lentils, starchy vegetables, and other vegetables. Simply fill half your plate with colored fruits and vegetables in fresh, frozen, canned, and dried forms to meet your daily recommended amounts. Try not to peel fruits and vegetables that have edible skin because the skin is a good source of dietary fiber, vitamins, minerals, and antioxidants. Many fruits and vegetables with seemingly inedible peels (like oranges) can actually be pureed whole and made into a juice. By doing this, you can even more nutrients that aren't always present in the “fruit” part. While preparing your shopping list try to include at least one fruit and one vegetable from each color. Eating home cooked meals as often as possible will allow you to cut your food cost and choose healthy ingredients for your meals.

DinnerTonight.org is a really good resource through Texas A&M AgriLife Extension. They have tons of recipes, useful tips for meal planning/management, food safety, and more. They also have a monthly newsletter with great tidbits!



FIRE ANTS IN VEGETABLE GARDENS



Over the past few weeks with more and more homeowners deciding to put in a vegetable garden your Panola County AgriLife Extension office has been fielding many calls for best management practice in dealing with the imported red fire ant. So, let's first look at what draws them to our gardens, simple; its the abundant moisture, rich organic soil, and the wide variety of foods available to them in gardens.

Being social insects, fire ants leave in a colony setting normally in outdoor settings. Fire ant mounds can be up to 18 inches tall and several feet in diameter. Each colony may contain one or more queen ants and more than 200,000 worker ants. Each queen ant lays as many as 800 eggs per

day. Worker ants forage for food and love to eat greasy or oily materials. In gardens, this includes oil-containing seeds, seed pods, and insects (pests and beneficial insects). They have been reported to feed on okra pods and tunnel into potato tubers, particularly during periods of dry weather.

In support of best management practice and in accordance with research trials conducted throughout Texas by Texas A&M AgriLife Extension agents the following chart outlines options and strategies available to combat fire ants in vegetable gardens. Remember that with all chemical products that the label is the law and it is recommended that you always read the product label before applying.

Hydramethylnon	Amdro Fire Ant Bait/Amdro Fire Strike/Amdro Yard Treatment	Not Approved for use in vegetable gardens but can be applied around and outside the borders so worker ants can take it back to colonies.
Abamectin	Clinch/Ascend/Varsity Award II, Enforcer Fire Ant Bait	
Fenoxycarb	Award	
Indoxacarb	Spectracide Fire Ant Killer Plus Preventer Bait Once & Done	
Spinosad	FertiLome Come and Get It	Approved for vegetable gardens.
Pyrethrins + Diatomaceous earth	Organic Solutions Multipurpose Fire Ant Killer/Dialect Results Fire Ant Killer	Effective mound drench at 4 tbsp per gallon water
Diatomaceous earth (DE)	N/A	
Bifenthrin	Ortho Bug B Gone Max/Ortho Max Lawn and Garden Insect Killer for Lawns/Over N Out/Bayer Lawn and Garden	Some of these products are approved against soil insects in garden, including fire ants, and may suppress foraging ants
B-cyfluthrin	Same as Bifenthrin	
Carbaryl	Sevin, various products	Read product label to determine if the product is approved for fire ants in the vegetable garden.
Acephate	Various, EX: Ortho Orthene Fire Ant Killer/Surrender Fire Ant Killer	



8 Things

You can do right now to protect your vision

By The National Eye Institute, nei.nih.gov

As you get older, your risk for some eye diseases may increase. But there's a lot you can do to keep your eyes healthy — and it all starts with taking care of your overall health. Set yourself up for a lifetime of seeing your best with these 8 tips!

1. Find an eye doctor you trust.

Many eye diseases don't have any early symptoms, so you could have a problem and not know it. The good news is that an eye doctor can help you stay on top of your eye health! Find an eye doctor you trust by asking friends and family if they like their doctor. You can also check with your health insurance plan to find eye doctors near you.

2. Ask how often you need a dilated eye exam.

Getting a dilated eye exam is the single best thing you can do for your eye health. It's the only way to find eye diseases early, when they're easier to treat — and before they cause vision loss. Your eye doctor will decide how often you need an exam based on your risk for eye diseases. Ask your eye doctor what's right for you.

