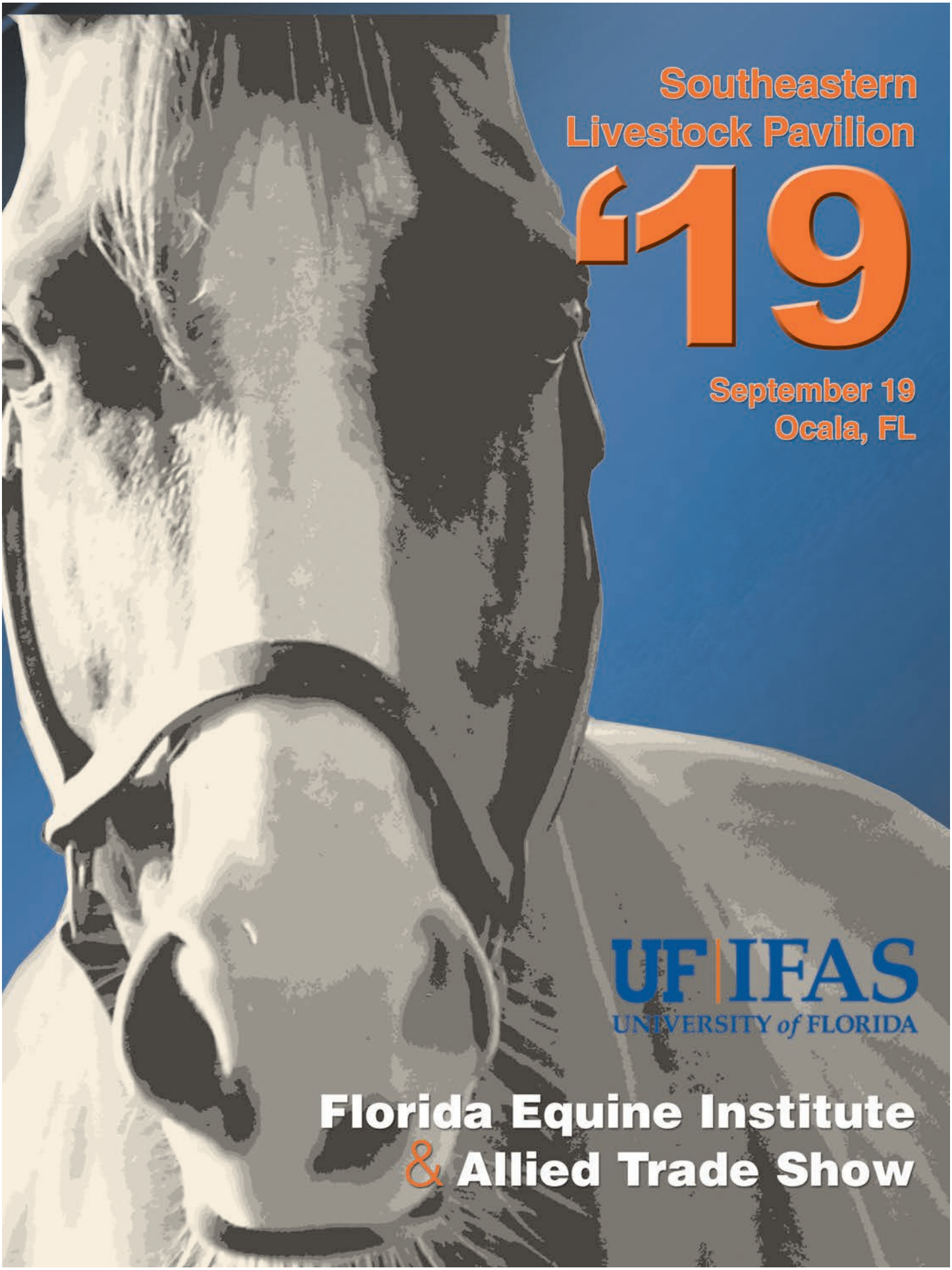

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September 19
Ocala, FL

UF | IFAS
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Florida Equine Institute
& Allied Trade Show

UF | IFAS Extension
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This Equine Institute and Allied Trade Show
is conducted by:
Central Florida Livestock Agents Group

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am

8:00
Registration/Trade Show Opens

8:30
Nutrition: Metabolic Issues & the Older Horse.. 7
Megan Mann,
UF/IFAS Extension Lake County Livestock Agent

9:30
Update on Equine Behavior Research 11
Dr. Carissa Wickens,
University of Florida Animal Sciences Department

10:00 ***Trade Show Break***

10:30
Proper Saddle Fit *16*
Joel McQuagge,
University of Florida Animal Sciences Department

11:30
Lunch & Live Animal Demonstration, Trick Horse and Florida Thoroughbred Retirement Farm at Lowell
Carol Fletcher, Trick Horse Trainer &
Tammy A. Gantt, Assoc. VP Florida Thoroughbred Breeders' and Owners' Assoc.

pm

1:00 ***Trade Show Break***

1:30
Breakout sessions- Body Condition Scoring, Weed ID, Forage Analysis & Quality 19
(3 stations)

Body Condition Scoring
Caitlin Bainum, UF/IFAS Marion Co-Extension

Pasture Weed Identification
CFLAG Agents

Forage Analysis & Quality
Carol Vasco, PhD Student

2:45
Equine Expert Panel led by University of Florida Animal Science Department

4:15
Evaluations & Giveaways

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Welcome to the 2019 Florida Equine Institute & Allied Trade Show!

Welcome to the Central Florida Livestock Agents Group (CFLAG) 2019 Florida Equine Institute & Allied Trade Show. We are excited you are here and look forward to a day of learning, interaction, and new connections! We would like to thank our allied industry members for participating in this year's trade show and for sponsoring this event. We encourage you all to get to know our local industry representatives, there is a wealth of knowledge amongst them. We'd like to extend a special thank you to all of our speakers and the UF Equine Science faculty that will be joining us today to share their specialized knowledge.

This year has been a full and productive year for UF/IFAS Extension, and we are constantly looking ahead for the next educational program that will benefit you. If you have a specific need or have an idea for a class or workshop, let us know! One of your best resources is your local UF/IFAS Extension office, we are fond of our livestock agents, but should you need help with other aspects in your daily lives we have a resource ready and able to assist. Specific to agriculture and equine operations, we urge you to get to know your local livestock agent, they are supportive assets. Expect one on one advice as well as group learning opportunities on topics ranging from farm management and livestock operations to wildlife and natural resources. Checkout our classes on a multitude of topics throughout the year, hosted in a variety of locations within the central Florida area. If you are unsure of who your local agent is, ask a CFLAG member today and we'll be sure to make that connection.

Be up to date by following and sharing our CFLAG Facebook page, https://www.facebook.com/UFIFASCFLAG. You will find an up to date calendar of events plus valuable educational posts. A Full list of the CFLAG agents are in the front of this program for your convenience. Thank you for being with us we appreciate you and look forward to your success.

Sincerely,

Caitlin Bainum & the CFLAG team!

Speaker Biographies

MEGAN MANN

UF/IFAS Extension Lake County Livestock Agent and County Director

Mann has been an equine enthusiast all her life. As a child if she wasn't riding horses she was reading about them, drawing them, playing with model horses, or pretending her dog was one. Meg holds a B.S. in Animal Science with a concentration in the Equine Industry and an M.S in Animal Nutrition, both from the University of Florida. She lives in Mount Dora with her husband, son, and three spoiled dogs. Meg enjoys working with local horse owners and has a soft spot for older horses and the folks who love them.

DR. CARISSA WICKENS

Assistant Professor and Extension Equine Specialist

Dr. Carissa Wickens is an Assistant Professor and Extension Equine Specialist at the University of Florida, Department of Animal Sciences. She received her B.S. and M.S. degrees in Animal Science from Michigan State University, and completed her PhD in Animal Science at Michigan State University (2009) with emphasis on stereotypic behaviors in horses. Prior to her position at the University of Florida, Dr. Wickens served as an Assistant Professor and Equine Extension Specialist with the Department of Animal and Food Sciences at the University of Delaware (2009-2013) where she taught undergraduate equine science courses and provided educational resources and programming for Delaware equine owners. Dr. Wickens's extension areas address expanding education experiences in equine behavior and welfare, management, and nutrition. Her specific areas of research include associations between management and behavior in horses, environmental impact of equine operations, and human-horse interactions.

JOEL MCQUAGGE

Associate Professor, UF Department of Animal Sciences

Joel McQuagge graduated from the University of Georgia in 1985. Subsequent to that he spent time managing a bovine embryo transfer facility, working in management for a livestock supply corporation and training horses for a variety of disciplines. Joel has also been a custom saddlemaker for over 30 years. Currently he is a faculty member at the University of Florida Department of Animal Sciences and holds a 90% teaching and 10% extension appointment. He teaches classes ranging from horse training and management to career exploration, advises clubs and serves as the faculty supervisor for the equine teaching and research units.

DR. MARCELO WALLAU

Assistant Professor and Forages Extension Specialist

Marcelo Wallau is an Assistant Professor and Forage Extension Specialist with the Agronomy Department at the University of Florida (70% extension, 30% research). With an engineer and MS degree in Agronomy and PhD in Animal Sciences, his focus is on forage production and management for beef cattle, dairy cattle and horses, and on integrated crop-livestock systems. Coming from a farming background in southern Brazil, Dr. Wallau's interests are on the big picture of the production systems, searching for solutions for daily questions from our farmers with a deep scientific base and global perspective. He also has worked on grassland ecology, modeling and foraging behavior, and on feral hog management and control.

DR. LORI WARREN

Associate Professor, UF Department of Animal Sciences - Equine Nutrition

Dr. Warren is an associate professor of equine nutrition in the Department of Animal Sciences at the University of Florida. She completed her B.S. degree at the University of Wyoming and her M.S. and Ph.D. degrees at the University of Kentucky with a dual emphasis in equine nutrition and exercise physiology. At UF she carries out research and trains undergraduate, graduate and veterinary students. Dr. Warren's research focuses on the effect of diet on immune function and gastrointestinal health, as well as the development of feeding programs that enhance athletic and reproductive performance of horses. Additionally, she works to identify management and nutrition solutions to minimize the environmental impact of horse manure on water quality.

DR. SAUNDRA TENBROECK

Associate Professor, State Extension Horse Specialist, and Undergraduate Coordinator

Dr. Tenbroeck has a B.S., Animal Science, Clemson University, M.S., Physiology of Reproduction, Texas A&M University, and a PhD., Physiology of Reproduction, Texas A&M University. She joined University of Florida in October 1985, was Youth Livestock Specialist through 2001, and has served as the State Horse Specialist from 2001 until present. Her IFAS assignment includes 60 % teaching and 40% extension. She serves on graduate committees and participate in grant and editorial reviews as needed. Supervise graduate students in livestock entomology research projects evaluating control methods for biting insects and house flies on horse farms.

She teaches Introduction to Equine Science; Horse Enterprise Management; Equine Reproductive Management; Horse Management Practicum, Undergraduate Coordinator; Co-Adviser Block & Bridle Club

DR. SALLY DENOTTA

Clinical Assistant Professor, Large Animal Medicine and UF Equine Veterinary Extension Specialist

Dr. DeNotta is a large animal veterinarian and is board-certified by the American College of Veterinary Internal Medicine. She serves on the clinical faculty at the University of Florida College of Veterinary Medicine, also as the UF equine veterinary extension coordinator. Sally grew up on the rural Oregon coast and received her veterinary degree from Oregon State University. She spent time in private practice in both Colorado and Oregon before heading to upstate New York where she completed an internal medicine residency at Cornell. Following residency she joined the clinical faculty at Cornell while obtaining a PhD developing optical techniques for in-vivo imaging of the central nervous system. She joined the UF faculty in 2018, where her clinical interests include infectious disease, neurologic disorders, colic, coagulation, and neonatology.

DR. SAMANTHA BROOKS

Associate Professor, Department of Animal Sciences

A lifelong horse woman, Dr. Samantha Brooks was diverted from vet school by a budding passion for equine research. Following a Bachelor of Science degree in Agricultural Biotechnology, Dr. Brooks remained at the University of Kentucky to study at the Gluck Equine Research Center. While there she earned her Ph.D. in Veterinary Science, specializing in Equine Genetics under the mentorship of Dr. Ernest Bailey. Following her Ph.D. she was awarded the Paul Mellon Postdoctoral Fellowship to study the expression of inflammatory genes in horses affected with laminitis. As an assistant professor at Cornell University she was responsible for the Equine Biology and Management course for six years. Now at the University of Florida, her research program explores a variety of topics relevant to horse health ranging from gene expression studies to mapping of genetic disorders in the horse. Previously her research group discovered genetic mutations and markers for coat colors, height, sarcoid tumors and two neurological conditions. Ongoing work targets variation in gait, susceptibility to infectious disease, metabolic syndrome and skeletal defects using genome wide association, genome re-sequencing and transcriptomics.

Caring for the Older Horse: Common Problems and Solutions[1]

Edward L. Johnson, Kylee Jo Duberstein, and Mark Shuffitt[2]

Horses, compared to other livestock and companion animals, have relatively long life spans, often living into their late 20s and early 30s. Many horses have productive careers into their 20s. In fact, in many disciplines, horses do not peak until their teenage years. Good nutrition, maintenance, and veterinary care have allowed horses to lead longer and more productive lives. However, as the horse ages, its needs change, and additional care may be required to keep the horse as healthy as possible.

