Range Cattle Research & Education Center

Forage and Cattle

FIELD DAY

October 1, 2013

UF IFAS
UNIVERSITY of FLORIDA

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Schedule of Events

Moderated by Bridget Carlisle, Polk County Extension Agent

9:00 AM Registration – Trade Show open
Refreshments provided by Farm Credit of Florida

10:00 AM Welcome and Introductions
John Arthington, Professor and Center Director, Range Cattle Research and Education Center

10:15 AM Opening Remarks
Henry Kempfer, Kempfer Cattle Company and President-Elect, Florida Cattlemen's Association

10:30 AM Cogongrass Management: Review and Update
Sarah Lancaster, Assistant Extension Scientist

10:50 AM Cow Size and Efficiency
Phillip Lancaster, Assistant Professor

11:10 AM Free Choice Intake of Salt-Based Trace Mineral Supplements
John Arthington, Professor and Center Director

11:30 AM Steak Lunch
Prepared by Hardee County Cloverleaf Foundation

1:00 PM Field Tour and Presentations
What We've Learned Over the Past 70 Years on Smutgrass Management
Brent Sellers, Associate Professor
Jiggs Bermudagrass Management in South Florida
Joao Vendramini, Associate Professor
Time for Fall Soil and Tissue Testing
Maria Silveira, Associate Professor

3:00 PM Adjourn

Welcome to Ona! We are delighted that you chose to join us for the 2013 Field Day. The Range Cattle Research and Education Center was established in 1941 with a mission to provide research-based solutions to the problems faced by south Florida cattlemen. In 2013, the faculty and staff at the center are still dedicated to providing information that will improve the beef industry. Our current faculty programs focus on beef cattle management, forage agronomy, soil fertility, and weed management. With the excellent help of support staff, scientists are working diligently to conduct experiments, provide extension programs, and educate graduate students.

The hard work of the faculty and staff at the center has produced outstanding results. Since the celebration of our 70th Anniversary in April of 2012, we have generated 42 scientific publications and 29 extension documents, earned 12 faculty and student awards, graduated 2 students, hosted 16 international scholars and interns, and added one faculty program. We are eagerly anticipating the addition of two more faculty programs in the near future. We think you will agree, we have enjoyed considerable success and anticipate we will continue meeting these high standards.

We value your support as our clients and partners. We realize that you face new challenges every day in cattle and forage management. It is our goal to continue to earn your trust as we work together to address your challenges and create a bright future for Florida cattlemen.

Thank you for attending today. We invite you to participate in other activities involving faculty from the Range Cattle Research and Education Center. You can find more information on our website, http://rcrec-ona.ifas.ufl.edu/. Feel free to contact us at ona@ifas.ufl.edu or 863-735-1314.

The RCREC Faculty

John Arthington
Brent Sellers
Maria Silveira
Joao Vendramini
Phillip Lancaster
Sarah Lancaster

Cogongrass Management: Review and Update

Sarah Lancaster

Introduction

Cogongrass (*Imperata cylidrica*) is a warm-season perennial grass native to Asia. It was intentionally introduced in Mississippi and Florida in the early 1900's to evaluate its potential as a soil stabilizer and forage crop. Cogongrass is an excellent soil stabilizer, but research quickly showed that it is a better weed than forage in part because cogongrass accumulates silca in the leaves, which makes it unpalatable to livestock. Efforts to improve the species were abandoned and scientists began warning of the need to eradicate the species in the United States because of its invasive nature within thirty years of its introduction. In recent years, cogongrass has become one of Florida's most troublesome weeds. It is found throughout the entire state in pastures, rangelands, reclaimed minelands, and other disturbed areas.

Cogongrass grows aggressively in a variety of environments. It thrives in the humid subtropical environment of Florida, but its northern expansion in the United States seems to be limited by poor cold tolerance. Cogongrass also grows well in a range of soil conditions. Experiments suggest that it grows best in acidic soils, similar to those found in southern Florida.

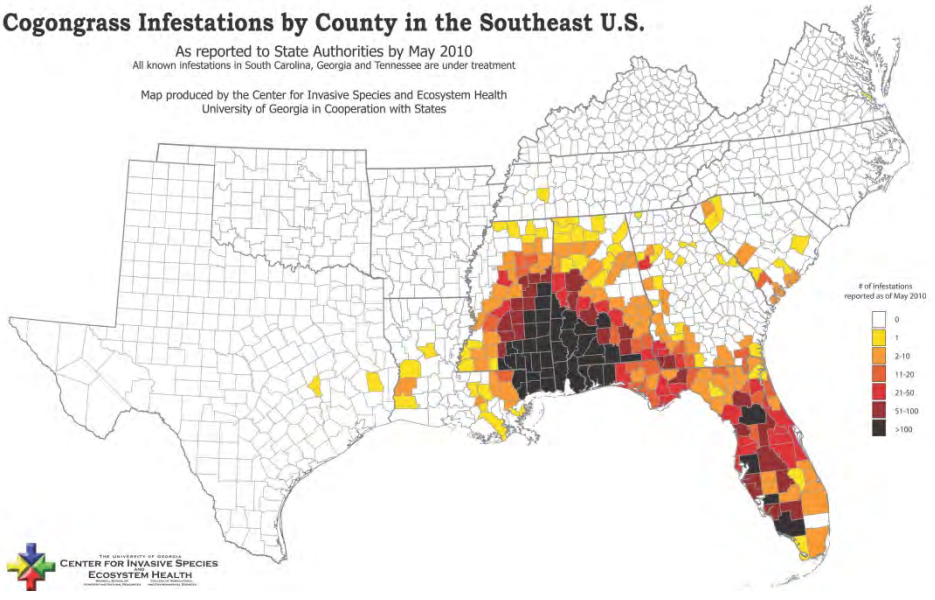

Figure 1. Counties infested with cogongrass. *Source: www.cogongrass.org*

Cogongrass tolerates disturbance by occasional tillage and it thrives in fire-dependent ecosystems, such as the flatwoods of Florida. Cogongrass is well adapted to Florida and the southeastern United States and is established throughout the gulf region (Figure 1).

Cogongrass is spread either by rhizomes or wind-blown seed. Once established, cogongrass spreads rapidly by aggressive rhizomes. These rhizomes represent over half of the biomass produced and help the plant survive the extremely hot fires fueled by the thick thatch layer it produces. Native species, including pines, cannot tolerate the hotter fires, resulting in fewer native plants. Cogongrass is also believed to be allelopathic, which further decreases the ability of native plants to co-exist in cogongrass swards. The aggressive growth and changes in the ecosystem caused by cogongrass invasions exclude the growth of other species such that cogongrass is typically the only plant species present in the invaded areas.

Identification

Identifying cogongrass is important for limiting its spread and it can be accomplished by learning a few special characteristics of the plant. Distinct characteristics of growth patterns, leaves, rhizomes, and seedheads differentiate cogongrass from other species. Cogongrass tends to grow in dense circular patches with evenly distributed plants. It is a distinct lime-green color during the growing season, which is from March to November. Cogongrass averages about 3 feet tall, but can reach 6 feet in height. The stems are flat and compressed near the ground, making it appear that the leaves arise directly from the ground. The leaves are about 1 inch wide with serrated margins and long hairs at the base. One key feature of the leaf is a white midrib that is almost always off-center (Figure 2). Rhizomes are covered in flaky scales, but are bright white when the scales are removed. They have distinct segments and very sharp tips.

Figure 1. Cogongrass infestation.

Figure 2. Cogongrass leaf.

Figure 3. Cogongrass seedhead.

Cogongrass rhizomes form a dense mat in the upper six inches of the soil, but can be found as deep as 4 feet. Cogongrass is able to produce seed year-round, but flowering is more common in spring, which sets it apart from many other perennial grasses. Another unique characteristic of cogongrass is that flowering seems to be induced by mowing. Seedheads are dense, white, fluffy cylinders (Figure 3).