3. Add more movement to your day.

Physical activity can lower your risk for health conditions that can affect your vision, like diabetes and high blood pressure. And bonus: it can help you feel your best. If you have trouble finding time for physical activity (normal!), try building it into other activities. Walk around while you're on the phone, do push-ups or stretch while you watch TV, dance while you're doing chores. Anything that gets your heart pumping counts!

4. Get your family talking... about eye health history!

Some eye diseases — like glaucoma and age-related macular degeneration — can run in families. While it may not be the most exciting topic of conversation, talking about your family health history can help everyone stay healthy. The next time you're chatting with relatives, ask if

anyone knows about eye problems in your family. Be sure to share what you learn with your eye doctor to see if you need to take steps to lower your risk.

5. Step up your healthy eating game.

Eating healthy foods helps prevent health conditions — like diabetes or high blood pressure — that can put you at risk for eye problems. Eat right for your sight by adding more eye-healthy foods to your plate! Try dark, leafy greens like spinach, kale, and collard greens. And pick up some fish high in omega-3 fatty acids like halibut, salmon, and tuna.

6. Make a habit of wearing your sunglasses — even on cloudy days.

You know the sun's UV rays can harm your skin, but did you know the same goes for your eyes? It's true. But wearing sunglasses that block 99 to 100 percent of both UVA and UVB radiation can protect your eyes and lower your risk for cataracts. So be sure to add sunglasses to your must-have list before you leave the house. Sunglasses? Check! Healthy eyes? Check!

7. Stay on top of long-term health conditions — like diabetes and high blood pressure.

Diabetes and high blood pressure can increase your risk for some eye diseases, like glaucoma. If you have diabetes or high blood pressure, ask your doctor about steps you can take to manage your condition and lower your risk of vision loss.

8. If you smoke, make a quit plan.

Quitting smoking is good for almost every part of your body, including your eyes! That's right — kicking the habit will help lower your risk for eye diseases like macular degeneration and cataracts. Quitting smoking is hard, but it's possible — and a quit plan can help. Call 1-800-QUIT-NOW (1-800-784-8669) for free support.



BROCCOLI IS A GREAT FOOD FOR EYE HEALTH!

It contains some key nutrients that are linked to eye health:
lutein, Vitamin C and Vitamin E.

→ BEEF AND BROCCOLI STIR FRY ←

<https://dinnertontnight.tamu.edu/?s=broccoli>

Ingredients

- 1 pound boneless beef top round steak cut into 3 inch strips
- 1 garlic clove minced
- 1 1/2 tablespoons ginger
- 2 tablespoons low sodium soy sauce
- 1 bunch broccoli
- 2 tablespoons olive oil
- 1/2 cup water
- 1 1/2 cups low-sodium beef broth
- 1 1/2 tablespoon corn starch

Instructions

1. Combine beef, garlic, ginger, and soy sauce in a bowl and let stand
2. Wash broccoli thoroughly and cut into florets
3. Heat oil in large nonstick skillet or wok over medium-high heat; add broccoli florets and then stir-fry for 2 minutes
4. Add 1/2 cup water and stir until water evaporates
5. Add beef mixture and stir fry for 3 minutes
6. Stir together broth and corn starch, add to meat and stir-fry until sauce is thickened, about 2-4 minutes longer.



Spring Flowers

ID & Photography Contest



Register by March 30
Submit photos by April 15



MID-SABINE CATTLEMAN *Conference*



April 29 - 8:00am

3 CEU's - Civic Center Conference Room

8:30: Welcome

8:45-9:45: Regenerative Agriculture Pasture Management – *Lee Dudley*

9:45-10:45: Pesticide Adjuvants 101 - *Shane Colston (1 general CEU)*

10:45-11:00: Break

11:00-12:00: Management of External Parasites in Beef Cattle - *Dr. Swiger (1 IPM CEU)*

12:00-1:00: Lunch

1:00-2:30: Weed Identification/Control Measures Weed ID Test - *Dr. Baron (1 general CEU)*

2:30: Meeting Concluded

SAVE THE DATE!