The older horse can often be cared for and managed well as long as the owner and/or caregivers understand the special needs a horse may have as it ages. It is important to recognize there is not a predetermined age when an individual horse becomes "old." Like people, horses age at different rates. Some areas of aging we can have an effect on as caregivers, and some we have little effect on or control over. Genetics and previous care, or lack of, as well as previous use, are areas that we as horse owners cannot do much about.

The key to caring for an older horse is to understand how the horse's body changes as it ages and how these changes impact the horse's requirements. Important areas that must be considered when caring for the older horse are nutrition, lameness, vision, immune response, and hormone changes.

In this article, we will address changes in the aging horse's body that impact its requirements, along with possible ways to meet these requirements and solutions to problems that may occur. It is important to recognize that not all older horses have problems; some are maintained easily without much change in routine. However, some horses begin to have problems as they age and are referred to as geriatric. These horses may require special attention and a change in management.

Nutrition

Nutritional needs of aging horses will vary greatly between individuals. Some older horses may never need drastic modifications to their diet, whereas other senior horses will require a special diet to help them maintain good health and body condition. In both situations, the goal is to provide adequate nutrition.

Dentition

For some horses, it becomes harder for them to meet their nutritional requirements as they age for a multitude of reasons. One of these reasons is poor dentition. Proper and routine care of the horse's mouth by a qualified equine dentist will help the horse maximize nutrients from the food he is eating. Horses chew in a circular motion from

1. This document is AN253, one of a series of the Animal Sciences Department, UF/IFAS Extension. Original publication date October 2010. Revised August 2013. Reviewed December 2016. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Edward L. Johnson, associate professor (retired), Department of Animal Sciences; Kylee Jo Duberstein, Department of Animal and Dairy Sciences, University of Georgia; and Mark Shuffitt, Extension agent IV, UF/IFAS Extension Marion County; UF/IFAS Extension, Gainesville, FL 32611.

one side of their mouth to the other. This motion naturally wears away the horse's teeth. Over time, this chewing motion will lead to sharp points developing on the outside of the horse's upper molars and on the inside of the horse's lower molars. These sharp points must be filed down by floating the horse's teeth regularly (one to two times per year). Floating, or keeping the horse's teeth filed down, will improve the horse's chewing ability and allow him to better digest foods that he is eating.

Some older horses may not even have teeth. When a young horse first develops molars, they are very long and folded into the dental socket in the jaw. The length of the entire tooth is around five inches in a young horse with only a small portion being visible above the gum line. As chewing wears away the tooth over time, it continues to push upwards above the gum to replace that which has been worn. This continues throughout the life of the horse, but by the time the horse approaches his 30s, most of the tooth may be worn down to the roots. This leaves the older horse with little ability to chew and digest foods he would ordinarily eat. This problem can be alleviated relatively easily by changing the type of food the older horse might eat. Some feed companies make senior horse feeds that tend to be softer in texture than ordinary horse feeds. Concentrates fed in the form of pelleted feed can be wet down and softened to make a gruel that is easy for the horse to chew. Forage can be provided in the form of hay cubes or pellets (made of either alfalfa or alfalfa/grass mix), which can also be wet down and softened for the horse to chew easily. In general, reducing the particle size of the food and feeding foods that can be wet down and softened will greatly ameliorate any nutritional problem the horse may have due to chewing difficulties. While dentition problems are usually relatively easy to manage, if the horse is not cared for properly (e.g., turned out to pasture with no additional care), it may quickly become emaciated due to inability to eat the available food.

Nutrient Absorption

Dentition is not the only nutritional challenge that must be overcome when caring for the geriatric horse. As horses age, some may become less able to glean nutrients from what they eat due to reduction in nutrient absorption, lowered ability to digest fiber, and reduced gastrointestinal motility. Some of these problems may be due to intestinal damage from parasites if the horse was not on a regular parasite control program throughout its life. Routine deworming is critical in maintaining the horse's health and longevity.

Feeding Strategies for Thrifty Horses

Regardless of the reason, when feeding geriatric horses that are having difficulty holding their body condition, it is very important to provide them with highly digestible, high-energy feeds. One commonly used practice is to feed older horses beet pulp in some form. Beet pulp is a highly digestible fiber source for horses. It is sometimes incorporated into commercial feed or can be bought separately to be wet down and fed in addition to grain. Another way to improve digestibility is to select commercial feeds containing grains that have been processed (crimping, cracking, rolling, or steam flaking). This will break the seed coat of the grain so that the horse may better digest it. Also, energy content of the diet may be increased by supplementing fat to the diet. Fat is a highly digestible energy source and will help to meet the energy needs of the horse. Commercial feeds are often formulated to contain added fat. Grain mixes without added fat typically contain approximately 3% fat. Many feed companies now market grain mixes with fat contents as high as 14%. If the horse owner does not wish to change their feed to one of the commercial feeds formulated with added fat, fat can be top-dressed to the horse's grain. Many feed companies market a fat supplement such as stabilized rice bran or extruded pellets with added vegetable oils. Some horse owners also choose to add fat to the horse's diet by pouring some type of vegetable oil over the horse's grain. However, it is critical to not increase the energy content of the diet without also ensuring that other nutrient needs are met. When feeding a commercially formulated feed, this is not typically a problem. However, when top-dressing the horse's grain with a fat supplement, one should check to ensure that other nutrient requirements are also being met. When feeding added fat in the diet, the horse will need less feed to maintain its condition. Therefore protein content should also be increased, along with vitamin and mineral content. Additionally, rice bran supplements that do not have added calcium can cause calcium:phosphorus imbalances in horses on grass forage. Care should also be taken to not feed vitamins and minerals in such excess to cause toxicities. Fat soluble vitamins (A, D, E, K) are stored readily in the body, which, over time, can lead to toxicities. Excesses of certain minerals can interfere with absorption of other minerals. It is important when adding supplements to the horse's diet—whether it be fat, vitamins, or minerals—to be sure that one is not creating imbalances in other nutrients. The simplest way to do this is to feed concentrates that have been commercially formulated or to feed supplements that have been commercially formulated to match a particular feed.

Another important consideration prior to adding supplemental fats, vitamins, or minerals to the horse's diet is to first ensure that the horse has proper kidney and liver function. Horses with liver dysfunction will not tolerate added fat in the diet. Providing feeds with high protein and/or calcium (e.g., alfalfa, beet pulp) can aggravate the kidneys in horses with kidney disease. Prior to supplementing the horse's diet with additional protein, fat, vitamins, or minerals, it is recommended that the owner do a simple blood analysis to determine liver and kidney functions.

It is important to be sure to feed good quality grain and forage that is free of mold and dust. Moldy, dusty feeds can cause gastrointestinal tract problems, such as colic, and are generally not as digestible to the horse as compared to better quality feeds. Older horses often are more susceptible to respiratory irritation, and feeding dusty feeds will only aggravate these conditions. Horses that suffer from persistent respiratory problems may benefit from soaking their hay for 15 minutes prior to feeding to control dust. It is important, if feeding hay, to feed good quality hay that was cut at the appropriate time. Hay that is too mature when cut is generally not very digestible for the horse since it has an increase in lignin content, and lignin is completely indigestible by the horse. This hay often appears to have a very high stem content and should be avoided in older horses that already have decreased forage digestion.

Horses That Are Too Fat

Not all older horses are hard keepers. Instead of becoming too skinny, some will hold their weight easily and may become too heavy. Often times, older horses are not exercised as often or as intensely as their younger counterparts. These horses may begin to accumulate fat at a rate that may be detrimental to their health. Horses that become too heavy may stress their bones and joints and may aggravate any lameness conditions such as arthritis and navicular syndrome. It is important to ensure that the horse is meeting all of its nutritional requirements without gaining an excessive amount of weight. For horses that are not in a routine riding program, allowing ample turnout time will provide the horse with some exercise and allow it to maintain muscle tone and a healthy body condition. Not overfeeding horses that are easy keepers will also help to alleviate stress on bones and joints.

Metabolic Disorders

Some horses may develop metabolic conditions as they age that lead to unhealthy obesity. This is commonly caused by imbalances in levels of hormones (such as insulin), which cause diseases such as Cushing's disease, insulin resistance, and metabolic syndrome. These conditions often develop in older horses (average age is 20 years). Insulin resistance and metabolic syndrome in horses are similar to the condition diabetes mellitus in humans. Horses with Cushing's produce excessive amounts of cortisol from their adrenal glands. Cortisol has many functions in the body including maintaining blood pressure, modifying the body's inflammatory immune response, regulating the function of nervous tissue, regulating muscle tone and connective tissue repair, and regulating the breakdown of carbohydrates, proteins, and fats by controlling insulin levels in the body. The excessive amount of cortisol produced in horses with Cushing's disease leads to many problems including recurring laminitis, muscle atrophy, susceptibility to disease, slow wound healing, excessive hair growth along with failure to shed, and lethargy. If any of the above symptoms, including excessive obesity, are noted, a veterinarian should be contacted as soon as possible. This disease can be controlled with medication if caught early enough. Horses with metabolic disorders can be managed with routine, quality hoof care, vaccinations, deworming, and a specialized diet. A routine exercise program may help to prevent the onset of metabolic disorders or to improve the outcome of individuals already suffering from these metabolic disorders.

A commonly used management practice for horses with Cushing's disease, insulin resistance, and/or metabolic syndrome is to feed them a diet with a low glycemic response. The glycemic response of feeds is a representative number to convey how much of a glucose and insulin spike a particular feed elicits in the blood. It is strongly correlated to the amount of sugar and starch present in the feeds that the horse is eating. Feeds that are high in sugar and starch will cause blood glucose levels to rise sharply and quickly. This is followed by a spike in insulin levels in the blood. For horses with metabolic conditions such as Cushing's, this spike in insulin is particularly undesirable. Feeding a diet with a lower starch content (i.e., feeding more highly digestible fiber and fat) will keep insulin levels in the bloodstream stabilized. Additionally, hay can be soaked in water for several hours and the water drained off to further remove sugars from the horse's diet. It is important to be sure that the horse's diet is meeting all of its protein, mineral, and vitamin requirements as these nutrients are critical for muscle tone and tissue repair, as well as wound healing and prevention of infection and illness. Horses with Cushing's, insulin resistance, and metabolic syndrome can be managed by feeding them a diet which meets their requirements but has little starch and sugar. Examples of feeds that may

be used are good quality forage, highly digestible fiber sources (e.g., unmolassed sugar beet pulp, soy hulls), fat supplementation if needed to maintain weight, and protein, vitamins, and minerals in the form of a ration balancer.

Lameness in Older Horses

One of the most common soundness problems seen in older horses is arthritis. Arthritis can begin at any stage of the horse's life but often worsens as the horse ages. It is questionable whether arthritis can be prevented to any extent, but it can often be managed with considerable success.

There are numerous feed supplements marketed for use in improving joint function. These supplements may contain chondroitin sulfate, glucosamines, hyaluronic acid, methylsulfonylmethane (msm), yucca, or a combination of these ingredients. Use of joint supplements may have beneficial effects on some horses that already have arthritis and other forms of joint disease. However, very little scientific research has been done in vivo to test these products. Equine joint supplements are not FDA approved and, therefore, are not regulated. Because of this, there is often considerable variability in these products. Some horses do appear to respond favorably to supplementation while others do not respond at all. For horses that do not improve with the use of joint supplements, another option is the use of injectable joint products that typically contain substances thought to replace joint fluid or improve cartilage regeneration. Examples of products that may be found in injectable form are polysulfated glycosaminoglycans or sodium hyaluronate (trade names Adequan and Legend). For those horses that still are not significantly improved with the use of injectable products, a veterinarian may recommend injecting a particularly bothersome joint with steroids and/or hyaluronic acid for direct and more immediate relief. These may improve joint flexion and reduce pain within days, and benefits may last for months to years before having to be repeated.

Other potential lameness-causing conditions for older horses are problems related directly to the feet, often caused by lack of proper care or lack of adequate hoof horn growth. Proper and adequate hoof care is necessary to keep older horses sound. As the horse gets ridden or worked less, their hooves often get neglected. Many older horses don't grow high quality horn because of lack of use and a decline in their ability to extract key nutrients from feeds. Poor hoof quality and imbalanced hooves can exacerbate arthritic conditions as well as lead to soft tissue injuries. So while an older horse may not be working and performing like they once were, routine, proper hoof care is still essential to maintain health and soundness.

Summary

The problems and solutions discussed in this article are meant to serve as guidelines for management of the aging horse. Horses vary greatly from individual to individual, and there are no hard and fast rules for caring for horses, geriatric or otherwise. Comprehending the underlying reasons for difficulties that might arise in aging horses will help owners and caregivers to make educated management decisions in older horse care. It is important to recognize that while older horses may not be as productive and useful as they might have been in their youth, routine veterinary, dental, and hoof care—along with proper nutrition and parasite control—are critical to keep these horses healthy for the remainder of their life span.

What's New in Equine Behavior Science?