Management

Cogongrass management has been researched for many years all around the world. Mechanical and chemical methods have been identified, but one conclusion common from much of the research is that *cogongrass management requires diligence and persistence.* Nearly every available herbicide has been tested, but only two provide adequate control of cogongrass: glyphosate (Roundup, others) and imazapyr (Arsenal, others). Both of these herbicides leave bare ground for a time, but imazapyr will cause bare ground for up to 6 months. Imazapyr should be used carefully, as it can potentially damage oak and other hardwood trees if runoff occurs. Suggested application rates and timings are listed in Table 1.

Table 1. Recommendations for chemical control of cogongrass in Florida.

Timing		Herbicide rate	
		Small infestation	Large infestation
Year 1	Fall	1% Arsenal + 0.25% NIS ***or*** 3% Glyphosate ***or*** 0.5% Arsenal + 2% Glyphosate + 0.25% NIS	48 oz/A Arsenal + 0.25% NIS ***or*** 3-4 qt/A Glyphosate ***or*** 24 oz/A Arsenal + 2 qt/A glyphosate + 0.25% NIS
Year 2 - eradication	Spring	2-3% Glyphosate on regrowth	2-3% Glyphosate on regrowth
	Fall	2-3% Glyphosate on regrowth	2-3% Glyphosate on regrowth

Source: Sellers et al. 2012

The recommendations in Table 1 are based on the size of the infestation. This is because the size of area infested is related to the age of the sward. Older, more established swards have more extensive rhizome systems and are more difficult to control. In general, infestations greater than 30 feet in diameter are considers "large".

Using an integrated approach to cogongrass control may be more effective than using herbicides alone. This is especially true for areas with very well-established infestations where cogongrass is the dominant plant species. The integrated method developed by the University of Florida uses fire, herbicides, deep tillage, and planting desirable

species (Table 2). Care should be used when tilling during the second year. If equipment is not cleaned following tillage, rhizomes could potentially be transported to another location and create a new infestation.

Table 2. Recommended integrated control of cogongrass in Florida pastures.

Timing		Action
Year 1	Summer – Fall	1. Burn 2. Apply herbicide 3. Soil sample and amend for desired species
Year 2	Spring	1. Till 2. Plant desired species
Year 3 - eradication	Spring	1. Monitor regrowth 2. Spray as needed
	Fall	1. Monitor regrowth 2. Spray as needed

Source: Sellers et al. 2012

Current research

Recent research related to cogongrass control has been focused on the evaluation of aminocyclopyrachlor, a new herbicide developed by DuPont. Commercial formulations of this product are expected to be available in the pasture market in Florida in 2014. In Florida, aminocyclopyrachlor was less effective than imazapyr or glyphosate at reducing cogongrass foliage or rhizome growth more than eight months after application (Table 2). Scientists from other states have reached similar conclusions. However, research in Alabama suggests that fall applications of aminocyclopyrachlor reduce seed head production, which could be useful for limiting the spread of cogongrass. Other research recently conducted in Florida suggests that adjuvant selection has little effect on cogongrass control by imazapyr or glyphosate. Funding has been obtained to conduct additional trials further evaluating cogongrass control and the growth of native plants following applications of aminocyclopyrachlor alone and in combination with other herbicides and to compare the genetics of various cogongrass populations in Florida.

Table 2. Cogongrass control by aminocyclopyrachlor and combinations in Hillsborough Co.

Herbicide		Weeks After Treatment						
		24	31	58	92	36	66	82
		cogongrass control (%)				rhizome biomass (% reduction)		
imazapyr	0.64	**98**	**98**	**92**	**61**	**34**	**79**	**78**
glyphosate	3.28	**98**	**89**	**77**	**35**	**55**	**79**	**79**
aminocyclopyrachlor	0.28	**88**	**69**	0	0	**2**	18	16
aminocyclopyrachlor + imazapyr	0.28 + 0.64	**98**	**96**	**79**	**58**	**41**	**79**	**93**
aminocyclopyrachlor + imazapyr	0.28 + 0.32	**97**	**95**	54	**34**	**43**	**67**	**69**
aminocyclopyrachlor + glyphosate	0.28 + 3.28	**97**	**86**	51	**28**	**43**	**71**	**61**
aminocyclopyrachlor + glyphosate	0.28 + 1.64	**95**	**79**	18	10	**48**	54	**54**
LSD $_{0.05}$[1]		8	24	33	36	28	21	58

[1]Data are means of 4 replications separated using Fishers Protected Least Significant Difference ($p < 0.05$). Numbers in **bold** are similar to standard treatment, imazapyr.

Source: Greis, A. 2012

Resources

http://www.cogongrass.org/

Sellers BA, Ferrell JA, MacDonald GE, Langeland KA, Flory SL (2012) Cogongrass (*Imperata cylindrica*) Biology, Ecology, and Management in Florida Grazing Lands. EDIS document SS-AGR-52.

Greis, AL (2012) Characterization of Aminocyclopyrachlor on Native and Invasive Species of Florida. Master of Science Thesis.

Cow Size and Efficiency

Phillip Lancaster and Julie Warren

Cow size and efficiency has long been debated by cattlemen and is still an important issue today. This article will discuss two key components of efficiency of the cow-calf enterprise, cow mature body weight and milk production, in relation to biological/energy efficiency. Biological efficiency is defined as energy or TDN used per pound of weaned calf or carcass weight produced if ownership is retained until slaughter. Biological efficiency will be consistent over time for genetically similar cows, but economic efficiency may fluctuate from year to year with feed costs and calf prices, and may be different for individual ranches even with genetically similar cows. Therefore, this article will outline the biological efficiency of cow size and milk production considering some points about economics.

A baseline of 100 head of 1000-lb cows weaning 50% of their mature body weight (500 lb) was used to calculate values for cows of different mature weight. The numbers shown in the tables are estimates and are used as examples to illustrate the concepts discussed. To determine the optimum cow size and milk production for an individual ranch, a rancher needs to evaluate the specifics of their operation.

Cow Mature Body Weight

Larger cows have greater maintenance energy requirements and require more feed than smaller cows, which would suggest that larger cows are less biologically efficient than smaller cows. But larger mature cow size is genetically correlated with faster growth rate, and larger weaning and yearling weight. Larger cows that have genetic potential to produce calves with greater weaning weight may be as biologically efficient as smaller cows. However, larger cows that do not possess genetic growth potential for heavier weaning weight are less biologically efficient.

It has been proposed that the ratio of calf weaning weight to cow body weight can be used as a measure to evaluate cow efficiency. When using cow body weight in this context we are using it as a proxy for maintenance energy requirements. However,

maintenance energy requirements are not linearly related to cow body weight. Maintenance energy requirements are a function of metabolic body weight (body weight raised to the 0.75 power), which means that as body weight increases maintenance energy requirements increase at a decreasing rate. Table 1 illustrates this point. As cow mature weight increases metabolic body weight as a percentage of cow body weight decreases, and the metabolic equivalent weaning weight as a percentage of cow mature weight decreases. Comparing cows on a metabolic BW basis rather than mature weight basis gives a more equal comparison of cows with different maintenance energy requirements.

Table 1. Theoretical effect of cow mature body weight on maintenance energy requirements and weaning weight.

Cow mature weight, lb	Metabolic BW, lb	Metabolic BW, % cow mature weight	Metabolic BW equiv. weaning weight, lb	Metabolic BW equiv. weaning weight, % cow mature weight
800	150	18.80	423	53
900	164	18.26	462	51
1000	178	17.78	500	50
1100	191	17.36	537	49
1200	204	16.99	573	48
1300	216	16.65	609	47
1400	229	16.35	644	46
1500	241	16.07	678	45

Cow mature weight = body weight of mature cows at body condition score 5. Metabolic BW = an estimate of a cow's maintenance energy requirement. Metabolic BW equiv. weaning weight = the calf weaning weight required to have equal weaning weight relative to metabolic BW.

The ratio of calf weaning weight to cow body weight was computed for 120 cows (3-13 years of age) from the research herd at the Range Cattle Research and Education Center (Table 2). Cow body weight was measured at pregnancy check June 4 approximately 50 days prior to weaning and was adjusted for body condition score and age of the cow. Weaning weight was adjusted for age and sex of the calf and age of the dam. Smaller cows weighing 1050 and 1149 lb were efficient because they were able to wean a calf at or above the metabolic BW equivalent percent of body weight (50.7 vs. 49% and 47.5 vs.