Pineywoods

Cattle Congress

May 20, 2022

4 Kings Cattle Ranch

San Augustine County - Fee: \$20



4-H Horse 
Validation

March 1 - April 15: \$10

April 16 - May 1: \$20



**District 5
Horse Show:**
May 31 - June 1
Athens, TX

Registration
opens April 9

Come Support the
Youth of Panola County
at the 2022

**Panola County Junior
Livestock Show
& 1st Annual
4-H Project Fair!**

FEBRUARY 28 - MARCH 4

**PANOLA COUNTY
JR. LIVESTOCK SHOW
SCHOLARSHIP**

Must be postmarked by

APRIL 1, 2022

Find the application under the
4-H tab on our website!

First Annual

PROJECT FAIR

Food & Nutrition - Arts, Crafts, & Fiber Arts - Clothing & Fashion
Photography - Clover Kids



Come check out our creativity!

SCHEDULE (FEB 28 - MARCH 4, 2022)

Tuesday: Check In Exhibits 5:00-7:00

Wednesday: Check In Exhibits 8:00-10:00
Closed Judging begins Wednesday at 1:00

Thursday: Open for public viewing, 9:00am-6:00pm

Friday: Open for public viewing, 9:00am-1:00pm
Pick Up Exhibits Friday 1:00-3:00





75th Annual Panola County Junior Livestock Show Event Schedule



February 28th March 4th

Monday February 28, 2022	5:30 - 6:00 pm Weigh-In for all PCJLS Steers & Bill Whitaker Rate of Gain Contest. Held at Carthage Veterinary Hospital
Tuesday, March 1, 2022	5:00 pm Ag Mechanics Projects in place & Checked-in
Wednesday, March 2, 2022	9:00 am Pen of Heifers Check-In 10:00 am Pen of Heifers Judging 1:00 pm Pen of Heifer Sale (All Heifers removed from barn following conclusion of sale) 2:00 - 4:00 pm Weigh-In Barrows 3:30 pm Market Broiler Check-In 4:00 pm Market/Breeding Rabbit Check-in 4:00 pm Market Broiler Show Followed by Market Rabbit and Breeding Rabbit Show 4:30 - 5:00 pm Weigh-In Market Lambs and Goats
<u>Pictures are to be taken immediately following judging of each species</u>	
Thursday, March 3, 2022	7:00 am Breeding Swine in place and Checked-in 8:00 am Judging Begins Market Barrows followed with Breeding Gilts 1:00 pm Judging Begins Market Lambs followed by Market Goats 2:00 pm Ag. Mechanics Judging Begins All Breeding Swine must be removed from the premises by 6:00 pm
Friday March 4, 2022	6:00 am All Breeding Heifers and Market Steers in place and Checked-in 8:00 am Ag. Mechanic Silent Auction Begins 8:00 am Judging Begins Pre-Junior Mini Herefords 8:30 am Judging Begins of Market Steers followed by Registered Heifers 10:45 am Buyers Lunch 1:00 pm Sale of Champions Starts 3:00 pm Ag. Mechanics Silent Auction Ends
Beef Showmanship to follow Conclusion of Heifer Show	
PCJLS Sale Order: Sale of Champions Steers All 1st placing Barrows, Lambs, Goats, Rabbits and Broilers All 2nd placing Barrows, Lambs, Goats, Rabbits and Broilers Etcetera through all remaining placings	



Lady BEETLE INVASION



By Mike Merchant Retired Professor and Extension Entomologist

This year Extension offices are receiving an unusually high number of calls about lady beetles inside homes. The culprit is an exotic lady beetle called the multicolored Asian lady beetle (MALB). While not new, high aphid populations in some trees last year are thought to have contributed to this year's higher than normal number of these "naughty lady beetles".

The multicolored Asian lady beetle is normally a helpful insect that eats aphids. Studies of the beetle in its native Asian habitats showed that it was such an efficient predator that for many years the U.S. Department of Agriculture tried to import them. Ironically, after repeated failures to get the beetles to establish here, the beetles mysteriously appeared on their own in a number of states during the early 1990s. Whether these beetles were survivors of earlier deliberate importations, or whether they found their way to the U.S. on their own, no one really knows for sure. But its one bad habit has many homeowners wishing this beetle might have stayed back in Asia.