Carissa Wickens
University of Florida, Gainesville, FL

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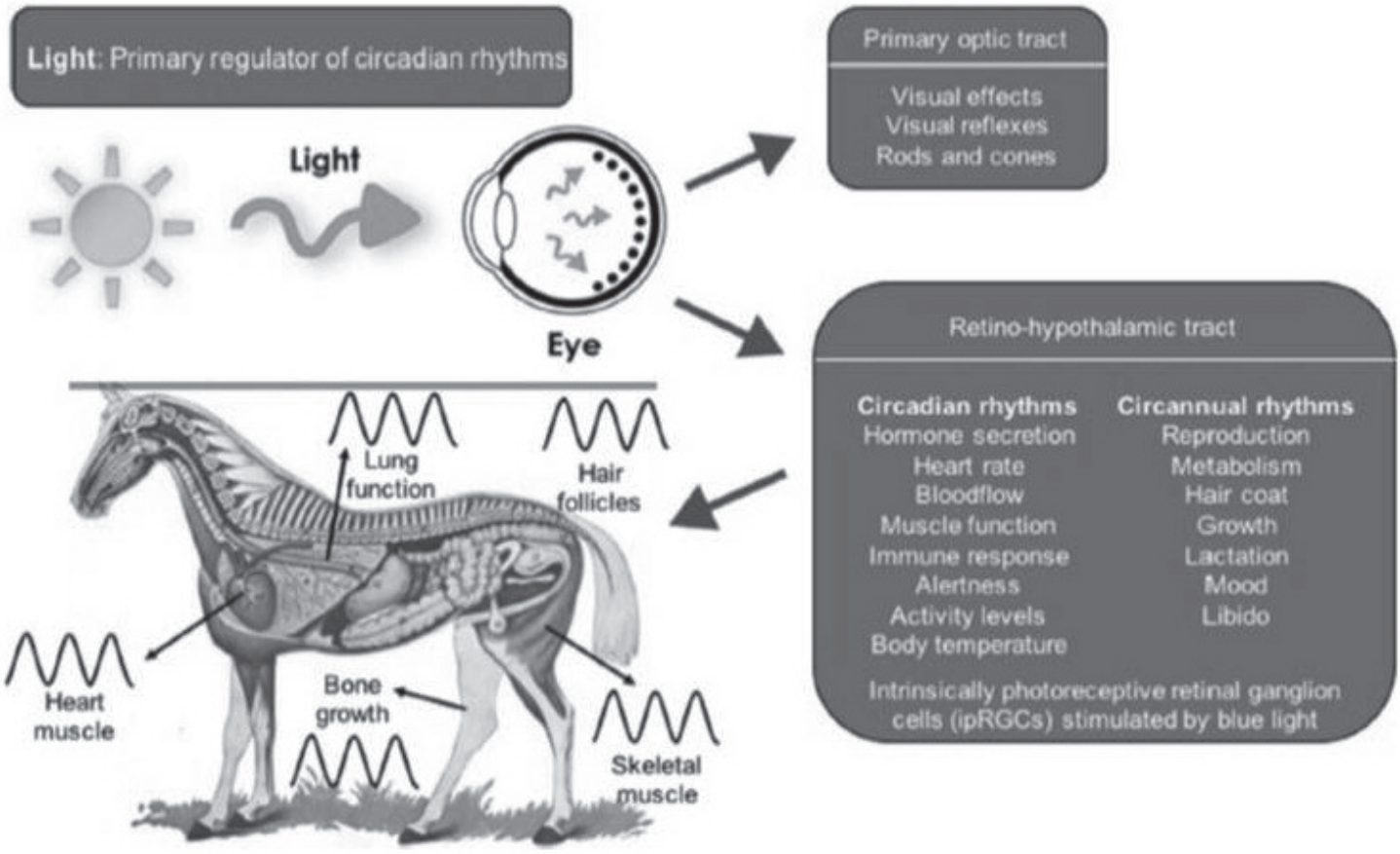
Importance of Equine Behavior Research
We already know a great deal about horse behavior, however…

notes:

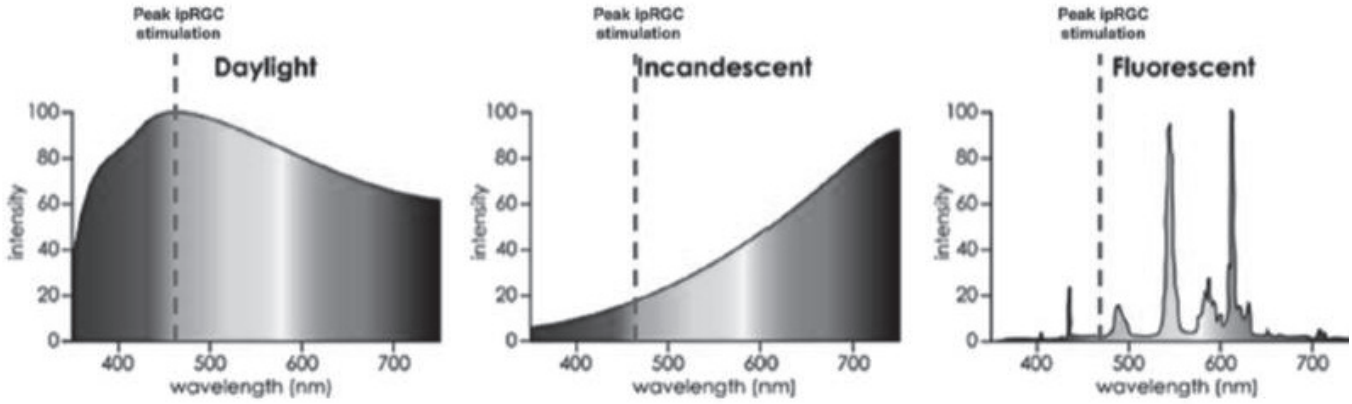


Circadian and Circannual Regulation in the Horse

Circadian – recurring on a 24-hr cycle

Circannual – occurs over the period of ~ one year

notes:



Spectral Composition of Natural Daylight Compared to Other Light Sources

Low-intensity Blue Light Suppresses Melatonin

Effective in advancing seasonal reproductive cycles, influencing gestation length, foal birth weight, and coat shedding

Absence of Light at Night Important for Healthy Functioning of Circadian System

Red light with wavelengths above 620 nm permit night time visibility without disrupting circadian rhythm and melatonin production

Human studies have demonstrated positive impacts of red light on daily brain activity, cortisol levels, sleep, and performance

Evidence for usefulness of red light in horse stables remains limited

Effects of Grazing Muzzles on Behavior and Physiological Stress

Grazing muzzles are an effective tool used to control weight in horses

Muzzles work by limiting intake

Reduced forage intake 30-83%

Used by 60% of owners of overweight equines in Maryland (Davis et al. (2019))

Use of Grazing Muzzles

Muzzling may inhibit natural behavior

Horses may experience stress
- Fractious, depressed, resentful

Conflicting recommendations for use
- 10 hours – Researchers to reduce rate of gain
- <12 hours – British Horse Society
- 24 hours – Anecdotal accounts by MD horse owners
- No recommendation – AAEP, AVMA, ASPCA

Assess the effects of muzzling for different lengths of time on behavior and physiological stress

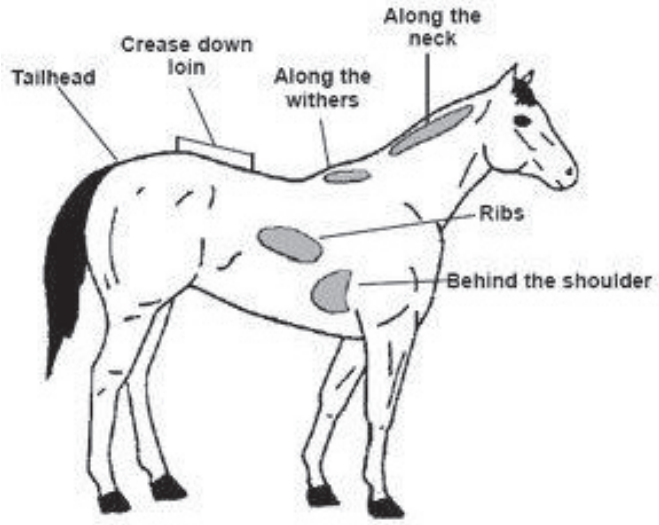
6 mature miniature horses (n=2 horses per treatment)
Three 21-day periods

Unmuzzled (M0), muzzled for 10 hours (M10), or muzzled for 24 hours (M24)Behavior

Muzzle acceptability score
- 1 – strongly accepts to 5 – strongly rejects
- Assessed daily at 8:30 AM

Developed ethogram to quantify % of time horses performed behaviors

Video recording 2x/week (AM and PM for 60 min each)



Physiological Measures

Body measurements
- BW, BCS, cresty neck score, body circumference

Physiological measures of stress
- Salivary cortisol

Findings

-M24 horses lost BW, M0 and M10 gained BW
-No differences between treatments for BCS, cresty neck score, or girth circumference
-M24 horses spent more time grazing than M10 horses
-M0 horses spent more time walking than M10 or M24
-No effect of treatment on salivary cortisol, frustration behaviors or muzzle acceptability score
-All horses were less accepting of muzzles between week 2 and 3

Auditory Stimuli for Horses

Consideration of music choices in the barn may be important for your horse's behavior and welfare

Music Genre's Effect on Horse Behavior

8 thoroughbred geldings stabled for three hours

Played four different music genres for 30-minutes each
- Classical (Beethoven)
- Country (Hank Williams Jr.)
- Rock (Green Day)
- Jazz (New Stories)

Detailed behavior observations recorded (120/horse/genre)

Horses also observed without music

Findings

Horses showed same balance of restful and alert behaviors during classical and country music and no music

Horses tended to eat more quietly with country than no music

Horses displayed more frequent stressful behaviors (compared to silence) with rock and jazz
- Stamping, head tossing, snorting, vocalizing, snatching food

Volume level of 21 decibels recommended

Does Music Influence Emotional State in Race Horses?

70 three−year−old Purebred Arabian horses in their first race season
- Divided into experimental group (n=40) and control group (n=30) and placed in separate barns

Experimental group was exposed to music (guitar music performed in a new age genre) played in the barn for 5 hours in the afternoon

Horses' emotional state was assessed at rest, saddling and warm−up walk under rider by measuring cardiac activity Measurements were taken six times, every 30 to 35 days (5-month study). Effect of music on horses' performance as determined by race records also evaluated

Stachurska et al. (2015)

Findings

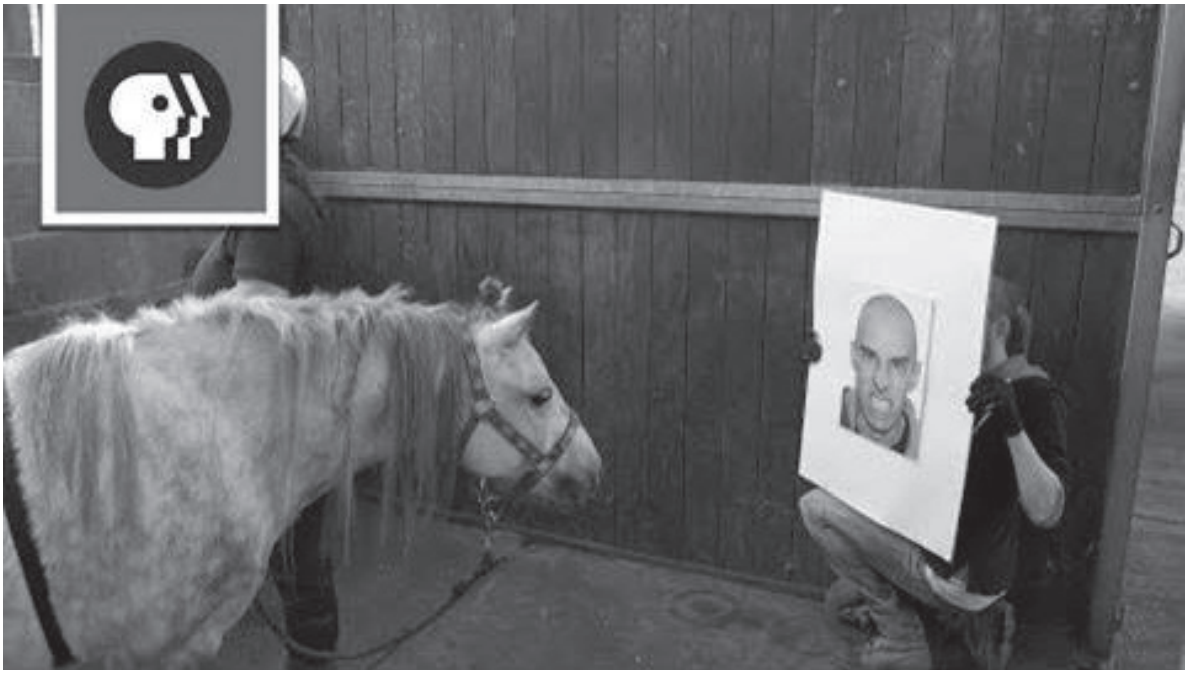
Music had a positive effect on the emotional state in racehorses (lower HR at saddling and at walk). Prizes won by horses exposed to music were greater compared to control.

Horses Can Read Human Expressions

McComb et al. (2016); Sussex University

Ongoing research

- Several studies underway to better understand and improve horse-human interactions
- Investigating horses' preferences and identifying the "happy" athlete (study of positive emotions in horses)
- Horse response to training methods and equipment
- Focus on improving horse health, performance and overall well-being and rider/handler safety



Saddle Fit for the Horse and Rider

Joel McQuagge
Department of Animal Sciences,
University of Florida

Comfort for the Horse
A proper fitting saddle for a horse may be likened to a comfortable boot for the rider. If the saddle does not fit, the horse may exhibit displeasure while being ridden, or performance may be compromised. Some horses will not bend or collect to their fullest potential. In severe cases actual physical injury may occur, with the horse developing "saddle sores".

In order to discuss saddle fit, one must first address proper placement of the saddle. A saddle should ride centered from right to left and positioned such that the bars of the tree are just behind the horse's scapula. Such placement will prevent interference with the animal's shoulders. The saddle should not rock up excessively in the hind end, but should pull down evenly on the horse's back. The angle and the rocker of the saddle tree's bars should follow the lines of the horse's back. If the saddle does not make contact with the back in the middle of the bars it is referred to as "bridging". Such a saddle will cause excessive pressure on the withers and in the loin area.