48%, respectively). But larger cows weighing 1245 or 1327 lb weaned calves 4-5 percentage units less than the metabolic BW equivalent weaning weight percentage (43.3 vs. 47% and 42.2 vs. 47%, respectively) indicating they are inefficient. In our herd it is unknown whether the larger cows possess greater growth potential or just have larger mature size, which would reduce their ability to wean an acceptable percentage of their body weight. Additionally, the milk production of individual cows is unknown. Potentially the larger cows do not have enough milk production for the calf to reach its growth potential, which will be discussed in more detail later.

Table 2. Effect of cow mature body weight on metabolic body weight and actual weaning weight in the research herd at the Range Cattle Research and Education Center in 2013.

Cow mature weight, lb	Metabolic BW, lb	Metabolic BW, % cow weight	Metabolic BW equiv. weaning weight, lb	Metabolic BW equiv. weaning weight, % cow mature weight	Actual weaning weight, lb	Actual weaning weight, % cow mature weight
1050	184	17.57	518	49	533	51
1149	197	17.18	554	48	545	48
1245	210	16.83	589	47	538	43
1327	220	16.57	618	47	563	42

Cow mature weight = body weight of mature cows at body condition score 5. Metabolic BW = an estimate of a cow's maintenance energy requirement. Metabolic BW equiv. weaning weight = is the calf weaning weight required to have equal weaning weight relative to metabolic BW. Actual weaning weight = weaning weight of calves weaned July 2013 from the RCREC cow herd.

With regard to cow size, economic efficiency should be evaluated on a herd basis rather than an individual animal basis because a ranch with set number of acres can carry more 1000 lb cows than 1200 lb cows. This is illustrated in Table 3 where it is estimated that relative to carrying 100 1000-lb cows the same ranch could only carry 87 1200-lb cows (computed based on metabolic body weight). Given the price structure for feeder calves of different weight classes, the smaller calves would be expected to bring a greater sale price and greater potential revenue than the larger calves. In Table 3, the revenue equivalent weaning weight is shown for cows of different mature weight using

the sale price structure shown. From this example, a herd of larger cows must wean a similar percentage of their mature weight as a herd of smaller cows (50% for both large and small cows). Therefore, even though larger cows can wean a lesser percentage of their mature weight to be equivalent on a metabolic BW basis, the larger cows need to wean a similar percentage of their mature weight to be equivalent on a revenue basis. *I want to stress that this is an estimate of potential revenue which does not take into account the potentially greater expenses of keeping a greater number of smaller cows, and is not an estimate of profit.*

Table 3. Theoretical effect of cow mature body weight on equivalent herd size, calf sale price, potential revenue, and revenue equivalent calf weaning weight.

Cow mature weight, lb	Metabolic BW equiv. herd size, no. cows	Metabolic BW equiv. weaning weight, lb	Sale price, $/cwt	Potential revenue, $	Revenue equiv. weaning weight, lb	Revenue equiv. weaning weight, % cow mature weight
800	118	423	148.47	74,236	386	48
900	108	462	146.27	73,133	444	49
1000	100	500	144.12	72,060	500	50
1100	93	537	142.03	71,013	555	50
1200	87	573	139.98	69,991	609	51
1300	82	609	137.98	68,989	661	51
1400	78	644	136.01	68,006	712	51
1500	74	678	134.08	67,041	763	51

Cow mature weight = body weight of mature cows at body condition score 5. Metabolic BW equiv. herd size = number of cows that could be carried on a set number of acres based on metabolic BW. Metabolic BW equiv. weaning weight = is the calf weaning weight required to have equal weaning weight relative to metabolic BW. Revenue equiv. weaning weight = calf weaning weight required to have equal weaning weight relative to potential revenue.

Peak Milk Production

The effect of peak milk production on biological efficiency is related to efficiency of feed energy used for milk production by the cow and efficiency of milk energy used for growth by the calf. If we calculate the efficiency of feeding the cow to produce milk for

growth of the calf and compare this to the efficiency of feeding the calf directly, then we can determine whether it is more efficient to have low or high milking cows. The efficiency of energy use for milk production is dependent upon the specific feed, but averages approximately 60%. The efficiency of energy used for growth by the calf also depends upon the specific feed, but averages approximately 45%. To estimate the efficiency of cow feed energy use for growth by the calf we have to multiply the 2 numbers together.

Efficiency of cow feed use for growth by the calf = 60 × 45 ÷ 100 = 27%
From this calculation, it is more energy efficient to feed the calf directly rather than feeding the cow to produce milk for the calf (45 vs. 27%) suggesting that low milking cows would be more efficient. Because of this, many previous studies have determined that cows of the same mature weight with low milk production are more biologically efficient than cows with moderate to high milk production. Cows with moderate to high milk potential have approximately 15% greater maintenance requirements during lactation and the dry period which increases the energy required for nonproductive functions of cows with moderate to high milk potential. Another potentially negative effect of having cows with high milk production is reduced pregnancy rates. Lactation can cause the cow to mobilize a significant amount of her body reserves decreasing body condition and her ability to rebreed in a timely manner. Thus, cows with higher milk production will require more feed for maintenance and more feed to maintain body condition and rebreed.

Cows with low milk production will only be more biologically efficient than cows with high milk production if the calf can achieve the metabolic BW equivalent weaning weight on forage. Calves less than 4 months of age digest forage very poorly, thus from birth to 4 months it is more efficient to feed the cow to produce milk for the calf. The cow must produce a minimum amount of milk for the calf to survive the first 4 months of life. After 4 months of age the calf must be able to consume enough energy to achieve its genetic growth potential, which is affected by quality of the forage. Low quality forage has low digestibility and is low in energy, and so the calf must have access to good quality forage that will allow it to achieve its genetic growth potential, which is often not the case. Therefore, optimum biological efficiency is most likely achieved with moderate milk production.

Interaction of cow size and milk production

Both large and small cows can be equally efficient. To do so, milk production must be matched with mature weight of the cow and genetic growth potential of the calf. Small cows that produce more milk than the calf can efficiently use will lose body condition and have lower pregnancy rates or will require more feed to maintain good body condition with no benefit in growth of the calf. This extra milk production also comes with a cost; higher maintenance requirements of the cow. Additionally, a calf consuming more milk than their genetic potential for lean growth will become fleshy resulting in discounts at the market. Conversely, large cows that do not produce enough milk to support the greater genetic growth potential of the calf will wean a lighter calf at a lower percentage of cow mature weight. Both of these scenarios will reduce the biological efficiency of the cow herd. To optimize biological efficiency larger cows that produce calves with greater growth potential should have higher peak milk production and smaller cows that produce calves with lower growth potential should

Table 4. Biological efficiency of cow size and milk production: Theoretical relationship of cow mature body weight with revenue equivalent calf weaning weight, calf ADG, and required peak milk production.