The multicolored Asian lady beetle is unique among major lady beetles in its behavior of routinely invading homes and buildings in the fall. In its native home in Japan, this beetle quietly disperses into the white limestone bluffs along its riverside feeding grounds. But in the U.S. it has become a significant pest when it seeks shelter in the walls and attics and living areas of homes.

The beetles seem to become pests more often in homes surrounded by trees and forests. They also seem to be attracted to homes of lighter or contrasting colors. The adults enter homes through any available crack or crevice and may aggregate in attics or even living areas of the home.

Although mostly harmless, like some other common lady beetles, MALBs are occasional "nippers," biting skin if they come in contact with humans. They also let off a disagreeable smell when disturbed, and medical reports exist of people developing allergies to the chemicals emitted by lady beetle aggregations. But mostly these beetles are a simple nuisance, unwanted and sometimes cursed.

Although homes were invaded in the fall, this winter's up and down temperatures have caused these beetles to get restless and move about the home in search of a way out.

When daytime temperatures reach the 80s outside, attic temperatures may reach the 90s, fooling the beetles into thinking that spring has arrived and sometimes sending them into living areas of the home or building.

Control

There are no easy ways to prevent MALB from entering homes or controlling them once inside. Caulking and sealing outside entry points is perhaps the most effective technique. Use of residual insecticides around areas that are not easily sealed may provide some temporary control of lady beetles attempting to enter homes. Pyrethroid insecticides are usually good for this purpose.

Once inside the beetles are best controlled by vacuuming.

Spraying insecticides on aggregations of lady beetles will result in piles of dead insects, and undesirable smells.

Discard your vacuum bag after use if you don't want a smelly vacuum. Bug bombs, light traps and lady bug houses are not effective at ridding homes of these beetles.

Once the weather completely warms up, the lady beetles will eventually find their way out of the house and on to their worthy pursuit of aphids. Until that happens, you may have to just continue to vacuum these little guys up as long as they are found.



Management of Internal Parasites

By: Lee Dudley CEA AG&NR Panola County

Many times, in the cattle industry, producer's profitability is so slim that the smallest management decisions can be the difference between a positive or negative return. With this in mind, we need to remember that even though many producers cannot influence the average market prices, we can control some of the price variations we see at the auction barns and other market outlets by following sound market-management practices. Besides, it being important that we market the types of calves the buyers demand, it is also critical that we as producers develop sound management practices that ensure premiums for our calf crops.

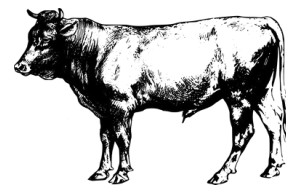
The first practice that we will look at is one that should already be a normal practice conducted within our area herds twice a year routinely. In fact, for our East Texas area it is so critical that if you wait until problem signs show up you are already losing production. However, it still is a practice that I hear far too often that producers are not taking advantage of. What we are talking about is the control of internal parasites. It is important that, we understand that calves are just as susceptible to internal parasites as adult cattle and managing these parasites can add additional pounds at weaning to our calf herds. Field trials indicate that deworming nursing calves along with their dams in the spring of the year can increase daily weight gains in calves by .1 to .2 pound, increasing weight gains by 25 pounds at a cost of only roughly \$3.50 in deworming. With the current market in true rollercoaster ups and downs from Covid-19 capturing every dollar count.

The administration of the proper drug at the correct time breaks the life cycle of the worms and prevents them from building up in cattle. The right time normally depends on the parasite and the development of optimal environmental conditions, which includes moderate temperatures, rainfall and wet grass. Worms are usually transmitted when soil temperatures are 55°F to 85°F in rainy periods in spring (April through June) and fall (October). Pasture larvae hibernate in winter (November through March) and die from heat, sunlight, drying and nutrient depletion in summer (July through September).

Another factor that can increase worm loads in pastures relate to stocking rates, cow-calf pairs stocked at a heavy rate like 1 head per 1-2 acres will have a significantly greater problem from internal parasites as compared to pastures stocked at 1 pair for every 5 acres. Additionally, the practice of rotational grazing can help manage internal parasites. Worms can only live so long outside the host therefore utilizing rotational grazing practices helps by cutting the life cycle within a single pasture setting. Practices such as the act on managing internal parasites as well as the additional management options will help our area producer realize more dollars by allowing them to producer more pounds per acre.