One must be aware that some horses may carry more muscle or fat on one wither side or the other. Bar contact changes with the addition of the rider's weight.

It is not uncommon to observe horsemen with the saddle positioned too far forward. Perhaps the saddle has tried to slip back into its proper position and the rider has resorted to a breast collar to hold it where he believes it should be. Some horses are quite forgiving of this transgression while others are more likely to show their displeasure.

Testing the Manufactured Saddle
In order to determine fit in a manufactured saddle where there is no record of the tree, ideally the saddle should be placed on the horse with the use of an adequate saddle pad. With the girth tightened and a rider mounted, the gullet must have adequate clearance above the horse's withers. The horse should then be ridden to the extent that he or she sweats under the saddle pad. The saddle may then be removed and the back examined for evenness of sweating. The back should also be palpated for signs of discomfort.

The Effects of a Poorly Fitting Saddle
The most common concern for many riders is the discovery of dry spots on each side of the withers. Dry spots are typically caused by excessive pressure concentrated in one area. The skin and hair follicles are compressed and the area does not sweat. Such spots are more common in young horses with immature backs. Many horses do not show pain when the spots are handled and the problem

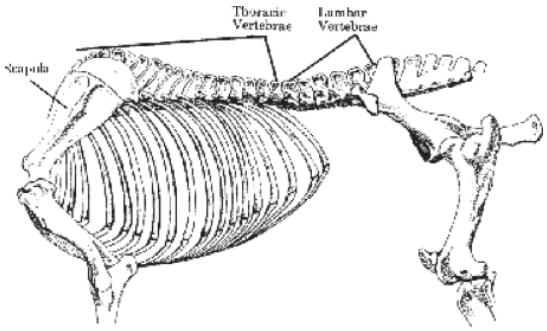

A saddle sitting nicely on a horse's back


View of a saddle tree placed correctly behind the scapula

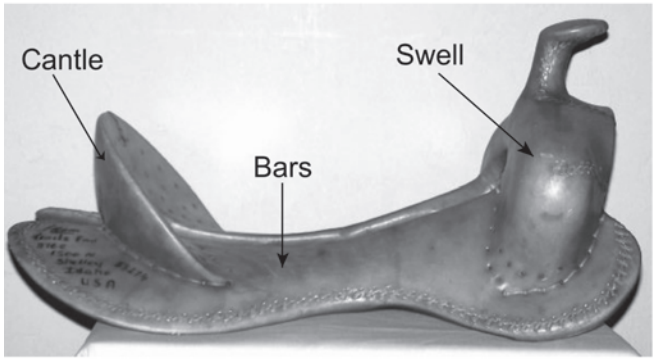
may be remedied with an adequate saddle pad. Dry spots with raised skin are cause for more serious concern, and may lead to saddle sores or white hair regrowth if the problem is not corrected. Soreness in the horse's loin may not be visibly seen, and requires palpation by the rider to identify. Pain in this area is generally caused by a bridging saddle, straight bar tips or skirt interference.

A nicely sweated back

Straight bars or improperly blocked skirts may also cause a horse discomfort if the horse has very prominent shoulders. Rubbing or pressure sores may occur at the leading edge of the skirts or just behind where the saddle tree's bars begin. Similarly a long, square skirted saddle on a short backed horse may cause interference at the points of the horse's hips. If a saddle does not have an adequate channel above the horse's spine it will cause pressure sores from the vertebrae rubbing the saddle pad.



When evaluating equine structure and saddle fitting, consideration must be given to changes that occur over an animal's life. As a horse matures, the vertebrae often become more pronounced and drop, making what some refer to as a "wither pocket". Many young horses carry a lot of fat on each side of the withers and this tissue disappears as a horse ages. Additionally, conditioning and amount of body fat affect a saddle's fit. In other words, the saddle that fits your horse in the winter may not fit as well after he has been turned out on summer pasture.



The Custom Saddle

The question is sometimes asked: Why should I spend $3,500+ on a custom saddle when a $1500 factory saddle will work fine and the answer is perhaps you don't need to. The question might better be stated: What should I get for my extra dollars spent? First off, a custom saddle from a mediocre saddle maker may certainly be no better than a higher quality factory saddle. A quality custom saddle should offer you much better fit for both horse and rider and a longer useful life for the saddle. Custom makers often use materials costing several times that of factory saddles and generally hand cut, shape and tool parts for a better fit. Additionally, having a saddle seat shaped to match your seat makes for a more pleasant day in the saddle. Riders should be cautious about having a saddle made to fit one particular odd backed horse as the saddle may not work on other animals. Additionally that horse's back will change as he ages and when the horse eventually dies, you are left with an odd saddle.

Saddle Pads

Saddle pads offer protection for the horse and the saddle. They should also help the saddle form-fit to the horse, provide shock absorption and help dissipate heat and sweat. In many saddlemaker's opinion, no material accomplishes this as efficiently as wool. Real wool felt and woven wool develop a memory when used on the same horse with the same saddle. This "memory" allows the pad to conform to the horse and compress where needed thereby filling voids and allowing more even pressure distribution. Wool also is second to none in wicking away moisture from a sweaty horse's back. Caution should be exercised when using synthetic foam and gel pads as some of these trap heat against a horse. This is perhaps not a factor for a horse ridden only an hour but may be a problem for the horse in harder work. Additionally, some gel pads actually concentrate pressure rather than spreading it. It should also be stated that more is not always better. Most western horses get along fine with 5/8" to 1" total padding. Rope horses and jumping horses may require more for additional shock absorption.

notes:

Body Condition Scoring of Horses

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Introduction

Equine body condition is primarily a function of the balance between a horse's intake and expenditure of energy and is affected by both external and internal factors. Availability and amount of feed and water, reproductive status, changes in weather, parasite load, performance demands, and dental abnormalities are all factors that may influence the body condition of horses. This system of appraisal is based on the amount and proportion of fat and muscle present on an animal. A numerical value 2 (emaciated) to 8 (very fat) is assigned to horses based on visual appraisal and palpable fat cover at six areas of the horse's body (Fig. 1). These areas can be described in such detail as to provide the equine appraiser with a visual image for scoring (Table 1). To accurately determine body condition, horsemen must rely on both visual observation (what the horse looks like), and manual palpation (what the horse feels like). The technique of evaluating and quantifying a horse's body condition is a tool horsemen can use for nutrition and reproduction management decisions.

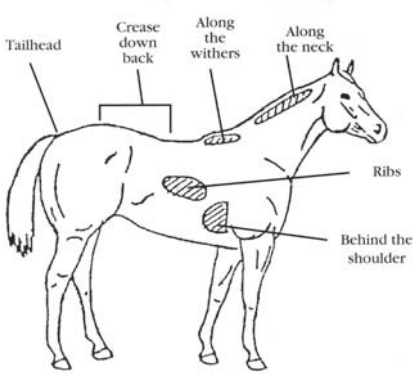

Figure 1. *Diagram of areas emphasized in condition score.*

Body condition of horses is affected by both external and internal circumstances. Availability and amount of feed, water, reproductive status, changes in weather, parasite control, performance demands, and dental abnormalities are all factors that influence the body condition of horses.

This visual method of assessing horses may be used to supplement regular weighing programs. Body condition or change in body condition is a more reliable indicator of nutritional status than liveweight or change in liveweight. It is important to note that all horses of the same weight will not necessarily have the same body condition score. For instance, a 1200 pound horse may either have high or low body condition score depending on the animal's frame size, muscling and fat deposition. Each animal is scored according to its individual characteristics.

Reproductive performance of broodmares is also related to condition score. Poor body condition of broodmares (below BCS 5) has been shown to:

- increase number of days to first estrus
- require more services per conception
- increase foaling intervals
- lower percentage of pregnant mares

Evaluating Body Condition

It is not difficult to learn how to evaluate equine body condition. Initially, almost all horsemen will be able to recognize the difference between BSC 2 and BSC 5.

Minor differences may be more difficult to detect until scoring has been practiced. Condition scoring requires a modest amount of training and will improve with experience.

First, know the definition of Body Condition Score 5. A BCS 5 horse will look average - neither fat nor thin. The ribs cannot be seen, but can be easily palpated. The horse's back will be level and the body will appear smooth. In addition, definition of muscling on the hind legs will be apparent.

Figure 2.

After a mental picture of a BCS 5 has been established, this image can be used as a benchmark for determining other condition scores. Condition scores of 4 or higher generally reflect fat deposition, whereas BCS 3 or lower often reflects both fat and muscle loss.

Second, visually and manually evaluate the amount of fat deposition and muscling as it occurs on the following sites:

- ✓ behind the shoulder
- ✓ ribs at mid-barrel
- ✓ crest of neck
- ✓ withers
- ✓ crease of the back, and
- ✓ at the tailhead.

Third, consider external and internal factors. Fill or shrink from digestive contents and/or pregnancy can change the appearance of moderately fleshed horses. Long hair may also make it difficult to visually appraise body condition. When horse are difficult to evaluate visually, the amount of body fat in relation to musculature must be determined by feel.

Finally, compare result of direct observation and manual palpation with the descriptions of body condition scores given in Table 1.

Table 1. Description of Body Condition Scores

BCS	Description
2	**Emaciated** No evidence of any fat deposits. Bony structure of ribs, spinal column and hips prominent. Animal may show signs of weakness and/or uncoordination when asked to move.
3	**Very Thin** Very little evidence of fat deposits. Spinal column is the highest part of the horses back from the withers to the tailhead.
4	**Thin** Ribs are evident. Spinal column is the highest part of the horses back from the withers to the croup. A slight amount of fat may be felt around the tailhead.
5	**Desired Condition** The horse's body is smooth. Ribs are not visually evident, but are easily felt. Back is level, no crease or ridge noticeable. Withers are rounded, shoulders and neck blend cleanly into the body. Fat around the tailhead will feel spongy. Muscles of the hind leg are evident.

Table 1. Description of Body Condition Scores (cont.)

BCS	Description
6	**Excess Condition** Moderate pressure needed to feel ribs. Horse may have crease down back. Fat deposits around the tailhead will feel soft. Fats deposits may be readily felt behind the shoulder and along the crest of the neck. Areas between muscles beginning to fill with fat.
7	**Fat** Ribs are difficult to feel. Crease down back; croup filled with fat. Fat around tailhead very soft; area along withers and behind shoulder filled with fat. Noticeable thickening of neck, fat deposits along inner thighs. Muscle definition no longer apparent.
8	**Very Fat** Excessive pressure needed to feel ribs. Definite "gutter crease" down back with extensive fat deposits over much of the body. Soft patchy fat: over ribs, around tailhead, along withers, behind shoulders, and along the neck. Fat on inner thighs may rub together.

Recommendations

- Adjust feeding program to ensure adequate energy intake from a forage-based diet
- For horses below BCS 5, provide higher quality forages or higher levels of energy supplements balanced with protein to reduce weight loss or improve condition score
- Provide free-choice mineral year-round
- Control disease and parasites by developing an appropriate herd health program (Consult your veterinarian)

Summary

When performed on a regular basis, condition score may be used to provide an overall view of the nutritional status of the herd as well as individual horses in the herd. Condition score is a helpful tool in determining the amount and type of forage, concentrate, and supplement needed.

Adjustments of condition score should be made prior to breeding (Table 2). Research has shown higher conception rates with fewer services for mares that enter the breeding season with a BCS 5 or greater (Henneke, et al., 1984). Even though excess body fat was not shown to adversely affect conception rates, obese mares may: experience difficulty foaling, produce less milk, and be more prone to laminitis problems.

Table 2. Adjusting Concentrate Intake

Score	Condition	Adjustment
3 or less	Very thin	+40%
4	Thin	+20%
5	Desired cond.	0
6	Excess cond.	-20%
7	Fat	-40%
8	Very fat	-60%

Monitoring Body Conditions in Horeses: Helpful Smart Phone Apps for Horse Owners

Maintaining proper body condition is vital to horse health, performance, and welfare. The Body Condition Scoring (BCS) scale developed by Dr. Henneke is a method of evaluating the amount of fat on a horse's body. This system is used by equine nutritionists, veterinarians, agriculture law enforcement personnel, horse farm managers, and horse owners to accurately assess a horse's condition. The scale ranges from one to nine, with 1 being very thin and 9 being obese. The level of condition is evaluated based on visual assessment and palpation of fat deposits. The areas of the horse's body emphasized in BCS are shown in (Figure 1).

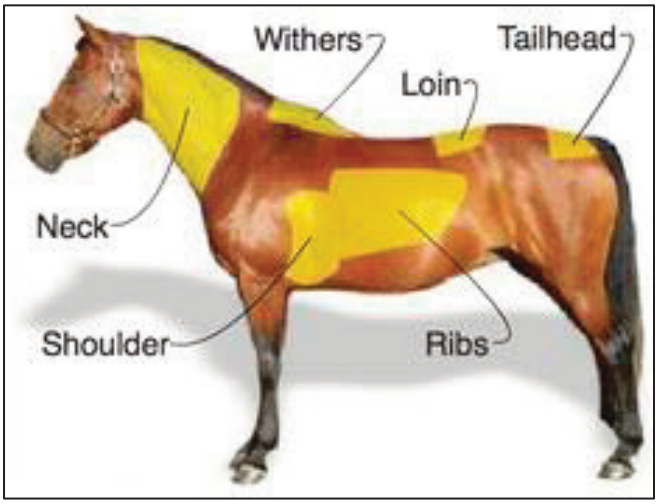

Figure 1. Areas of the horse's body used to evaluate and assign a body condition score (BCS).
Image courtesy of the eXtension Horses BCS App.