Cow mature weight, lb	Revenue equiv. weaning weight, lb	Calf ADG, lb/d	Required peak milk, lb/d
800	386	1.21	6
900	444	1.44	10
1000	500	1.65	13
1100	555	1.86	15
1200	609	2.07	20
1300	661	2.27	22
1400	712	2.47	26
1500	763	2.66	27

Cow mature weight = body weight of mature cows at body condition score 5. Revenue equiv. weaning weight = calf weaning weight required to have equal weaning weight relative to potential revenue. Calf ADG = rate of gain required by calf to achieve the revenue equivalent weaning weight in 260 days assuming birth weight of 70 lb. Required peak milk = peak milk production required for calf to achieve the necessary rate of gain after accounting for forage intake.

have lower peak milk production so that milk production matches growth potential of the calf. Table 4 shows estimates of the growth rate of the calf and peak milk production of the cow required for small and large cows to produce a revenue equivalent weaning weight. This is the amount of milk to achieve the revenue equivalent weaning weight, but if your calves have the growth potential for higher weaning weights than in Table 4, then the cows should have more milk than shown in Table 4 to match the growth potential of the calf. *I want to stress that the peak milk values in Table 4 are estimates for comparison and should not be used for sire selection purposes.*

The optimum cow size and milk production to maximize biological efficiency of a given ranch depends upon management and marketing strategy of the ranch. For example, ranches that sell calves at weaning would maximize efficiency by developing a cow herd of moderate size cows with moderate milk production. Typically forage resources will not allow large cows to produce enough milk for the growth potential of large calves which will decrease the biological efficiency of large cows when calves are sold at weaning. In contrast, ranches that retain calves until slaughter would maximize efficiency by developing a cow herd of larger size cows with low to moderate milk production. In this case, the ranch is not concerned with maximizing weaning weight and so high milk production is not necessary and would increase the maintenance requirements of the cow. The greater growth potential of large calves maximizes efficiency in the feedlot, and the lower milk production improves efficiency by feeding the calf in the feedlot rather than feeding the cow to produce milk for the calf. Thus, the ranch management and marketing strategy influences the cow type that will be most efficient.

One of the best ways to increase biological efficiency for both types of producers is to use crossbreeding. Previous studies indicate that crossbreeding systems have improved biological efficiency when calves are sold at weaning or retained until slaughter compared with purebred systems. Using a sire with larger size and high growth potential on moderate size cows with moderate milk production can increase weaning weight as a percentage of cow mature weight and thus improve biological efficiency. This can be done by using sires with moderate size on some cows to produce replacement heifers, then using terminal sires (no replacement heifers are kept) with larger size on the remaining cows to produce feeder calves. Or a rancher could

purchase replacement heifers of a moderate size breed, then use sire breeds with larger size to produce feeder calves. Using artificial insemination with crossbreeding systems can reduce management and facility requirements of crossbreeding by allowing a ranch to use multiple breeds of bulls without the need for multiple pastures. For example, a ranch could use artificial insemination on their best cows using a sire with moderate size and milk production to produce replacement heifers, then the remaining cows are bred to a sire with large size and high growth potential to produce feeder calves.

In conclusion, for equal biological efficiency cows of different mature weight must wean a calf with a weaning weight at similar percent of metabolic BW, and milk production must match the growth potential of the calf. Larger cows can be as biologically efficient as smaller cows; however, one year of data from the research herd at the Range Cattle Research and Education Center suggests that large cows are not as efficient as small cows in our environment. On a revenue basis, the large cows have to wean the same percentage of mature body weight as small cows to make up the difference in sale price of light versus heavy feeder calves. To maximize biological efficiency of the cow herd the best approach is to use large size terminal sires on moderate size cows in a crossbreeding program which will increase the growth potential of the calf relative to the mature weight of the cow.

Free Choice Intake of Salt-Based Trace Mineral Supplements

John Arthington

Cattle have a nutritional need for sodium and chlorine. This requirement has been realized for centuries due to a natural craving for common salt. In fact, salt is the only nutrient for which cattle display a nutritional wisdom for consumption. When given adequate access, cattle will consume salt in amounts that meet or exceed their nutritional requirement for sodium and chlorine. Collectively, these two elements function as electrolytes in body fluids and are essential for nutrient metabolism. Signs of sodium and chlorine deficiency result in pica, which is an abnormal apatite or craving for non-nutritional substances, presumably to obtain salt. This condition results in behaviors such as licking of wood, rocks, soil, sweat, or bones from other animals. A prolonged deficiency results in a loss of appetite, decreased growth, unthrifty appearance, reduced milk production, and loss of body weight (Underwood and Suttle, 1999). Sodium is the most limiting of the two minerals in typical cattle diets, so supplementation is almost always required. Common salt is the most widely utilized source for sodium supplementation. The sodium requirement of beef cattle is not well understood; however, it is reasonable to assume that it will be impacted by level of milk production, environmental conditions, and growth status. The Beef NRC (1996) suggests a maximum sodium requirement of 0.08% for dry cows and 0.10% for lactating cows. These guidelines were derived from Morris (1980) and still serve as a functional guideline for grazing beef cattle today.

Annual variations in salt-based, free-choice mineral supplements are widely observed across the globe. These fluctuations are typically associated with changes in precipitation and temperature and stage of cow production (Figure 1; Arthington and Swensen, 2004). A common misconception is that cattle will consume free-choice mineral at the amount needed to meet their requirements, thus if cattle are consuming more mineral than usual, it must be due to an increased need. This is not true. Cattle only have a nutritional wisdom to consume salt at or above their nutritional requirement. Because salt is used as a carrier for most of our free-choice mineral supplements, seasonally-impacted increases in intake are only a reflection of an increased craving for salt. This seasonal change in mineral intake pattern is likely

related to both an increased sodium requirement, but also an unexplained craving for salt. If allowed free choice access, grazing cows will often consume mineral supplement in excess of their requirement during certain seasons of the year. This increased intake will typically not harm the cowherd; however, it is also important to understand that it also will not improve production. It is a costly waste that can be lessened by a couple different management strategies.

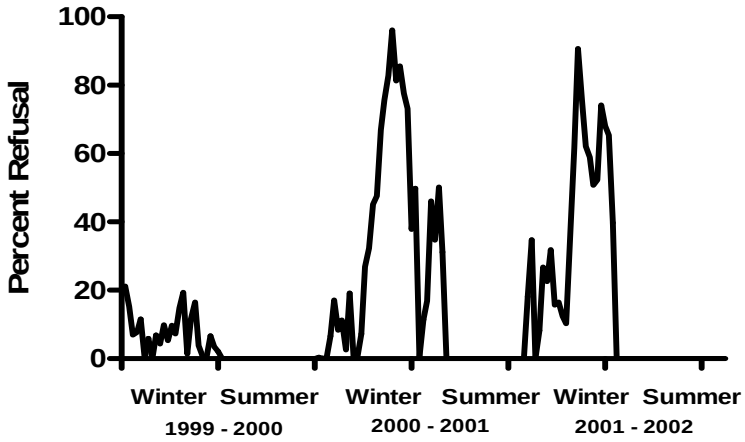

Figure 1. Annual variation in free-choice, salt-based mineral intake among grazing beef cows in Florida. Cowherds (n = 8; 20 cow/herd) were provided the product's recommended intake of 2 oz/d in a single weekly feeding (14 oz/cow weekly). Refusals were measured each week for a three year period.

Diluting free-choice mineral supplements with straight stock salt. White stock salt is not free, but it is much less expensive than a fully fortified mineral supplement. Therefore, if a product is formulated for a 4 oz/d intake and the cowherd is consuming an average of 8 or more oz/cow daily (typical seasonal variation), then consider mixing the mineral supplement with straight white stock salt at a 50:50 ratio. Thus, an 8 oz/cow daily intake of the blended mixture will result in the originally targeted consumption rate of 4 oz/cow daily of the complete mineral premix. This management option can greatly reduce your annual cowherd mineral costs without impacting production. Remember, when using this management strategy; do not feed the white stock salt and mineral supplement separately - instead, hand-mix the two together. Also, it is important to continually monitor intake. As the natural seasonally-influenced salt craving changes and voluntary intake declines, reduce in the inclusion of white stock

salt with the goal of regulating the intake of the mineral supplement as close as possible to the formulation's feeding instructions. By monitoring and recording mineral intake each week, a record can be obtained that will be fairly repeatable on an annual basis with the same mineral supplement, pastures, and herd of cows.

Controlled feeding of minerals. This management strategy involves the formulation of a palatable, grain-based supplement fortified with essential minerals. This method of mineral feeding can be particularly useful when cattle are not attracted to supplemental salt, which can be observed in areas with saltwater intrusion or otherwise high-salt content of drinking water. Under these situations, cattle may not adequately consume free-choice mineral supplements, and thus, lack essential minerals such as copper, cobalt, selenium, and zinc. When offered at a minimum of twice weekly, this mineral-fortified supplement can be an effective, efficient tool for delivering supplemental minerals to the cowherd. For best results, the supplement should be formulated into a range cube or pellet and fed on the ground, or as a loose mix supplement offered in feed bunks. Molasses-based liquid formulations are also available. To limit the costs associated with handling and storage, these mineral supplements should be concentrated such that maximum intake can be limited to ¼ to ½ lb per cow at each feeding for the dry supplements and less than 1 lb per day for the liquid supplements. The mineral specifications can vary greatly depending on the amount of product being consumed and the frequency of feeding. Free choice white stock salt should be offered to the cowherd at all times.