Timing is Everything

By: Lee Dudley CEA Ag& NR Panola County



In livestock management, timing is everything. Even the smallest off-tempo step can ripple into a larger effect on performance, and ultimately, the bottom line. Take, for example, a defined breeding season. Imagine how many things are affected by that one season, and the opportunities it presents. To start with, all the cows would be calving in that 60- to 90-day window. All calves could be processed at one time. All bull calves castrated and implanted; heifers could be implanted if they are not being kept for replacements. Cows would all get pre-breeding shots as open cows at the same time. Since all cows and calves are the same stage of reproduction and calves are essentially the same age, grazing considerations and decisions become much easier. Fertilizer needs and pasture rotations are streamlined. Everybody in the herd has the same requirements, growth and weight gain for the calves, and reproduction for the cows. Weaning becomes much easier. All calves can receive vaccinations, de-wormer and be separated from their dams at the same time. Cows can be checked for pregnancy and culling decisions can be made on all cows. The time and labor involved in multiple cow handling events is reduced to three to four times per year. Whether you “wean and hold” to pre-condition, or “strip and ship,” you should have a uniform size and shape to offer buyers in a larger grouping that will work out to more dollars in your pocket. For more information and or assistance in preparing your own management plan to streamline your cattle herd, contact the Panola County AgriLife Extension office to set up a farm visit and consultation by calling (903) 693-0300 Ext 161. Remember, with current world development now is the time to fasten the seatbelt and make those sound management plans that will see us through the rough spots.



Panola County 4-H **PHOTOGRAPHY CONTEST**



Email entries to lani.west@ag.tamu.edu by **4:30pm on March 15**
Junior, Intermediate, Senior Divisions. **NO FEE to enter!**

THIS Contest WILL qualify SENIOR winners to participate in Texas 4-H Photography contest
Winners announced week of March 28 - April 1 - Exhibitors may enter one in each category.

*Categories: Animals-Domestic, Animals-Wildlife, Catch-All, Details & Macro, Elements of Design,
Enhanced, Food, Landscape & Nature-Non Animal, Leading Line, Long Exposure,
Motion/Action, People, Plant/Flora, Shadow/Silhouette, Theme*

VIRTUAL

Texas 4-H Reel 'Em In

FISHING SKILL-A-THON 2022



SPRING

Tournament
Register: Feb 1-28

Fish:
March 1 - May 31

Saltwater or Freshwater

SUMMER

Tournament
Register: May 1-31

Fish:
June 1 - August 31

District 5 4-H

SHOOTING SPORTS GAMES AND RIFLE CLINIC

May 7, 2022

Register: March 1 - April 7

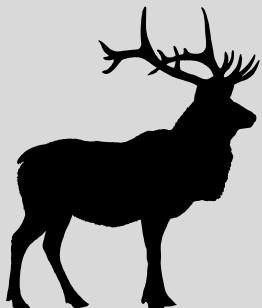
5H Shooting Sports Range - Frankston

Shotgun Events:

Skeet, Trap, 5-Stand,
Sporting Clays

Rifle Events:

3 Position Smallbore
& Metal Silhouettes



District 5 4-H

Aim For the Game

*The Ronald Barlow Memorial
3-D Archery Meet*

May 14, 2022

Register: March 15 - April 14

Fairway Farms - San Augustine

Bow Classes:

Barebow,
Recurve,
Compound Aided,
NASP Genesis Barebow





Panola County 4-H ROUNDUP



Winners of county contest will advance to district. You can only advance to district and state contests if you have participated in the county contest

Public Speaking
Educational Presentations
Share the Fun (Dance, Music, Other Talents)
Fashion Show

SIGN UP BY MARCH 11
SIGN UP HERE!!!

MARCH 26 - PANOLA COLLEGE - STARTING AT 9AM



FOOD CHALLENGE *at Come Alive in D5!*

Practices: 5:30-6:30 p.m.
Thursdays (March 10-April 28)
Sammy Brown Library

Panola County 4-H is sending a junior team and intermediate team to the District 5 Food Challenge at "Come Alive in D5"! If you're interested in learning more about the event or just want to come watch, all are welcome!