The ideal BCS for a given horse should be 5 to 6 out of 9, however the recommended body condition score may vary depending on the stage of production. For example, horses in heavy race training would be expected to have a BCS of 4 to 5, and a BCS of 6 is considered ideal for broodmares entering the breeding season. Many factors can affect a horse's body condition including food availability, exercise/work activities, season/weather, parasites, dental problems, and feeding management practices. Becoming familiar with how to evaluate body condition and including BCS monitoring as part of your management will allow you to keep your horse(s) at a healthy weight. Assessing the condition of your horse(s) can help you more quickly identify and alert your veterinarian to potential problems.

Newly developed tools are available to assist horse owners and farm managers with recording and monitoring BCS in horses. The Horse BCS App developed by eXtension Horses is available for Smart Phones through iTunes and Google Play for a cost of $1.99. The app includes both learn and score features as well as video tutorials on how to assess BCS. The app allows you to take a picture of the horse and to assign a score taking into account each of the six areas of the horse's body used to evaluate BCS. The picture and BCS are date stamped and archived for future reference allowing comparison between previous and later scores (e.g. at different time points throughout the year). Other useful BCS and body weight calculator apps for horses include the Horse Health Tracker App developed by Equine Guelph *(http://www.equineguelph.ca/Tools/app.php)*, and the Healthy Horse App developed by the *University of Minnesota (http://license.umn.edu/technologies/20130294_healthy-horse-appcalculates-weight).*

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UF IFAS Extension UNIVERSITY of FLORIDA

SS-AGR-08

Weed Management in Pastures and Rangeland—2018[1]

B. A. Sellers[2]

Weeds in pastures and rangeland cost ranchers in excess of $180 million annually in Florida by reducing forage yield, lowering forage quality, and causing animal injury through toxicity or specialized plant organs (thorns and spines). Effective weed management begins with a healthy pasture. Weeds are seldom a serious problem in a well-managed, vigorously growing pasture. Good pasture management involves the proper choice of the forage species and variety, an adequate fertility program, controlled grazing management, and pest management (weeds, insects, and diseases).

If pasture health declines, weeds will exploit the situation and become established. Bare ground is the perfect environment for establishment of weeds. Once established, weeds must be controlled with mechanical or chemical methods. However, unless the pasture-management problem that caused forage decline is corrected, the grass will not re-establish and weeds will re-infest the area.

Integrated weed management is both an economically and environmentally sound approach to weed management. An integrated approach involves scouting, prevention, and control (biological, cultural, mechanical, and chemical) in a coordinated plan.

Scouting

Scouting pastures is the foundation of a sound weed management program but is often overlooked. Scouting involves routinely walking or driving through pastures and identifying weeds. This defines the scope of the problem and allows the best management practices to be implemented in a timely fashion. The number of weeds, the species present, and their locations are important. Note the dominant species as well as uncommon or perennial weeds. The management strategies adopted should focus on controlling the dominant species, while preventing the spread of less common species. If not managed proactively, the less common weeds in a pasture may become future dominant weed problems.

Proper identification of weeds is the first step toward weed control. A good example is knowing the difference between tropical soda apple (TSA) and red soda apple (cockroach berry). Of the two, only TSA is a troublesome invasive weed that must be controlled. However, some have occasionally confused the two species and allowed TSA to go uncontrolled. Unfortunately, this costly mistake results in TSA spreading throughout the ranch and potentially onto neighboring ranches. If there are questions concerning weed identification, contact your local UF/IFAS Extension office for assistance.

1. This document is SS-AGR-08, one of a series of the Agronomy Department, UF/IFAS Extension. Original publication date January 2000. Revised February 2009, February 2010, March 2011, January 2012, January 2013, January 2014, February 2015, December 2015, December 2016, February 2017, and January 2018. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. B. A. Sellers, associate professor, Agronomy Department, UF/IFAS Range Cattle Research and Education Center, Ona, FL 33865.

Some weeds grow best in wet sites (maidencane ponds, depressional areas, ditches, etc.), while others can be found on dry sites (ditch banks, upland areas, and fence rows). Scout pastures for weeds in conjunction with other activities, such as checking calves, working cattle, and feeding. When a weed is first discovered, remove it or spot treat with an appropriate herbicide. Do not allow that one plant to produce seed and give rise to hundreds of new plants. It is less expensive (in terms of both time and money) to control one plant than to wait and have to control hundreds of plants.

Poisonous plants (e.g., *Crotalaria*, black nightshade, spiny pigweed, lantana, etc.) are commonly found throughout Florida. Animals do not usually choose to graze most poisonous plants when forage is abundant; however, when quality forage is limited because of poor growing conditions or overstocking, they may graze these plants.

Prevention

Prevention is any activity that keeps weeds from infesting a pasture. Most weeds spread by seed. Thus, preventing the movement of weed seeds onto the ranch reduces potential weed pressure. Weed seeds can be transported in hay, harvested grass seed, sod, cattle, mowing equipment, or dispersed by wind, water, and wildlife. Producers should avoid buying hay or grass seed that is contaminated with weed seeds. Refuse to purchase hay from someone who cannot provide a weed-free product. Using certified forage seed reduces weed seed contamination and is highly recommended.

Also, consider TSA. Cattle have been shown to excrete TSA seeds for at least 7 days after consumption. If cattle are grazing in a TSA-infested pasture, it is recommended that the cattle are held in a clean area for 10 days before moving them to a new pasture. This will reduce the likelihood of transporting TSA seeds. Remember, an ounce of prevention is worth a pound of cure.

Control

Cultural Control

Cultural practices improve weed control by increasing the competitiveness of the forage. This involves optimizing forage production through monitoring soil pH, fertility, and, potentially, water management. Generally speaking, a thick sward will prevent weed emergence, will outcompete emerged weeds, and will capture the majority of environmental resources (light, water, nutrients) necessary for growth. The aim of cultural practices is to modify your management program so that the sward is as competitive as possible.

Soil pH is an important factor for forage growth as well as weed establishment. Forage agronomists and soil scientists at the University of Florida have determined the optimum soil pH for most forages grown in Florida. Acidic soils limit plant growth and can result in aluminum and manganese toxicity, and magnesium, calcium, phosphorous, molybdenum, and potassium deficiency. Soil acidity may also result in poor root growth, which can reduce water and nutrient uptake. Weeds that grow under such conditions can be indicators of low soil pH. For example, crowfoot grass germination is optimum at soil pH levels between 4 and 5, which is too low for optimum forage growth. Thus, the presence of crowfoot grass in your pasture may warrant a soil test and corrective action.

Mechanical Control

Mowing is one of the most often used weed control methods in pastures. Mowing improves the appearance of a pasture, temporarily increases forage production, and, if properly timed, prevents weeds from producing seed. Mowing is generally more effective on broadleaf weeds than grass weeds and is more effective on annual weeds than perennial weeds. Carefully consider the cost of mowing and the anticipated effectiveness. As fuel prices increase, it may be more cost-effective to avoid mowing and use other forms of weed control since other weed control methods may be more effective on a given species.

Mechanical weed control does have drawbacks. Large weeds with extensive root systems will not be controlled through mowing alone. Additionally, mowing misses prostrate-growing weeds like crabgrass, spurges, and matchweed. Mowing can also spread vegetative plant stems, allowing the plant (e.g., prickly pear) to root elsewhere. If mowing is performed after seed set, seeds can accumulate on the mowing equipment and worsen the weed problem by spreading seed to other pastures.

Biological Control

Biological control involves the use of biotic agents (e.g., plants, herbivores, insects, nematodes, and phytopathogens) to suppress weeds. Overall, biological control is still in its infancy, but great strides are being made, especially against invasive plants. Two good examples are the tobacco mild green mosaic tobamovirus (TMGMV), and the newly released insect, *Gratiana boliviana*, both used for TSA control. The virus TMGMV can be sprayed to control

existing TSA plants, while the beetle is used primarily for suppression.

Most biological control agents rarely provide complete weed control, but they usually suppress the weed population to a manageable level. Additionally, biological control agents are rarely fast-acting, so time is needed for the agent to suppress a given weed population. For example, the effect of *Gratiana boliviana* is not often seen until the year following the release of the beetle.

Chemical Control

Chemical weed control includes the use of herbicides. Herbicides kill weeds by inhibiting plant processes that are necessary for growth. Herbicides should be selected based on forage species being grown, weed species present, cost, and ease of application. Application method and environmental impact should also be considered.

Proper herbicide choice and application rate are extremely important. Lower-than-recommended application rates will not provide consistent weed control, while excessive application rates may cause injury to the forage or result in only killing the above-ground portion of perennial weeds. Also, herbicides must be applied at the correct time to be cost-effective.

Preemergence applications are made before weeds germinate and emerge. Understanding the life cycle of the weed is important when using a preemergence herbicide. Some weed seeds germinate in the summer, while others germinate in the winter months. Always refer to the herbicide label for additional information about controlling specific weeds.

Postemergence applications are made after the weeds emerge. The most effective and cost-efficient applications are made when the weeds have recently emerged and are small. For perennial weeds (regrowing from root storage organs), it is advisable to allow them to bloom before spraying, which allows sufficient leaf surface for coverage and ensures that the perennial is transporting photosynthates back to the roots.

Postemergence herbicides may be broadcast over the entire pasture or may be applied as a spot treatment to sparse weed patches. Spot treatment is less costly compared to broadcast spraying. Other application methods include wipers and mowers that dispense herbicide while mowing the weed. In all cases, it is extremely important to carefully read the herbicide label before purchase to determine if that herbicide controls the weeds in your situation.

PRECAUTIONS WHEN USING PHENOXY OR BENZOIC ACID HERBICIDES

1. For information about growth-regulating herbicides not covered below, see UF/IFAS Publication SS-AGR-12, *Florida's Organo-Auxin Herbicide Rule 2015* (http://edis.ifas.ufl.edu/wg051).

2. Application of other pesticides from sprayers previously used for 2,4-D, dicamba, or other phenoxy or benzoic acid herbicides to susceptible crops may result in injury.

3. Legumes in pastures or rangelands will be injured or killed by these herbicides.

4. Avoid drift to susceptible crops by applying at low pressures and when wind speeds are low and blowing away from susceptible crops. The use of a drift-control additive is advisable.

5. Clean sprayer thoroughly with household ammonia as follows:

    a. Flush system with water. Drain.

    b. Flush the system with ammonia (1 qt ammonia per 25 gallons water); let it circulate for at least 15 minutes, then flush the system again. Drain again.

    c. Remove screens, strainers, and tips, and then clean in fresh water.

    d. Repeat step 5b.

    e. Thoroughly rinse the tank, hoses, booms, and nozzles.

    f. Be sure to clean all other associated application equipment.

Forage Tolerance

Not all cultivars of a particular forage species respond similarly to a given herbicide (Table 5). 'Argentine' bahiagrass tolerates most pasture herbicides except Roundup, while 'Pensacola' may be severely injured by metsulfuron-containing products, such as Cimarron and others. All herbicides may be used on stargrass and bermudagrass, with some level of injury from Velpar (hexazinone). *Hemarthria*, also known as limpograss, is the most sensitive to herbicide applications of all forage grasses grown in Florida.

It is important to realize that the response observed from an herbicide application can vary. For example, the chance

for forage injury can increase or decrease as the rate of herbicide applied either increases or decreases. Additionally, environmental conditions such as high temperature and high relative humidity may increase the potential for herbicide injury. For example, we have observed little or no injury to limpograss from 8 pt./acre 2,4-D amine when applied under cooler conditions, while 4 pt./acre in warmer weather caused moderate to severe injury.

The response of forages in Table 5 is for established forage cultivars. However, 2,4-D + dicamba (2 pt./acre) can be applied to sprigged forage cultivars, except for limpograss, seven days after planting/sprigging. A forage can be considered established when at least three tillers are present on bahiagrass or at least 6 in. of new stolon growth is present on sprigged forages.

Summary

Maintaining healthy, productive pastures will minimize the risk associated with weedy plants. Good pasture management practices such as adequate fertilization, insect control, and controlled grazing will result in healthy pastures. Unfortunately, weeds are present in pastures and the associated loss in forage production can have serious economic implications. An integrated weed management strategy involving prevention, detection, and control is the most economical and environmentally friendly approach to pasture weed management.

notes:

Table 1. Weed control in pastures and rangeland.