Limit creep feeding of trace mineral-fortified supplements. Creep feeding has long been suggested as a management system that may improve post-weaning and post-transport performance of beef calves. Unfortunately, creep feeding is associated with inefficient body weight gain. As an alternative to traditional creep feeding systems, we have proposed that by limiting creep feed intake, calves may benefit from the behavioral association of humans and feed, while also becoming acclimated to the consumption of concentrate feedstuffs. In addition, limited creep feed can serve as a vehicle for the controlled delivery of trace minerals, which are typically excreted and/or repartitioned during periods of stress. Recently, we completed an experiment evaluating the impact of limit-fed, trace mineral-fortified creep feed supplements on measures of performance of pre-weaned calves. In these studies, calves provided creep-

feed without trace mineral fortification (MIN-), had greater voluntary supplement intake compared to calves provided the same creep supplement but fortified with trace minerals (MIN+). In this experiment, MIN+ calves, never reached our targeted maximum supplement intake of 0.50 lb/calf daily (0.23 kg; Figure 2). Following our experiences with reduced voluntary intake of trace mineral-fortified supplements, we sought to examine various sources of trace minerals that might improve voluntary supplement consumption. One new source of Cu, Zn, and Mn, called hydroxychlorides (trade name IntelliBond), is offered by Micronutrients in Indianapolis, IN. Compared to the sulfate counterparts used in our initial study, the hydroxychloride sources of Cu, Zn, and Mn are highly insoluble. Why hypothesized that the low solubility of these ingredients would improve preferential intake. In our first experiment, weaned calves, offered supplements fortified with IntelliBond had much greater preferential intake compared to supplements fortified with equivalent amounts of Cu, Zn, and Mn from organic and sulfate sources (Figure 3). We are currently investigating applications for these ingredients in multiple supplementation strategies.

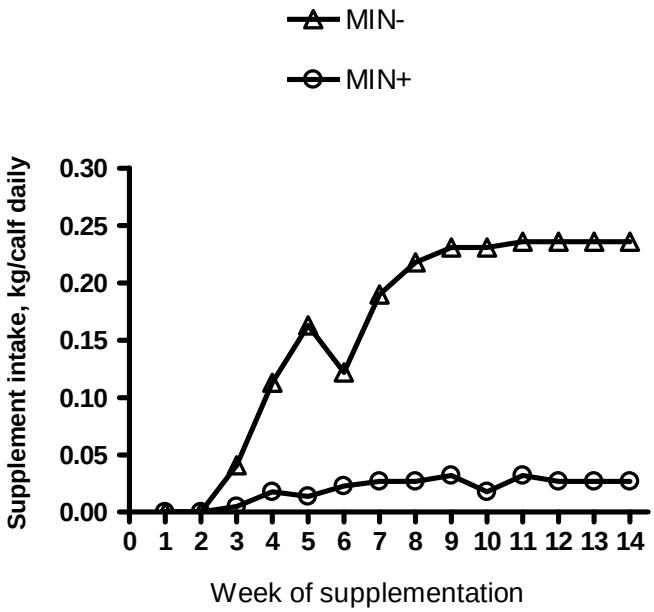

Figure 2. Intake of limit-fed creep supplements fortified (MIN+) or not (MIN-) with trace minerals. Calves were provided supplements 3 times weekly (M, W, and F) in amounts equivalent to 0.5 lb (0.23 kg) daily.

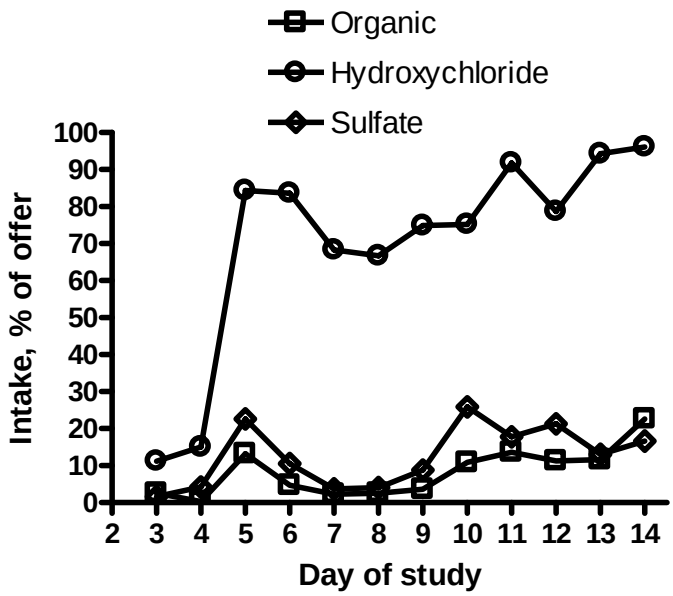

Figure 3. Preferential intake of supplements fortified with Cu, Zn, and Mn from three sources; organic, hydroxychloride (IntelliBond), or sulfate by weaned beef calves. Twenty-four beef calves (2 calves/drylot pen) were provided a complete ration over a 14-d evaluation period. At 10:00 daily, all feed was removed and calves were offered each of the three supplements simultaneously (2 lb/supplement/pen). Preferential intake, as a percent of offer, was calculated 4 h later.

In summary, it is important to understand the seasonal fluctuations in free-choice mineral intake among grazing beef cattle. These changes are regional and can be impacted by salt content of drinking water, presence of supplemental feeds, environmental conditions, and stage of production. Cattle will consume supplemental salt at levels that meet and exceed their requirement. Therefore, salt can be used to dilute free-choice mineral mixtures during times of excessive salt craving. Alternatively, when cattle lack an attraction to salt-based mineral supplements, producers can control-feed minerals through a low-intake, mineral-fortified feedstuff offered 2 to 3 times weekly. Current studies at the Range Cattle REC are investigating applications for improved voluntary consumption of trace mineral fortified supplements using hydroxychloride ingredients as sources of Cu, Zn, and Mn.

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What We've Learned over the Past 70 Years on Smutgrass Management

Brent Sellers

Smutgrass species have been problematic in Florida pastures for the last 60-70 years. It is a perennial bunch-type grass that is capable of producing at least 45,000 seeds per plant. Our work with seed germination shows that seed can germinate nearly year-round, but germination will most likely occur during the rainy season when soil moisture is adequate. Although the hot and rainy conditions of summer are optimum for seed germination, it is common to see smutgrass seedlings in the spring and fall when soil moisture is relatively high. Therefore, prevention of seed production is necessary to limit the amount of smutgrass spread. Preventing seed production, however, is extremely difficult considering that seed heads are produced as early as March in south Florida, and mowing tends to stimulate seed-head production.