COME ALIVE IN DISTRICT 5

District Roundup

SIGN UP BY MARCH 31

APRIL 28-30

CROSS BRAND COWBOY CHURCH
11915 FM 2015, Tyler, TX

Something for Everyone!

Agriculture Product Identification
Consumer Decision Making - Duds to Dazzle
Educational Presentations - Entomology Collection
Fabric & Textile Creation - Family Community Health Quiz Bowl
Fashion Show - Food Challenge - Horse Quiz Bowl - Horticulture
Identification - Leaders 4 Life - Livestock Quiz Bowl - Photography
Public Speaking - Robotics Challenge - Share the Fun - Storyboard

Dealing With High Fertilizer Costs in Forage Production Systems

By M.L. Silveira, J. M. Vendramini, P. J. Hogue and J. F. Selph

Fertilizer costs have increased tremendously over the last few decades. For instance, nitrogen (N) fertilizer prices have doubled in the last two years. Unfortunately, this trend is expected to continue in the future in response to high energy demand and decreased reserves of fossil fuels. Commercial fertilizers are the most costly input in warm-season grass forage production. Thus, it is important that fertilizers are used efficiently, so the investment return can be optimized. This document addresses some important issues relative to fertilizer efficiency as well as alternatives for reducing fertilizer use and reducing production costs for forage production.

Adequate soil fertility is one key to successful forage and livestock production in Florida. Most soils in Florida are deficient to some degree in more than a single essential plant nutrient. Unless all required nutrients are supplied in adequate amounts, the benefits of a single nutrient application are not fully maximized.

Soil testing is still the best management tool to monitor soil fertility levels. Routine soil tests can help identify nutrient deficiencies and inadequate soil pH. Similarly, soil test results can also indicate which nutrients are present at adequate levels in the soil so fertilizer can be omitted. In addition to the money saved by limiting application to required fertilizers, losses and associated environmental problems can also be minimized. Based on soil test results, cost-effective fertilization programs can be developed to meet forage nutrient requirements and minimize production costs.

Although soil testing is a vital component of soil fertility programs for forage crops, the results and interpretation of a soil test are only applicable if the soil samples have been properly collected. Soil samples submitted to the laboratory should accurately represent the area of interest. A minimum of 15 to 20 subsamples (0 to 6 inches in depth) should be collected from each field. Areas that are managed or cropped differently should be sampled

separately. Similarly, areas that show clear problem signs (i.e., poor forage production, disease) should also be sampled and analyzed separately. After collecting a minimum of 15-20 subsamples, soil should be mixed in a clean plastic bucket. A hand full (~1 pint) of soil should be sent to a reputable laboratory for analysis. Soil testing should be repeated at least every 3 years.

Often overlooked, maintenance of adequate soil pH is an extremely important step in soil fertility programs for forage crops. Soil pH is one of the most important soil properties because it controls nutrient availability to plants, root development and fertilizer efficiency. Optimum soil pH promotes better root growth, which, in turn, results in more efficient fertilizer and water utilization by the plants. For instance, N fertilization efficiency in forage systems can increase 2.5 times by increasing soil pH from 4.5 to 5.5. Similarly, P and K fertilization efficiency is also increased when soil pH is adequate.

Florida soils often exhibit low pH and are considered "acidic". Lime is frequently used to raise soil pH. By raising the soil pH, macronutrient (i.e. N, P, and K) availability is typically increased. However, at high soil pH (> 6.5) micronutrients become less available. Therefore, it is important that adequate amounts of lime material are applied to the soil to bring the pH to a desirable range.

Forage crops require different soil fertility conditions and target pH varies according to the forage species. In general, warm-season grasses are more tolerant of soil acidity than legumes. Liming frequency as well as application rates will depend on the soil's characteristics and management practices. Nitrogen fertilization and decomposition of organic materials contribute to soil acidity. It is important to closely monitor pH and soil fertility status by testing the soil regularly. Routine soil testing provides the soil pH levels as well as the recommended lime application rates.



Several fertilizer sources are commercially available to supply N, P, K, and micronutrients to forage crops. In this section, we will focus on commercial N sources, but the same considerations should be applied to other essential nutrients.