Trade Name and Rate of Commercial Product Per Acre	Common Name	Remarks
DURING ESTABLISHMENT		
Preemergence to Weeds		
2,4-D Several Brands[1] 1.0–2.0 qt. of 4 lb./gal. formulation	2,4-D amine or LV ester 1.0–2.0 lb.	**Bermudagrass and stargrass only.** Apply after sprigging and before emergence of sprigged bermudagrass. Will not give complete weed control; however, short residual control of seedling broadleaves, sedges, and certain grasses may be noted for 2–3 weeks, if proper environmental conditions exist.
Diuron 4L 1.5–4.5 pt. or Diuron 80 1–3 lb.	Diuron 0.8–2.4 lb.	**Bermudagrass only**. Will provide fair to good control of crabgrass, crowfootgrass, and goosegrass. Plant sprigs 2 inches deep. If sprigs have emerged at time of application, bermudagrass injury will occur. Do not graze or cut hay within 70 days. Before application, ensure that your product has proper labeling, since not all Diuron products are labeled for use in pastures. Do not use this herbicide when planting tops.
2,4-D + dicamba[1] (Weedmaster, others) 2 pt.	dicamba + 2,4-D	**Bermudagrass and stargrass only.** Similar to 2,4-D, but often provides greater weed control. Short residual control of seedling broadleaves, sedges, and certain grasses may be noted for 2–3 weeks if proper environmental conditions exist. **Do not apply to limpograss (*Hemarthria*).**
Postemergence to Weeds		
2,4-D Several Brands[1] (0.5–1.0 qt. of 4 lb./gal. formulation)	2,4-D amine	**Do not apply to bahiagrass until plants are 5"–6" tall. Do not apply to limpograss (*Hemarthria* sp.).** Bermudagrass can tolerate 2,4-D at any growth stage. Controls most seedling broadleaf weeds. Repeat application may be needed.
2,4-D + dicamba[1] (Weedmaster, others) 2 pt.	dicamba + 2,4-D	Can be used during establishment of hybrid bermudagrass, stargrass, and pangolagrass. Annual sedges and some grasses will be suppressed if less than one inch at time of application. Best results are seen if applications are made 7–10 days after planting. **Do not apply to limpograss (*Hemarthria*).**
Banvel, Clarity, Vanquish 1.5–2 pt.	dicamba	Primarily used for establishment of limpograss (*Hemarthria*). Annual sedges and some grasses will be suppressed if less than one inch at time of application. Best results are seen if applications are made 7–10 days after planting.
ESTABLISHED STANDS		
Dormant Pastures		
Gramoxone SL 1-2 pt.	paraquat	For **dormant** bermudagrass or bahiagrass. Apply in 20–30 gallons of water in late winter or early spring (probably in January or February) before grass begins spring green-up. Add one pt. surfactant (non-ionic) per 100 gal. spray mix. Do not mow for hay until 40 days after treatment. Can be mixed with 2,4-D or other herbicides for more broad-spectrum control.
Prowl H_2O 1.1–4.2 qt.	pendimethalin	Applications of 3 qt/ac. have provided satisfactory weed control, but late-season escapes should be expected. Provides preemergence control of crabgrass, goosegrass, Texas panicum, sandbur, and other summer annual grasses. Must have activating rainfall or irrigation within two weeks or control will be minimal at best. Does not control plants that have already emerged.
Roundup Weathermax (or other 5.5 lb formulations) 11 fl. oz. or Roundup Ulta (or other 4 lb formulations 16 fl. oz.)	glyphosate	Apply in mid- to late-winter months to bermudagrass or bahiagrass pastures and hayfields for the control of weedy grasses. Apply before new growth appears in the spring. Bermudagrass that is not dormant at the time of application may show a 2–4 week delay in green-up. No restrictions exist between application and grazing or haying.
Non-Dormant Pastures		
2,4-D Several Brands [1] 2.0–4.0 pt. of 4 lb./gal. formulation	2,4-D amine **or** LV ester 1.0-2.0 lb.	**Broadleaf weeds.** Annual weeds should be treated soon after emergence for best control with lower rates. Perennial weeds should be allowed to obtain a leaf surface large enough to allow sufficient spray coverage (about 12"–18" tall). Use amine formulations during warm weather and LV esters during cool weather. Avoid drift. Applications of 2,4-D to limpograss (*Hemarthria* sp.) will cause significant injury during periods of high temperatures and humidity; much less injury has been observed during cool and dry conditions.

Trade Name and Rate of Commercial Product Per Acre	Common Name	Remarks
Banvel[1], Clarity, Vanquish 0.5–2.0 qt	dicamba	**Broadleaf weeds.** Rate depends on weed species and size. Refer to the label for grazing restrictions. Avoid drift. *Hemarthria* has generally exhibited more tolerance to dicamba than 2,4-D.
Chaparral 2.0–3.3 oz.	metsulfuron + aminopyralid	Use on bermudagrass, pangolagrass, stargrass, and limpograss. Do not use on bahiagrass. Controls tropical soda apple, pigweed, blackberry, and many other problematic weed species. Will not control dogfennel. Add a non-ionic surfactant at 1–2 pt./100 gal. of solution. Avoid applications during spring green-up.
Cimarron Plus 0.125–1.25 oz. or Cimarron Xtra 0.5–2.0 oz./ac.	metsulfuron + chlorsulfuron	Use on bermudagrass, pangolagrass, and stargrass. Controls several cool-season broadleaf weeds, pigweeds, and Pensacola bahiagrass. Bermudagrass should be established no less than 60 days prior to application. Add a non-ionic surfactant at 1–2 pt./100 gal. of solution. Avoid application during spring green-up.
Cimarron Max Part A (0.25–1.0 oz.) Part B (1.0–4.0 pt.)	Part A—metsulfuron Part B—2,4-D + dicamba	Cimarron Max is a two-part product that should be mixed at a ratio of 5 oz. *Part A* to 2.5 gallons *Part B*. Depending on the weeds present and the rate range that is selected, this mix will treat between 5 to 20 acres. For specific information on rate selection, consult the product label.
GrazonNext HL[1] 1.6–2.1 pt.	aminopyralid + 2,4-D	Excellent control of TSA, horsenettle, and other members of the nightshade family. Also controls pigweeds and other broadleaf weeds including less than 20" dogfennel. Do not apply more than 2.1 pt./ac./yr. Do not apply to desirable forage legumes or severe injury and stand loss will occur. Do not apply to limpograss. GrazonNext will pass through animals and remain in the waste. Do not mulch sensitive crops with manure if animals have been grazing on GrazonNext-treated pastures. Avoid applications of this product to limpograss pastures during hot and humid conditions.
MSM 60, others 0.3–1.0 oz.	metsulfuron	Use on bermudagrass, pangolagrass, and stargrass. Controls several cool-season broadleaf weeds, pigweeds, and Pensacola bahiagrass. Bermudagrass should be established no less than 60 days prior to application. Add a non-ionic surfactant at 1–2 pt./100 gal. of solution. Avoid application during spring green-up.
Impose or Panoramic 4–12 fl. oz.	imazapic	DO NOT apply to bahiagrass. DO NOT apply during spring transition or severe bermudagrass or stargrass injury will occur. In summer months, expect 3–4 weeks of bermudagrass stunting after application, followed by quick recovery and rapid growth. This will reduce harvest yields of that cutting by 30%–50%. If this yield reduction is not acceptable, do not use these herbicides. Yield reductions of subsequent cuttings have not been observed. For control of crabgrass, sandspur, nutsedges, and vaseygrass, use 4 oz./ac. For suppression of bahiagrass, use 12 oz./ac.
Milestone 3–7 oz.	aminopyralid	Excellent control of tropical soda apple, horsenettle, and other members of the nightshade family. Controls pigweeds and other broadleaf weeds, but does not control blackberry or dogfennel. Can be safely applied under trees. Do not apply more than 7 oz./ac./yr. Do not apply to desirable forage legumes or loss of stand will occur. The use of a non-ionic surfactant is recommended. Milestone will pass through animals and remain in the waste. Do not mulch sensitive crops with manure if animals have been feeding on Milestone-treated pastures. Safe on limpograss.
Outrider 1.0–1.33 oz.	sulfosulfuron	Safe to apply to established bermudagrass and bahiagrass. Provides excellent control of annual and perennial sedges.
Pastora 1–1.5 oz.	metsulfuron + nicosulfuron	**Established Bermudagrass Only**. Can be used to effectively control seedling crabgrass, sandbur, vaseygrass**,** and established johnsongrass. Established vaseygrass will require retreatment for long-term control. If sandbur or crabgrass is greater than 4" tall, only seedhead suppression should be expected. Do not apply more than 2.5 oz**/**ac./yr. Do not apply to limpograss or bahiagrass due to high injury potential.
PastureGard HL[1] 1–2 pt.	triclopyr + fluroxypyr	Provides excellent control of dogfennel, blackberry, teaweed, and other broadleaf weeds. Less effective on tropical soda apple than triclopyr-ester (Remedy Ultra, others) alone. Forage legumes will be severely injured or lost if present at time of application. Applications of 2 pt/A may result in less than desirable weed control. Do not apply more than 8 pt./A per season. Surfactant should be added to spray mixture at 0.25% v/v.

Trade Name and Rate of Commercial Product Per Acre	Common Name	Remarks
Prowl H_2O 1.1–4.2 qt.	pendimethalin	Apply only to established perennial warm-season grasses including bahiagrass and bermudagrass grown for forage or hay production between cutting or grazing events. DO NOT apply to bermudagrass and other warm-season grasses after greenup in the spring before the first cutting. DO NOT apply when surface water is present. Maximum application per year is 4.2 qt/acre. Provides preemergence control of annual and some perennial grass weeds, but does not control existing plants.
Remedy Ultra, others 2 pt.	triclopyr ester	Provides excellent control of herbaceous and certain woody plants in pasture and rangeland. For best results, apply in 30 or 40 gallons of water per acre. The addition of a non-ionic surfactant at 0.25% v/v will increase control. Applications at air temperatures >85˚F may cause moderate to severe bermudagrass injury for 2–3 weeks.
Roundup Weathermax 8–11 fl. oz./ac.	glyphosate	For control of annual grasses in bermudagrass and stargrass. Apply immediately after hay removal, but prior to regrowth. Applications made after regrowth has occurred will cause stunting. Application rates as low as 6 oz./ac. are often effective for crabgrass and other small annual grass weeds. Do not apply more than 2 qt./ac./year. If Roundup Weathermax is applied to a dormant pasture, it cannot be sprayed again that season. Be sure to read the label of the particular brand prior to purchase to ensure that the application site is labeled for use.
Sandea 0.67 – 1.33 oz	halosulfuron	Safe to apply to bahiagrass, bermudagrass, and stargrass for annual and perennial sedge control. Does not control Surinam sedge. Do not apply more than 1.33 oz per acre in a 12 month period.
Telar 0.1–1.0 oz.	chlorsulfuron	For use on established warm-season forage grass species. Telar will control blackberry, pigweeds, wild radish, and selected winter weeds. Not effective on ragweed, tropical soda apple, and other common weeds. Ryegrasses will be severely injured or killed by Telar. Do not apply more than 1.3 oz./ac./yr. There are no grazing restrictions for any animals.
2,4-D + dicamba[1] (Weedmaster, others) 0.5–4.0 pt.	dicamba + 2,4-D amine	See remarks for 2,4-D and dicamba above. This mixture is usually more effective than either herbicide used alone.
Hard-To-Kill Perennial Grasses		
glyphosate 1.3–4. oz per gal	glyphosate 1%–3% solution for hand sprayer	**Spot treatment.** Apply when perennial weeds are actively growing. Surrounding forage will be killed if sprayed.
glyphosate 4–8 qt. to 2 gal. water	glyphosate 33%–50% solution	**Wiper application.** Apply at speeds up to 5 mph. Two passes in opposite directions. No more than 10% of any acre should be treated at one time.
Smutgrass		
Velpar L/Tide Hexar 2.75–4.5 pt., Velossa 2.29–3.75 pt. or Velpar DF 0.9–1.5 lb.	hexazinone	Apply hexazinone to established stands of bermudagrass or bahiagrass when soil conditions are warm and moist and weeds are actively growing. Best control of smutgrass is usually achieved in late spring to early summer when regular rainfall occurs. Some temporary yellowing of the bermuda or bahiagrass will be noted, but plants will soon outgrow this effect. Apply hexazinone by ground equipment only, and only **one** application is allowed per year. **KEEP SPRAYS WELL AWAY (AT LEAST 100 ft.) FROM THE BASE OF DESIRABLE TREES, ESPECIALLY OAKS.** Check label instructions for further precautions and safe use suggestions.
Pensacola Bahiagrass		
MSM 60, others 0.3 oz.	metsulfuron	Apply to bermudagrass hay fields early in the season, after bahiagrass green-up but prior to seedhead formation. Early applications are often most effective; fall applications rarely control bahiagrass. Do not apply with liquid fertilizer solutions, as poor control may occur. Prolonged periods of dry weather prior to application will greatly decrease herbicide effectiveness. Always include a non-ionic surfactant at a rate of 0.25% v/v. Common or 'Argentine' bahiagrass will not be effectively controlled. Pasture legumes will be severely injured or killed.