Mowing. Mowing smutgrass, in general, has no long-term effects on eradication. Work performed in the late 1950s at the Range Cattle Research and Education Center revealed that mowing resulted in little change in smutgrass plant density, even when plants

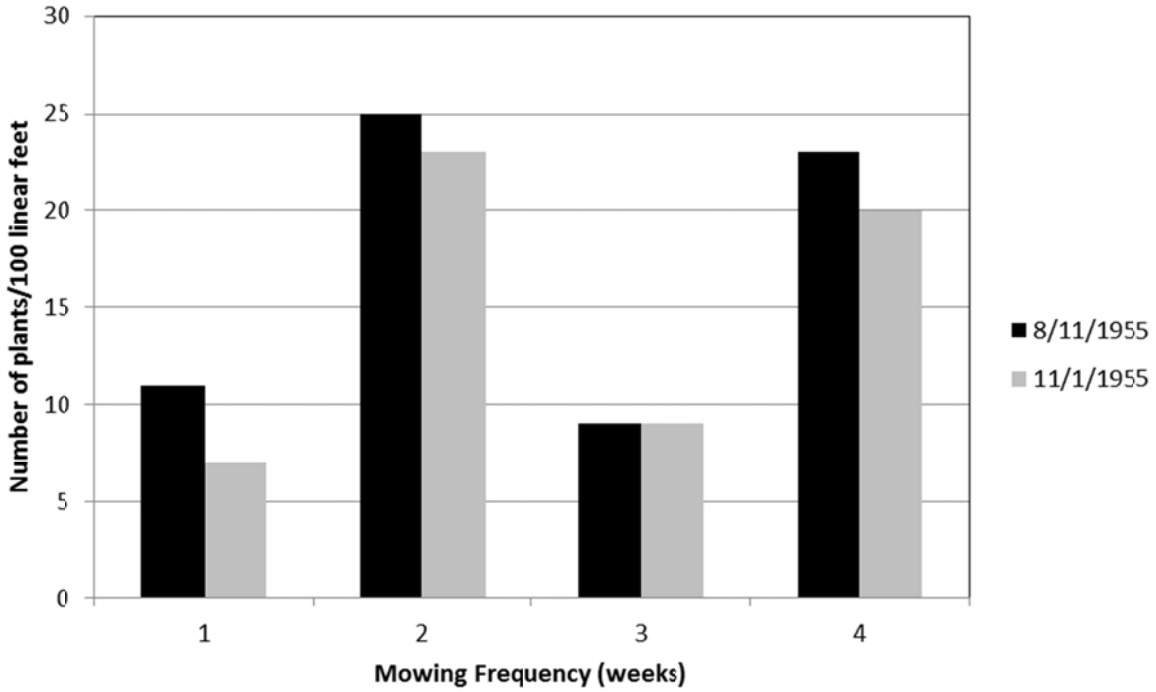

Figure 1. Change in smutgrass density over a three month period following 1, 2, 3, or 4 weekly mowing events. Data adapted from McCaleb et al. (1966) from Florida Agric. Exp. Stn. Circ. S-149.

were mowed weekly for four weeks (Figure 1). The size of individual clumps decreased by as much as 50%, but the long-term effects of mowing on smutgrass control were negligible and may actually facilitate seed dispersal. The only advantage to mowing smutgrass is that the tender regrowth may be more palatable to cattle.

Soil fertility and pH. There have been no studies that have examined the role of soil fertility on the impact on smutgrass management per se. However, given the results of our work on smutgrass competition with bahiagrass in soils differing only in pH, it is likely that any added fertility will only enhance the growth of smutgrass. Our work with soil pH revealed that giant smutgrass is likely to outperform bahiagrass, except when soil pH falls to 4.5, but at this low pH, neither species performed very well. Once soil pH was raised to 5.5, giant smutgrass outperformed bahiagrass (Figure 2). Although raising soil pH to 5.5 will not result in less smutgrass in the pasture, bahiagrass absorption of necessary nutrients is optimum at this soil pH.

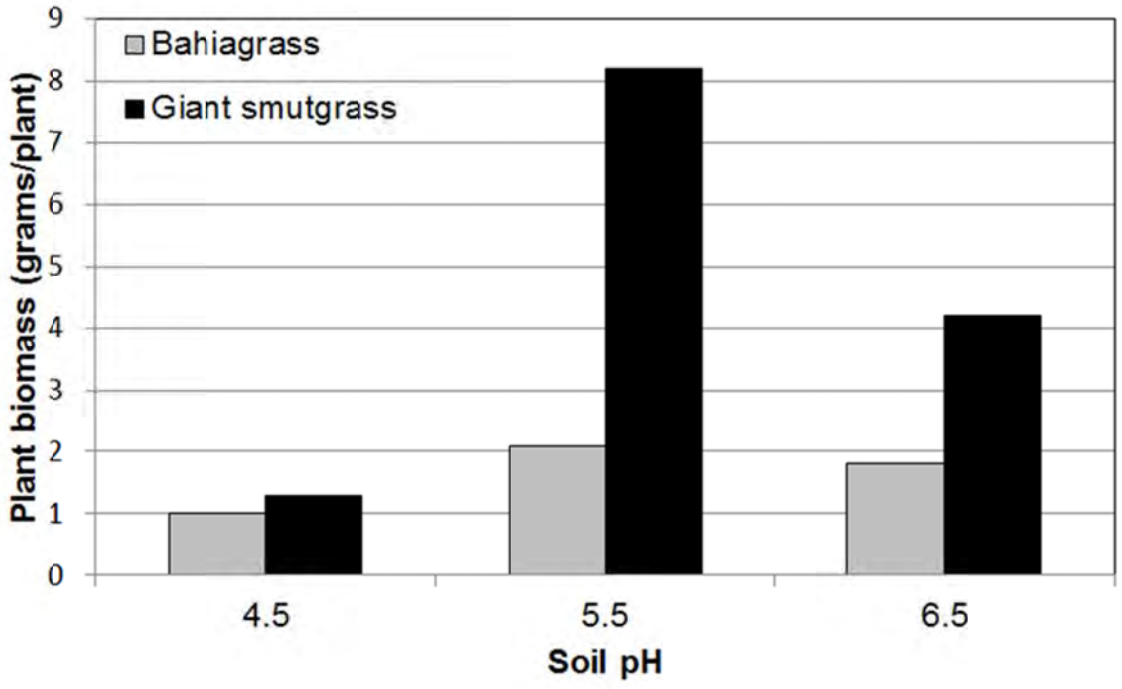

Figure 2. Impact of soil pH on the competitive growth of bahiagrass with giant smutgrass under greenhouse conditions. Bahiagrass and giant smutgrass were grown in equal proportions at a density of four plants per gallon-sized pot.

Herbicides. Prior to the registration of Velpar (hexazinone) in 1989, the only herbicide utilized for smutgrass control was dalapon. However, dalapon is no longer available and hexazinone (Velpar, Velossa) is the only active ingredient registered that will

effectively kill established smutgrass plants. Hexazinone can be applied at 0.5 lb (1 qt/A) to 1.0 lb (2 qt/A) to control smutgrass in established pastures (Figure 3). Note that control of smutgrass in Figure 3 shows considerable variation in smutgrass control at 0.5 lb, but variation in control decreased as application rates increased to at least 0.75 lb. We have observed control with 0.5 lb to be as high as 90%, but also as low as 20%. Hexazinone is very sensitive to environmental extremes and it is not uncommon for it to fail even when high rates (1.0 lb/A) are applied. Rainfall is necessary to move the herbicide into the root zone for uptake into the plant, but too much rainfall can move the herbicide completely out of the root zone, making it unavailable to the plant.

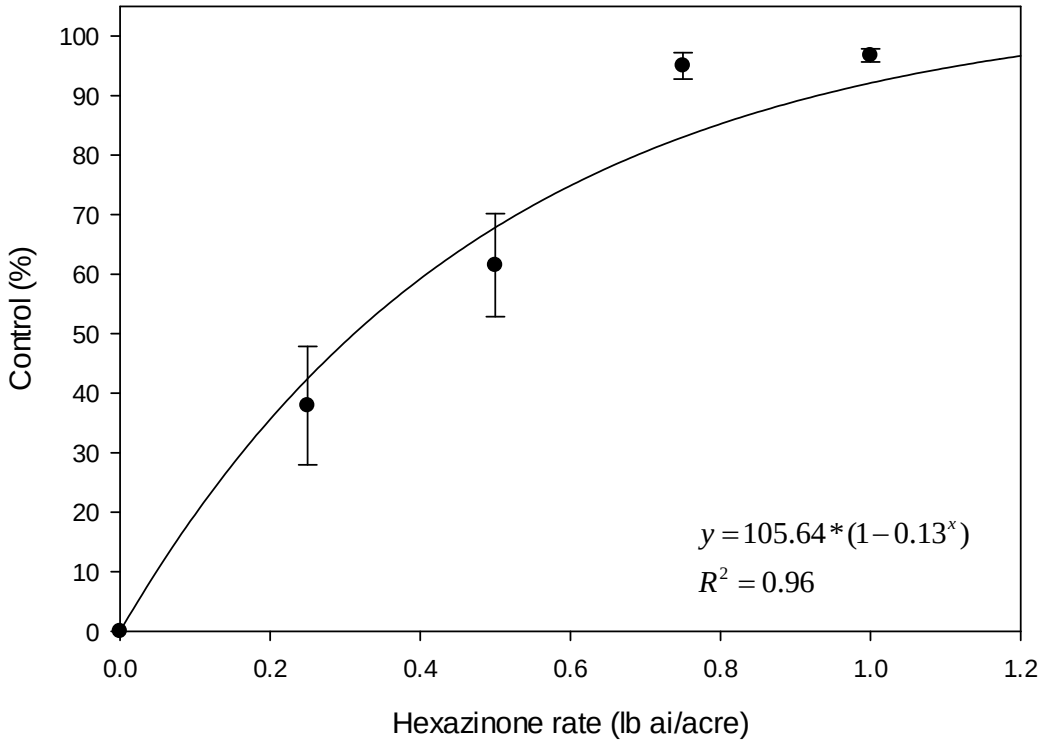

Figure 3. Smutgrass control with various rates of hexazinone.