Ammonium nitrate, ammonium sulfate, and urea are the major N sources used on pastures in Florida. Organic sources such as biosolids and animal manure also represent important sources of N that can be used in pastures. When choosing the right fertilizer source, it is important to consider important factors, such as price, fertilizer effectiveness, method and rate of application.

Cost of fertilizer should be calculated in terms of dollars per pound of nutrient. Below is an example how this can be easily calculated. Please note the fertilizer prices used here are just an example, so please check with your local fertilizer dealer the current fertilizer cost.

- Ammonium nitrate (34% N) costs \$350/Ton. 2000 lb ammonium nitrate contains 680 lb N ($2000 \times 0.34 = 680$). Thus, the price per lb of N is \$0.51 ($350/680 = 0.51$)
- Ammonium sulfate (21% N) costs \$300/Ton. 2000 lb ammonium sulfate contains 420 lb N ($2000 \times 0.21 = 420$). Thus, the price per lb of N is \$0.71 ($300/420 = 0.71$)

In addition to fertilizer costs, it is also important to consider the acidity potential of each N fertilizer source. Regardless of the source, N fertilization typically reduces soil pH. However, some N sources can cause a reduction in soil pH more rapidly than others. Thus, when choosing a N source, it is also important to account for additional costs associated with lime application. For instance, ammonium nitrate requires 0.61 lb of lime per lb of fertilizer, while ammonium sulfate and urea require 1.10 and 0.81 lb of lb of lime per lb of fertilizer to maintain soil pH.

Commercial fertilizer mix often provides multiple nutrients, which can be most economical in some situations. However, the N:P:K ratio of the fertilizer formula should coincide with the soil test recommendations to avoid unnecessary nutrient application. For instance, if a soil test indicates that P levels are adequate, producers should select fertilizer mixes that contain no P (i.e. 20-0-20).

Organic fertilizer sources such as animal manure and biosolids can satisfactorily provide N and other nutrients to forage grasses. When properly applied, these organic sources can be beneficial to agriculture with no negative impact on the environment. Another advantage of organic sources is that, because of the alkaline nature of some of these materials (i.e., lime-stabilized biosolids), they can increase soil pH and reduce costs associated with liming.

One important aspect to consider when using organic amendments is that the N present in these sources is not readily available to plants and total N is often a poor indicator of N availability. For instance, while only 40% of the total N in some biosolids materials may become available in the first year, up to 80 to 90% of the total N present in chicken manure may be available during the same period. As the organic compounds mineralize, N and other essential nutrients become available to the plants. Factors such as source, time and rate of application and environmental conditions can impact the effectiveness of organic materials in providing N to pastures. From an environmental perspective, because improper application of organic amendments may lead to excessive soil P concentrations and increase soil pH above the desirable range, it is important to monitor soil fertility after manure and/or biosolids application.

Fertilizer should be applied when the forage is actively growing. For most warm-season grasses commonly used in Florida, such as bahiagrass, growing season does not start until night temperatures reach 60°F, which typically occurs in early spring. For establishment of new plantings, fertilizer should not be applied until plants have emerged. Nitrogen and K should be split-applied into two applications: after emergence and 30 to 50 days later. For hayfields, N and K should be applied after each cutting.

Unlike P and K recommendations, N application rates are not based on soil test results, but rather they are calculated based on expected yields. From an economic perspective, it is important to consider realistic yield expectations when calculating the amount of N that a pasture will receive. Improved grasses such as bermudagrass and stargrass usually require higher fertilizer application rates than bahiagrass pastures. Beside the forage species, another



important aspect that should be considered is how much grass is needed. Do not fertilize pastures if forage production will not be consumed by grazing animals and/or harvested for hay. For instance, N fertilization will likely increase forage production and nutritive value but these benefits may not be economical if not converted into animal product. Thus, adequate stocking rate is another important variable to consider when choosing N rates

Nitrogen-fixing legumes have the ability to convert atmospheric N into compounds that plants can use. Symbiotic fixation of N is achieved by the association of bacteria and the roots of legumes species. Normally the association between legume and bacteria species is very specific, so the efficiency of the symbiosis is largely dependent on the presence of the bacteria. Legumes are only able to fix N from the air if specific strains of bacteria are present in nodules on their roots. The seed must be inoculated before planting to ensure that the best strain of bacteria is present for each legume species. In addition, soil fertility (i.e. pH and cations) and environmental conditions also affect the efficiency of N fixation. The primary driving force in calculation of N fixation is legume yield. High yielding legumes fix more N.