Trade Name and Rate of Commercial Product Per Acre	Common Name	Remarks
Cimarron Plus 0.5 oz. or Cimarron Xtra 1.0 oz.	metsulfuron + chlorsulfuron	Same as metsulfuron.
		Cogongrass
Roundup, others 4 to 6 fl oz/ga	glyphosate 3 to 5% solution for hand sprayer	For spot treatment of cogongrass. For best results apply in the fall prior to frost. Applications to the entire patch plus an additional 5 ft beyond the patch is beneficial. Late fall treatment is typically better than spring treatments.
Roundup, others 128 oz.	glyphosate	For broadcast treatment of cogongrass infestations. Burning followed by 6 weeks of regrowth tends to improve control over treating long-established cogongrass stands. Late fall treatment is typically better than spring treatments.
Arsenal, others 1.4 fl oz/gal	imazapyr 1% solution for hand sprayer	For spot treatment of cogongrass. Do not apply near areas with desirable hardwood trees. Provides longer-term control than glyphosate. Applications to the entire patch plus an additional 5 ft beyond the patch is beneficial. Late fall treatment is typically better than spring treatments. **DO NOT** treat more than 1/10 of the available area to be grazed or cut for hay.
Arsenal, others 48 oz/acre	imazapyr	For broadcast treatment of cogongrass. Do not apply near areas with desirable hardwood trees. Provides longer-term control than glyphosate, but plant-back restrictions may limit opportunities to plant forage crops in treated areas with this herbicide. DO NOT treat more than 1/10 of the available area to be grazed or cut for hay nor apply more than 0.75 lb of imazapyr (48 fl oz) per acre per year.
		Tropical Soda Apple
Chaparral 2–3 oz.	metsulfuron + aminopyralid	Excellent control of TSA plants. Provides preemergence control of TSA seedlings for approximately six months after application. There are no grazing or haying restrictions; however, delaying cutting for 14 days will enhance weed control. Not for use on 'Pensacola' bahiagrass.
GrazonNext HL[1] 1.6–2.1 pt.	aminopyralid + 2,4-D	Excellent control of tropical soda apple. Provides preemergence control of TSA seedlings for approximately six months after application. The 1.6 pt./ac. rate is highly effective on emerged TSA plants, but the 2.1 pt./ac. rate will provide the greatest length of residual control. Do not apply more than 2.1 pt./ac./yr. Will severely injure desirable forage legumes. Do not apply to limpograss. There are no grazing restrictions, but do not harvest for silage or hay for seven days.
Milestone 5–7 oz.	aminopyralid	Excellent control of tropical soda apple. Provides preemergence control of TSA seedlings for approximately six months after application. The 5 oz rate is highly effective on emerged plants, but the 7 oz. rate will provide the greatest length of residual control. Do not apply more than 7 oz./ac./yr. Do not apply to desirable forage legumes or loss of stand will occur. Volatility is low. The use of a non-ionic surfactant at 0.25% v./v. is recommended.
Remedy Ultra, others [1] 1.0 qt.	triclopyr ester	Apply in late spring through summer as a broadcast spray for control of this species. Best results will occur when plants are adequately covered with spray solutions. Application of 30–40 gal./ac. of herbicide solution will be more effective than 20 or lower. The addition of a non-ionic surfactant at 0.25% v./v. will increase control. Retreatment will be required as new seedlings emerge. Spot spray rate is 0.5%–1.0% v./v.
		Prickly Pear Cactus
Remedy Ultra, others [1] 20% + basal oil 80%	triclopyr ester 20% diesel fuel or basal oil 80% (Spot treatment)	Apply as a spot treatment directly to prickly pear pads during spring and summer. Grass will be burned in treated spots but will recover. The addition of diesel fuel drastically enhances herbicide uptake, which will lead to prickly pear control. Prickly pear will die slowly over a period of 6–8 months with a few plants requiring retreatment.
Trump Card 3 pt.	fluroxypyr + 2,4-D	Apply Trump Card as a broadcast treatment in water. The use of a surfactant is required. A maximum of 3 pt./acre per growing season is allowed, but 6 pt./ac. is required for effective control. Two applications of 3 pt./ac. over two growing seasons has been shown to be effective.

Trade Name and Rate of Commercial Product Per Acre	Common Name	Remarks
Vista XRT 22 oz.	fluroxypyr	Apply Vista XRT at 22 oz./ac. as a broadcast treatment in water. The use of a surfactant is required. For spot treatment, use 0.5 fl. oz. (15 ml) per gallon of water. Control is very slow, and it often takes more than one year to see satisfactory results.
Blackberry		
Chaparral 2 oz.	metsulfuron + aminopyralid	Chaparral will provide good to excellent control of blackberry. For best results, apply when moisture conditions are sufficient and blackberry plants are not under drought stress. Late bloom and fall applications of Chaparral are the most effective. DO NOT apply in bahiagrass pastures. Do not mow within six months prior to application or control will be greatly reduced.
Cimarron Plus 0.75 oz. or Cimarron Xtra 2.0 oz./ac.	metsulfuron + chlorsulfuron	Cimarron will provide good to excellent control of blackberry. Results are best when applied at blooming or late in the fall. Do not mow within six months prior to application or control will be reduced. **DO NOT** apply to bahiagrass pastures.
MSM 60, others 0.3–0.5 oz	metsulfuron	Metsulfuron will provide good to excellent control of blackberry. Results are best when applied at blooming or late in the fall. Apply to bahiagrass pastures only as a last resort and expect 6–8 weeks of reduced growth and some stand thinning. Mixing with 1 pt./ac. 2,4-D amine will help reduce bahiagrass injury when applying in bahiagrass.
PastureGard HL[1] 2 pt.	triclopyr + fluroxypyr	Control similar to Remedy.
Remedy Ultra, others [1] 2 pt.	triclopyr	For best control of blackberry, apply 2 pt. when blooming and do not mow within one year prior to application. Remedy does not control dewberry. Applications made during prolonged periods of dry weather can greatly decrease control. Fall applications often provide more consistent blackberry control.
Telar 0.75 oz.	chlorsulfuron	Similar to control with Cimarron. Telar can safely be applied to bahiagrass or bermudagrass.
Dogfennel		
2,4-D + dicamba[1] (Weedmaster, others) 2–3 pt.	dicamba + 2,4-D	Apply when plants reach a height of 12"–18". Weedmaster is most effective approximately one month after dogfennel transition from winter dormancy. Refer to previous comments for dicamba and 2,4-D above.
GrazonNext HL[1] 24 oz.	aminopyralid + 2,4-D	Apply when plants are less than 30" tall. If plants are larger than 30", tank-mix GrazonNext with 3 pt./ac. 2,4-D, or 8 oz/A PastureGard HL.
PastureGard HL[1] 24 oz.	triclopyr + fluroxypyr	For control of larger dogfennel that has reached 40 inches or more in height.
Trump Card 3 pt.	fluroxypyr + 2,4-D	For control of dogfennel that are 18"–36".
Mixed Stands: Grass - Clover/Lespedeza Pastures		
2,4-D amine[1] 0.5–1.0 pt.	2,4-D (0.25 + 0.5 lb)	Apply only one treatment per year to established perennial clover. Slight to moderate injury may occur. See label for specific use information.
Thistles		
2,4-D 2 qt.	2,4-D	Highly effective if applied to thistles in the rosette stage. 2,4-D is not effective on thistles that have bolted or flowered. During cool temperatures, the ester formulation of 2,4-D will be most effective.
GrazonNext HL[1] 1.6–2.1 pt.	aminopyralid + 2,4-D	Excellent control of thistles at any stage of growth.
2,4-D + dicamba[1] (Weedmaster, others) 1.0–2.0 qt	dicamba + 2,4-D	Apply late fall to early spring when daytime temperatures are > 50ºF. Applications are most effective if applied before flower stalks elongate. The addition of crop oil will increase herbicidal activity. Refer to previous comments for dicamba and 2,4-D above. For small rosettes, 1 qt./ac. rate is sufficient. For larger rosettes, 1.5–2 qt./ac. will be required.

[1] For state rules pertaining to application of organo-auxin herbicides in Florida, see EDIS Publication SS-AGR-12, *Florida Organo-Auxin Herbicide Rule 2015* (http://edis.ifas.ufl.edu/wg051).

Herbicide recommendations in this report are contingent upon their registration by the US Environmental Protection Agency. If an herbicide's EPA registration is canceled, the herbicide is no longer recommended.

Table 2. Estimated effectiveness of herbicides on common broadleaf weeds in pastures and hayfields (2,4-D through Impose/Panoramic).[1]

Weed Name	2,4-D	Chaparral	Cimarron Plus or Xtra	Banvel or others	Vista XRT	Diuron	GrazonNext HL	Metsulfuron	Impose/ Panoramic
bagpod	F–G	E	E	G	-	-	E	E	-
bitter sneezeweed	E	E	E	E	-	G	E	E	-
blackberry	P	G–E	G–E	F–G	F	P	P–F	G–E	P
bracken fern	P	E	E	P–F	P	P	P	E	-
Brazilian pepper-tree	P	P	P	P	P	-	P	P	P
bullrush	G	-	-	G	P	P	P	-	-
bushmint	P	-	-	F	F–G	-	F	-	-
butterweed	F–G	E	E	F–G	-	-	E	E	-
buttonbush	P	-	-	-	-	-	-	-	-
Caesarweed	G–E	G	G	-	G–E	-	G–E	G	-
camphor weed	F–G	-	-	F–G	-	-	G	-	-
Carolina geranium	P–F	G	G	F–G	G	-	F–G	G	-
castor bean	F–G	-	-	-	-	-	F–G	-	-
chickweed	F	E	E	E	-	P	F	E	-
coffee weed	G	E	E	E	G	-	E	E	-
coral ardisia	P	P	P	P	P	-	P	P	G
creeping indigo	G	E	E	G	-	-	E	E	-
crotalaria, showy	G	G	-	G	G	-	G	-	-
cudweed	F	G	G	E	-	-	E	G	-
curly dock	F	E	E	E	-	P	E	E	-
dayflower	G	F	F	F	-	-	F–G	F	-
dewberry	P	F–G	F–G	P	-	-	P	F–G	-
dodder	P	-	-	P	-	P	-	-	-
dogfennel	F–G	P	F	F–G	G	P	F–G	F	-
dollarweed	G	G	G	E	F	-	G	G	-
elderberry	F–G	-	-	F-G	-	-	F-G	-	-
evening primrose	E	G	G	E	-	G	E	G	-
Florida pusley	P	-	-	P–F	P	E	G–E	-	-
flat-top goldenrod	G	P	P	F–G	P	-	G	P	-
gallberry	G	-	-	E	-	P	-	-	-
goatweed	G	G	G	F–G	P–F	-	-	G	P
goldenrod	F	P	P	G	-	P	G	P	-
greenbrier	P	F	F	P	F–G	-	P	F	-
groundcherry	F–G	-	-	F–G	-	-	E	-	-
hairy indigo	F–G	E	E	F–G	F–G	-	E	E	-
hempvine	F–G	E	-	F–G	E	-	E	-	-
honeysuckle	-	-	-	E	-	P	-	-	-
horsenettle	P	E	P–F	G	F	P	E	P–F	-
horseweed	F	G	F	E	-	P	E	F	-
kudzu	P–F	G	P–F	G	P	P	G	P–F	P
lantana	P	P	P	P	F–G	-	P	P	-
matchweed	G	-	-	G	F–G	-	G–E	-	-

Weed Name	2,4-D	Chaparral	Cimarron Plus or Xtra	Banvel or others	Vista XRT	Diuron	GrazonNext HL	Metsulfuron	Impose/ Panoramic
maypop	P	P	P	P	-	-	-	P	-
Mexican tea	G	E	E	G-E	-	-	E	E	-
milkweed	F–G	-	-	G	-	-	F–G	-	-
morning glory	G–E	E	G–E	E	E	-	E	G–E	-
palmetto	P	P	P	F	G	P	P	P	P
pawpaw	P	P	F	P	F–G	-	P	F	-
persimmon	P	-	-	F–G	-	P	P	-	P
pigweed	F	E	E	E	P	F	E	E	G
plantains	E	E	E	E	-	-	-	E	-
pokeberry	G	-	-	E	P	P	P	-	-
prickly pear	P	P	P	F	G	P	P	P	P
prickly poppy	G	E	G	G–E	G	-	E	G	-
ragweed	E	E	G	E	G	G	E	G	F
red sorrel	P	E	E	E	-	F	-	E	-
redroot, Carolina	-	P–F	P–F	-	P–F	-	-	P–F	F–G
rosary pea	F	E	G	G	F–G	-	E	G	-
sand vetch	F	E	G	G	G	-	E	G	-
saltbush	P	P	P	P	F	-	P	P	-
shepherd's purse	E	-	-	E	-	G	-	-	-
sicklepod	G	G	G	E	G	F	G	G	F–G
smartweed	G	E	G	G	-	-	E	G	-
softrush	G	P	P	F–G	P	-	F–G	P	-
Spanish needles	G–E	E	G	E	-	-	E	G	-
stinging nettle/ fireweed	P	E	-	-	G–E	-	E	-	P
tall elephant's foot	F	-	-	F–G	-	-	F–G	-	-
teaweed	P	G	G	G	-	-	G	G	-
thistles	E	E	F	G	G	F	E	F	-
toadflax, oldfield	F–G	G-E	G-E	G	-	-	G–E	G–E	-
tropical soda apple	P	E	P	F–G	F	P	E	P	P
Virginia pepperweed	G	-	-	E	G	G	-	-	-
wax myrtle	P	P	-	P–F	-	P	P	-	-
whitehead broom	P	P-F	P–F	P	P	-	P	P–F	-
winged sumac	F–G	-	-	-	F–G	-	F-G	-	-
wild garlic	G–E	G	G	E	-	P	-	G	-
wild radish	G	G–E	G–E	E	-	P	G	G–E	-
yellow jessamine	-	G	G	-	-	-	-	G	-
yellow woodsorrell	P	F–G	F–G	G	F	-	F–G	F–G	-

[1] Weed control symbols: E = 90%–100% control; G = 80%–90% control; F = 60%–80% control; P < 60% control.