Mowing and herbicides. Research at the Range Cattle REC showed that mowing smutgrass to 2 inches 5 weeks after dalapon application resulted in increased smutgrass control 1 year after treatment. Conversely, the effect of mowing prior to hexazinone applications has not increased smutgrass control. Research in south Florida also showed that repeated mowing (3 times) prior to hexazinone application resulted in no increase in smutgrass control. Therefore, it appears that mowing prior to hexazinone application will not increase smutgrass control, but rather add more cost to an already expensive herbicide treatment.

Burning and Grazing. Cattle generally avoid grazing mature smutgrass, but they readily graze tender regrowth within 1 to 3 weeks of burning. This may be because the forage quality of young smutgrass is similar to that of bahiagrass. Research evaluating the effectiveness of burning and grazing was performed by Dr. Jeff Mullahey in the late 1990s and by Dr. Yoana Newman during the past few years. Both studies showed that this method can reduce the growth and vigor of smutgrass, especially during the following year after burning. However, if burning is not imposed within the next two years, smutgrass densities tend to revert back to original densities as with any management program applied to smutgrass.

Multi-year approach. We have examined the effect of sequential hexazinone applications at various application rates over a two year period. Obviously, applying a full rate of hexazinone usually results in excellent smutgrass control. Our results show that applying a half-rate (0.5 lb/A) of hexazinone two years in a row results in similar levels of control compared to applying a single full rate of hexazinone (Table 1). This could allow for spreading the cost of smutgrass control over a two year period, and can also result in an increase in the amount of acres that can be managed if you have budgeted a specific amount of money to control smutgrass. For example, if you have budgeted $4,000 for smutgrass control, and the full rate of hexazinone is applied, a total

Table 1. Impact of single and sequential hexazinone applications on smutgrass control 24 months after the 2009 application.

2008 Hexazinone rate (lb/A)	2009 Hexazinone rate (lb/A)	# of plants per plot 24 MAT[a]	Cost/A in 2008 ($)	Cost/A in 2009 ($)	Total Cost/A for 2 years ($)
0.00	0.00	11.7	0.00	0.00	0.00
0.00	0.50	12.7	0.00	20.00	20.00
0.50	0.50	1.0	20.00	20.00	40.00
0.75	0.00	2.5	30.00	0.00	30.00
0.75	0.50	0.8	30.00	20.00	50.00
1.00	0.00	1.5	40.00	0.00	40.00

[a]MAT = months after treatment. In this table, the number of plants indicated are the number of plants 24 months after hexazinone application in 2009.

of 80 to 100 acres can be treated. However, if the half-rate is applied, the amount of acreage can be doubled. We continue to monitor these studies to understand the long-term effects of these sequential treatments on smutgrass control.

Integrated approaches. During the past five years we have examined the effects of an integrated approach using fire, herbicides, and complete pasture renovation for smutgrass management. We have determined that burning during the late winter prior to applying hexazinone does not increase smutgrass control. However, it does allow for removal of smutgrass thatch, allowing for an increase in bahiagrass regrowth once the smutgrass has been controlled with hexazinone. We also investigated the impact of applying a half-rate (0.5 lb/A hexazinone) one year after completely renovating bahiagrass pastures. In this situation, smutgrass reinfestation after replanting was quite high, but the application of 0.5 lb/A hexazinone the summer after planting resulted in excellent smutgrass control. To date, very little smutgrass has reinfested the pastures where we replanted bahiagrass, and we continue to monitor these pastures for long-term control and is equal to the level of control we observed with applying hexazinone at 1 lb/acre followed by an additional ½-lb/acre the following year.

Fertility management in conjunction with hexazinone applications may also be important. In a separate experiment we applied a full rate of hexazinone to an entire pasture in year one. In the second year, we applied hexazinone at either 0 or 0.5 lb/A with or without 50 lb/A nitrogren. The initial application of hexazinone resulted in nearly 100% smutgrass control throughout the pasture. The long-term effects of the second application of hexazinone with or without nitrogen continue to be under evaluation, however, we are seeing a trend of reduced smutgrass invasion in plots that received both hexazinone and nitrogen the second year compared to all other treatments.

Forage tolerance. The Velpar label specifically states that it is intended for use in bermudagrass and bahiagrass pastures. This is for good reason as these two forages are the most tolerant to hexazinone. While other forages like stargrass and limpograss are not specifically mentioned on the label, the label states "Treatment of mixed patures containing forage species other than bermudagrass or bahiagrass may result in injury or mortality to the other forage species." Spraying hexazinone on these two species can be tricky, and the use rate should not exceed 0.5 lb/A. Significant injury to almost complete death of limpograss and stargrass has been observed on several occasions. For limpograss, it is best to apply hexazinone when the grass is tall and rank as applications during active limpograss growth can result in >50% injury. Stargrass

injury from hexazinone is a little more difficult to predict as we have not been able to determine why stargrass responds to hexazinone applications in some instances with hardly any injury at other times. Mulato (brachiaria hybrids) should not be treated with hexazinone.

For current information regarding smutgrass control, please see the University of Florida EDIS document entitled "Smutgrass Control in Perennial Grass Pastures" (edis.ifas.ufl.edu/aa261) or contact your local county extension office.

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SS-AGR-18

UF UNIVERSITY of FLORIDA
IFAS Extension

Smutgrass Control in Perennial Grass Pastures[1]

Brent Sellers, J. A. Ferrell, and J. J. Mullahey[2]

Introduction

Smutgrass (Figure 1)–an invasive bunch grass, native to tropical Asia–is a serious weed of improved perennial grass pastures, roadsides, natural areas, and waste areas in Florida. Results of a survey conducted by The South Florida Beef Forage Program in 2003 indicated that smutgrass ranks as the second-most-problematic weed species in Florida pastures, behind tropical soda apple, which is the most problematic weed. However, because practices to control tropical soda apple have been widely adopted in Florida since that survey was conducted, it is likely that smutgrass has by now become the most problematic weed species in Florida pastures.

Two smutgrass species are found in Florida–small smutgrass (*Sporobolus indicus*; Figure 2) and giant smutgrass, which is also known as West Indian dropseed (*Sporobolus indicus* var. *pyramidalis*; Figure 3). Small smutgrass was once the predominant smutgrass species throughout Florida. By the 1990s, however, giant smutgrass had become the most common smutgrass species throughout

Figure 1. Smutgrass infestations are common in bahiagrass pastures throughout Florida. Credits: B. Sellers

Central and South Florida. Giant smutgrass continues to move northward in Florida.

Mature smutgrass plants are unpalatable to livestock, but some grazing of mature smutgrass does occur. New regrowth of smutgrass, which is similar in quality to that of bahiagrass, is grazed for two to three weeks after burning or mowing. However, it is difficult to graze cattle on smutgrass due to the need to rotate cattle among smutgrass-infested paddocks,

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Figure 2. Small smutgrass, once the most troublesome smutgrass species in Florida, is still found throughout the state.