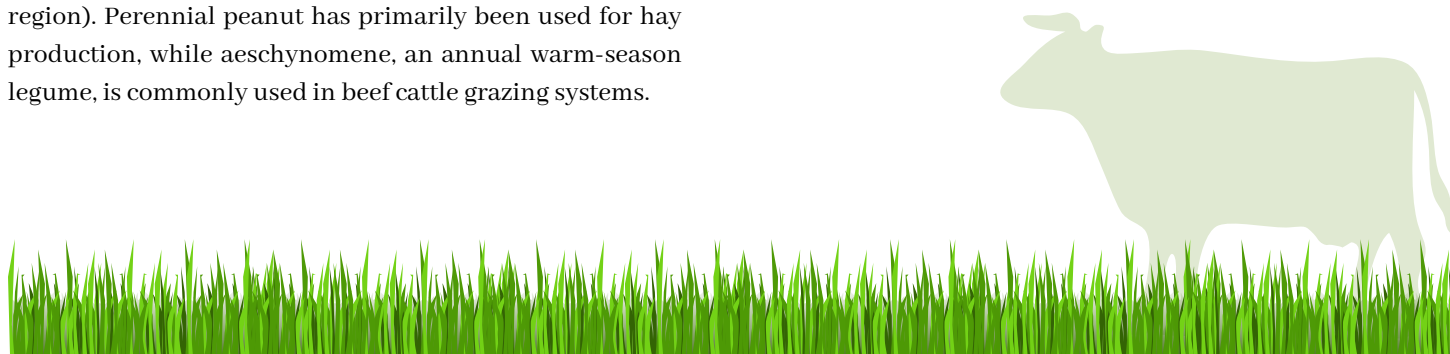
Cool-season legumes grow the most in the spring when temperature and rainfall are favorable. Cool-season legumes are more widely used in North Florida because they are more adapted to well drained soils and mild temperatures. Some clovers such as arrowleaf, ball, rose, and white clover produce a high percentage of hard seed which allows them to reseed if managed properly. Cool-season legumes are high in nutritive value and when grazed by beef cattle provide excellent animal performance. Annual clovers can contribute with about 75–100 lbs N/acre for the subsequent grass crop.

The most common warm-season legumes species adapted to Florida's conditions are perennial peanut (North-Central regions of the state), and aeschynomene (South region). Perennial peanut has primarily been used for hay production, while aeschynomene, an annual warm-season legume, is commonly used in beef cattle grazing systems.

The majority of the legume-N is transferred to the soil by unused plant material and/or animal excreta. Grazing animals can return more than 80% of the consumed nutrients to the soil through the feces and urine. If the legume crop is harvested and removed from the pasture as hay, haylage, or silage, the contribution of legume-N to the subsequent crop is reduced.

Because a large proportion of nutrients are returned to the soil via animal excreta, grazing management can have significant impacts on soil fertility status. Significant amounts of N, P, Ca, Mg, and micronutrients can be recycled to the soil via animal feces and urine. However, because grazing animals tend to excrete near to water, shade and feeding area, homogeneous distribution of excreted minerals is typically a major challenge. The heterogeneous distribution of nutrients is not only undesirable in terms of forage management, but it may also result in high concentration of nutrients in small areas.

Grazing management can have a major role in maximizing the benefits of nutrient recycling in grazing pastures and, consequently, reducing the dependence on commercial fertilizer. Stocking rate and grazing method (rotational versus continuous) are important factors that may affect nutrient redistribution. Typically rotational grazing leads to a more homogeneous distribution of excreta. Research in Florida has shown that short grazing periods can increase the uniformity of excreta return as well as the efficiency of nutrient recycling compared to continuous grazing. Similarly, increasing the stocking rate may increase nutrient concentration and redistribution across the pasture but it may also lead to excessive nutrient accumulation in the soil. Environmental factors such as daily temperature and animal type may also affect animal grazing behavior and, consequently, nutrient redistribution in pastures.





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