Table 3. Estimated effectiveness of herbicides on common broadleaf weeds in pastures and hayfields (Milestone through WeedMaster or others).[1]

Weed Name	Milestone	Outrider	PastureGard HL	Remedy	Velpar	WeedMaster, others
bagpod	E	-	G	F–G	-	F–G
bitter sneezeweed	E	-	E	E	-	E
blackberry	P	P	G–E	G–E	F	P–F
bracken fern	P	-	P–F	P–F	F	P
Brazilian pepper-tree	P	P	P–F	G–E	G–E	P
bullrush	P	-	P	F–G	-	-
bushmint	P	-	G	G	-	P
butterweed	G–E	-	G–E	-	-	F–G
buttonbush	-	-	F–G	G	-	-
Caesarweed	G–E	-	E	E	-	G–E
camphor weed	-	-	G	F–G	-	G
Carolina geranium	G–E	-	-	-	-	G
castor bean	-	-	G	G	-	F–G
chickweed	-	-	F	E	E	E
coffee weed	E	-	E	E	-	G
coral ardisia	P	-	F–G	G	-	P
creeping indigo	E	-	G	G	-	G
crotalaria, showy	-	-	E	E	-	G
cudweed	E	-	G	E	-	G
curly dock	E	-	F	E	P	E
dayflowers	-	-	G	G	-	G
dewberry	-	-	F–G	F–G	-	P
dodder	-	-	P	P	-	P–F
dogfennel	P–F	P	E	G–E	G	G
evening primrose	E	-	G	E	E	E
Florida pusley	-	-	G	-	-	F
flat-top goldenrod	P	-	P	P	-	G
gallberry	-	-	E	E	P	G
goatweed	-	-	F	F	-	G
goldenrod	G	-	G	G	-	G–E
hairy indigo	E	-	G–E	G	-	G
hempvine	E	-	E	E	-	F–G
honeysuckle	-	-	P	P	-	E
horsenettle	E	-	F	F–G	-	F
horseweed	E	-	G	G	-	E
kudzu	G	P	F	F	-	F
lantana	P	-	P–F	P–F	-	P
matchweed	G	-	G	G	-	G
maypop	-	P	G	F	-	P–F
Mexican tea	E	-	E	E	-	E
milkweed	F–G	-	F–G	F–G	-	F–G
morning glory	E	-	E	E	-	E
palmetto	P	P	G	F	P	P–F

Weed Name	Milestone	Outrider	PastureGard HL	Remedy	Velpar	WeedMaster, others
pawpaw	P	-	F–G	G	-	P
persimmon	P	P	F–G	F–G	F	P–F
pigweed	E	-	F	E	G	E
plantains	P	-	-	-	-	E
pokeberry	F	-	P	P	-	E
prickly pear	P	P	F	G[2]	P	P–F
prickly poppy	E	-	E	E	-	G–E
ragweed	E	-	E	E	F	E
red sorrel	-	-	F	E	-	G
redroot, Carolina	-	-	F–G	G	-	G
rosary pea	E	-	G–E	G–E	-	F–G
sand vetch	E	-	E	E	-	E
saltbush	P	-	G–E	E	-	F
shepherd's purse	-	-	G	E	E	E
sicklepod	-	-	G–E	E	-	E
smartweed	E	-	G	G	-	G–E
softrush	P	-	F	P–F	-	F–G
Spanish needles	E	-	E	E	-	E
stinging nettle/fireweed	E	P	E	E	-	F
tall elephant's foot	F	-	F–G	F–G	-	F
teaweed	-	-	G	G	-	F-G
thistles	E	-	G–E	E	E	E
tropical soda apple	E	P	G	G–E	F–G	F–G
Virginia pepperweed	-	-	G	P	E	E
wax myrtle	P	-	F–G	G	P	P–F
whitehead broom	P	-	P	P	F–G	P
winged sumac	-	-	G	G	-	F–G
wild garlic	P	-	P	-	-	E
wild radish	P	-	G–E	E	E	E
yellow jessamine	-	-	G	G	-	-
yellow woodsorrell	-	-	F	F	-	F

[1] Estimated effectiveness based on rates recommended in this report. Effectiveness may vary depending on factors such as herbicide rate, size of weeds, time of application, soil type, and weather conditions.
[2] When applied as spot-treatment in basal oil.
Weed control symbols: E = 90%–100% control; G = 80%–90% control; F = 60%–80% control; P < 60% control.

Table 4. Estimated effectiveness of herbicides on common grass and sedges in pastures and hayfields.

Herbicide	bahia-grass	bermuda-grass	broom-sedge	crab-grass	dallis-grass	guinea-grass	johnson-grass	rye-grass	sandbur	smut-grass	vasey-grass	nutsedge
2,4-D	P	P	P	P	P	P	P	P	P	P	P	P
Banvel or others	P	P	P	P	P	P	P	P	P	P	P	P
Chaparral	G	P	P	P	P	P	-	P	P	P	P	P
Cimarron Plus or Xtra	G	P	P	P	P	P	-	P	P	P	P	P
Diuron	P	P	P	F–G	P	P	P	P	G	P	P	P
GrazonNext HL	P	P	P	P	P	P	P	P	P	P	P	P
Metsulfuron	G	P	P	P	P	P	-	P	P	P	P	P
Impose/ Panoramic	P–F	P	P	E	F	-	G	F	G–F	P	P–G	G–E
Milestone	P	P	P	P	P	P	P	P	P	P	P	P
Outrider	P	P	P	P	P	P	E	-	-	P	F–G	E
Pastora	F–G	P	P	F–G	F–G	F–G	G	G	G	P	F–G	P
PastureGard HL	P	P	P	P	P	P	P	P	P	P	P	P
Remedy	P	P	P	P	P	P	P	P	P	P	P	P
Velpar	P	P	P	P	-	-	-	G	-	E	-	P
Vista XRT	P	P	P	P	P	P	P	P	P	P	P	P
Weedmaster or others	P	P	P	P	P	P	P	P	P	P	P	P

[1] Estimated effectiveness based on rates recommended in this report. Effectiveness may vary depending on factors such as herbicide rate, size of weeds, time of application, soil type, and weather conditions.
Weed control symbols: E = 90%–100% control; G = 80%–90% control; F = 60%–80% control; P < 60% control.

notes:

Table 5. Tolerance of ***established*** (for at least 6 months) forage cultivars to commonly used herbicides.

Forage Species	**Cultivar**	**2,4-D**	**Aim**	**Banvel**	**Chaparral**	**Cimmarron Plus**	**Cimmarron X-tra**	**Vista XRT**	**Grazon-Next HL**	**Imppose/ Panoramic**	**Metsulfuron** (MSM 60, others)	**Milestone**	**Outrider**	**Pastora**	**Pasturegard HL**	**Remedy Ultra,** others	**Roundup/** others	**Telar**	**Vista**	**Banvel + 2,4-D** (Weed-Master, etc.)	**Velpar**
Bahiagrass																					
	Argentine	T	T	T	I	I	I	T	T	S	I	T	T	NL	T	T	S	T	T	T	T
	Pensacola	T	T	T	S	S	S	T	T	S	S	T	T	NL	T	T	S	T	T	T	T
Bermudagrass																					
	Coastal	T	T	T	T	T	T	T	T	I	T	T	T	T	T	T	I–S	T	T	T	T-I
	Florakirk	T	T	T	T	T	T	T	T	I	T	T	T	T	T	T	I–S	T	T	T	T-I
	Jiggs	T	T	T	T	T	T	T	T	I–S	T	T	T	T	T	T	I–S	T	T	T	T-I
	Tifton-85	T	T	T	T	T	T	T	T	I	T	T	T	T	T	T	I–S	T	T	T	T-I
Brachiaria																					
	Mulato	T	I	T	N	N	N	T	T	N	N	T	T	NL	T	T	S	N	T	T	N
Stargrass																					
	Florico	T	T	T	T	T	T	T	T	I	T	T	T	NL	T	T	I–S	T	T	T	NL
	Florona	T	T	T	T	T	T	T	T	I	T	T	T	NL	T	T	I–S	T	T	T	NL
	Okeechobee	T	T	T	T	T	T	T	T	I	T	T	T	NL	T	T	I–S	T	T	T	NL
	Ona	T	T	T	T	T	T	T	T	I	T	T	T	NL	T	T	I–S	T	T	T	NL
Hemarthria																					
	Floralta	I–S	T	T	T	T	T	T–I	I–S	T–I	T	I	T	NL	I	I	S	T	I	I-S	NL
	Gibtuck	I–S	T	T	T	T	T	T–I	I–S	T–I	T	I	T	NL	I	I	S	T	I	I-S	NL
	Kenhy	I–S	T	T	T	T	T	T–I	I–S	T–I	T	I	T	NL	I	I	S	T	I	I-S	NL

T = tolerant; very little injury if any
I = Intermediate; slight injury, will regrow in approximately one month
S = Severe injury; more than two months to recover or complete death
N = No current information available
NL = Not labeled

Table 6. Days between herbicide application to forage or pasture and feeding, grazing, or animal slaughter.

Herbicide	Non-lactating Cattle			Lactating Dairy Cattle		Horses
	Grazing	Hay Cutting	Slaughter	Grazing	Hay Cutting	
Banvel (Up to 1 pt.)	0	0	30	7	37	0
Banvel (Up to 1 pt.)	0	0	30	21	51	0
Banvel (Up to 1 pt.)	0	0	30	40	70	0
Chaparral	0	0	0	0	0	0
Cimarron Plus and Cimarron Xtra	0	0	0	0	0	0
Vista XRT	0	7	0	0	7	0
2,4-D	0	30	3	7	30	0
GrazonNext HL	0	7	0	0	7	0
Metsulfuron	0	0	0	0	0	0
Impose or Panoramic	0	7	0	0	7	0
Milestone	0	0	0	0	0	0
Outrider	0	14	0	0	14	0
Pastora	0	0	0	0	0	0
PastureGard HL	0	14	3	1 season	1 season	0
Prowl H_2O	0	0	0	0	0	0
Remedy Ultra, others	0	14	3	1 season	14	0
Roundup Weathermax (Dormant application)	0	0	0	0	0	0
Roundup Weathermax (Between cuttings)	0	0	0	0	0	0
Roundup Weathermax (Pasture renovation)	56	56	56	56	56	56
Sandea	0	37	0	0	37	0
Telar	0	0	0	0	0	0
Trump Card	7	14	2	7	14	7
Velpar	0	38	0	0	38	0
2,4-D + dicamba (Weedmaster, others)	0	37	30	7	37	0

notes:

Forage Testing and Quality of Forages in Florida

Carol Vasco, MSc
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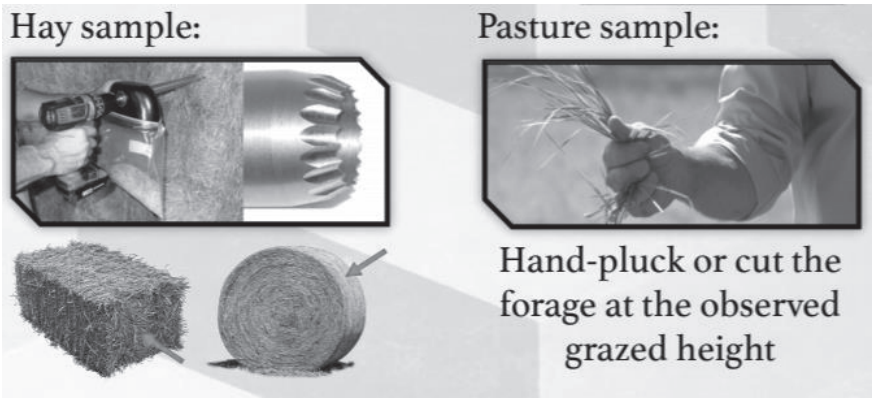
Quality of Forages in Florida

Forage	DE[1] (Mcal/lb)	CP[2] (%)	NDF[3] (%)	ADF[4] (%)	TDN[5] (%)
Bahiagrass	0.97	8–11	68	33	50–54
Bermudagrass	0.89-1.32	10-15	50-77	29-33	52-66
Pearl Millet	1.0	9-18	58-68	31-42	59-68
Rhizoma Peanut	1.1	14-18	42	32	60
Small grains	1.2-1.3	14-22	42-50	22	60-65
Clovers	1.5	18–25	27	18	75

[1] Digestible Energy, [2] Crude Protein, [3] Neutral Detergent Fiber, [4] Acid Detergent Fiber, [5] Total Digestible Nutrients

Why testing? Forage testing provides useful information on nutritive value of the forage, and if supplementation is required



How to collect a sample?

-collect sample from several bales/locations on pasture

-Send sample in plastic bag IMMEDIATELY after it is harvested or store it in a refrigerator

-Properly collecting and identifying a forage sample is very important

-Should I exclude weeds from sampling? It depends on whether your horse eats it

Your results are as good as your sample!

Forage	Features
Bahiagrass	Most cultivated during summer, heavy grazing tolerant and requires less fertilization to maintain productivity
Bermudagrass	Highly productive, but relies on fertilization more than bahiagrass. Excellent for hay crop and less grazing tolerant
Pearl Millet	Useful to complement perennial summer grasses. Drought tolerant and highly productive under adequate fertility
Rhizoma Peanut	High quality forage, can substitute alfalfa, especially as hay, but also can be suitable for grazing
Small grains	Oat, rye, ryegrass and triticale require good level of fertilization to be productive. Can produce high quality hay
Clovers	Excellent winter forages. A mixture with grasses, such as bahiagrass, is often recommended

Forages in the horse's diet Florida is suitable for forage production most of the year with a large variety of possible choices Forage is an essential component in the diet of horses. Effective use of forages in the horses management can help reduce feeding costs, and a good-quality forage can provide an important source of nutrition

Where can I send my samples?

Forage Extension Laboratory
Range Cattle REC
3401 Experiment Station
Ona FL 33865
863-735-1314 ext 205
jv@ufl.edu

Waters Agricultural Laboratories
257 Newton Road
P.O. Box 382
Camilla, GA 31730
229-336-7216
info@watersag.com

Soil, Plant, and Water Lab
2400 College Station Road
Athens, GA 30602
706-542-5350
soiltest@ug.edu

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