Figure 3. Giant smutgrass first became a problem in South Florida and is spreading north through the state. In Central and South Florida, giant smutgrass is more problematic than small smutgrass. Credits: B. Sellers

so that growth of the smutgrass does not reach a stage where cattle will not graze the plants.

Biology

Both smutgrass species – small and giant – are perennial bunch grasses. Average bunch size of small smutgrass is approximately 8 - 10 inches in diameter while giant smutgrass diameter is approximately 12 - 18 inches.

Small smutgrass has a compact seedhead (Figure 4) with the panicle branches touching the panicle. The small smutgrass seedhead is almost always infected with a black fungus. Small smutgrass plants produce approximately 1,400 seeds per seedhead and 45,000 seeds per plant.

In contrast, giant smutgrass has an open seedhead with panicle branches directed somewhat upward (Figure 5). The seedhead of giant smutgrass is usually not infected with the black fungus, but giant smutgrass plants are sometimes infected with this fungus. Little information exists concerning seed production of giant smutgrass, but some indications suggest this plant may be a more prolific seed producer than small smutgrass.

Seed production of both species occurs throughout the growing season, and new seedheads are produced shortly after mowing or burning. The seeds, which are red to orange in color, remain attached to seedheads for some time after maturing and are spread by adhering to livestock and machinery or by movement via water and wind. Natural seed germination has been shown to average less than 9%, and seed are thought to remain viable in the soil for at least two years.

Figure 4. Small smutgrass seedheads are appressed near the raceme, giving the seedhead a cylindrical appearance.

Figure 5. Giant smutgrass seedheads are open and generally not infested with the black smut fungus that typically infests small smutgrass, but sometimes smut fungus is also found on giant smutgrass.

Control

Cultural practices to control smutgrass species have not been successful to date. Mowing decreases the diameter of the clumps, but often results in increased density. Burning is thought to increase the germination of seeds in the soil seed bank. However, both burning and mowing allow for approximately two to three weeks of grazing. Smutgrass forage quality during this two to three week window is often equal to or slightly greater than bahiagrass.

Chemical control of smutgrass includes applying Velpar at 2 qt/acre (1.0 lb hexazinone/acre) to small and giant smutgrass. A surfactant may be added to the spray mixture, but recent research has indicated that a surfactant is not necessary. Mowing smutgrass prior to Velpar application does not increase control. Velpar should be applied from June through September, when rainfall is typically sufficient to move the herbicide into the root zone for uptake. There is little foliar activity from Velpar on smutgrass. If rainfall does not occur within a two-week period after application, the herbicide treatment will likely fail. There are no grazing restrictions for Velpar if the application rate is below 4.5 pt/acre (1.13 lb hexazinone/acre). However, there is a 38-day haying restriction.

Velpar is a highly effective herbicide, but is also expensive. Experiments were recently conducted to determine when Velpar should be applied to maximize smutgrass control, especially in light of the best timing for application to realize return on the herbicide investment. An economic analysis indicated that Velpar should not be applied until smutgrass density is approximately 50 percent of the area of a pasture. Applications of this herbicide prior to this level of infestation will not result in enough additional bahiagrass biomass (i.e., ability to increase stocking rate) to justify the cost of Velpar application. However, in terms of preventing smutgrass infestation, it may be economically justifiable to spray highly infested areas of a pasture, even before 50% of the entire pasture is infested.

Oak trees are extremely sensitive to Velpar, and care should be taken to stay at least 100 ft away from oak trees when applying Velpar. If smutgrass is

present under or near oak trees, spot applications of 3% glyphosate are effective.

Forage Grass Tolerance

Bahiagrass will turn slightly yellow about 15 - 20 days after spraying with Velpar at the recommended rates. However, bahiagrass will recover and turn dark green within about 40 days. This green color will be darker than the non-treated pastures. Bermudagrass will turn yellow with some necrosis for approximately 30 days before new green growth occurs.

Recommendations

General

- Do not apply Velpar within 100 feet of oak trees because application within this range may cause death of the tree.
- Read the Velpar label for complete instructions on reapplication interval, safety and grazing restrictions.
- Cattle may graze treated pastures if applications are less than 4.5 pt/acre.
- To realize economic gains from Velpar application, smutgrass infestation should be approximately 50 percent of pasture.
- If the initial smutgrass density covers more than 80 percent of the pasture area (if 8 out of 10 regular steps touch the base of smutgrass plants), complete renovation of the pasture should be considered.

Bahiagrass/Bermudagrass Pastures

- Graze pasture in the spring until the beginning of the rainy season.
- Apply 2.0 qt/acre Velpar during the summer rainy season, but not later than the end of September. Apply when plants are actively growing and rainfall is dependable and consistent.
- Fertilization after Velpar application will increase forage production and allow bahiagrass to quickly fill the open areas created by dying smutgrass.

Floralta Limpograss

- Velpar is not currently labeled for smutgrass control in limpograss.

Stargrass

- Velpar is not currently labeled for smutgrass control in stargrass.

Mulato

- Velpar is not currently labeled for smutgrass control in Mulato as it will be severely injured – DO NOT USE.

Jiggs Bermudagrass Management in South Florida

Joe Vendramini

Bermudagrass is one of the most important warm-season perennial grasses in the southern USA. Coastal bermudagrass was the first hybrid bermudagrass released in 1943 and since then, a massive number of new bermudagrass cultivars were released by state agricultural experiment stations and private companies. Despite of the large number of cultivars released, it has been challenging to find a bermudagrass cultivar adapted to South Florida, primarily because of the poorly drained soils. Coastal, Tifton 85, and the "Central Florida Tifton 44" (which is different from the true Tifton 44) are cultivars well adapted to North-Central Florida and have superior drought tolerance; however, they are not productive and persistent when planted in poorly drained soils.

Dr. Paul Mislevy brought Jiggs to the UF/IFAS Range Cattle Research and Education Center, Ona, FL approximately 10 years ago to conduct research and compare Jiggs with the existent improved warm-season grass species adapted to South Florida. A study was conducted in Ona, FL to compare the herbage production and nutritive value of different stargrass (Florona, Okeechobee) and bermudagrass (Tifton 85, World Feeder, Bermuda 2000, and Jiggs) cultivars at different grazing frequencies (2, 4, 6, and 7 weeks). Jiggs and Bermuda 2000 (cultivar not released) were generally the two highest yielding entries at grazing frequencies of 2 (3.4 and 3.1), 4 (6.5 and 5.7), 5 (6.9 and 7.9), and 7 weeks (9.3 and 8.2 ton/acre), respectively, and the most persistent. The winter forage production was highest for Bermuda 2000 and Jiggs averaged 1.1 ton/acre when harvested after 12 weeks regrowth. It was noted that the early spring and fall forage production of Jiggs was greater than the other cultivars.

A recent study conducted in Wauchula, FL compared several species and cultivars of warm-season grasses commonly planted in South Florida. Jiggs was among the most productive entries with similar nutritive value. As a result of standing water conditions for two weeks during the summers of 2007 and 2008; many entries did not persist throughout the 3-years trial. Jiggs persisted under those conditions and maintained 95% of the stand after the experimental period.

A haylage study was conducted at the UF/IFAS Range Cattle Research and Education Center in Ona to compare nutritive value and fermentation characteristics of Jiggs and Tifton 85 ensiled at two dry matter concentrations, 30 and 50% DM. The plots were fertilized with 80lb N/acre and harvested at 4 weeks regrowth interval. There was no difference in nutritive value and fermentation characteristics between Jiggs and Tifton 85 haylage. The average crude protein, in vitro digestibility, lactic acid concentrations, and pH were 13, 55, and 3%, and 4.5 respectively.

A grazing study was conducted at the UF/IFAS Range Cattle Research and Education Center to test the effects of Jiggs stubble height on forage and animal performance. Jiggs grazed at approximately 7 inches stubble height had crude protein and in vitro digestibility of 15 and 57%, respectively. Jiggs should not be grazed at stubble heights below 7 inches and it was observed that the Jiggs ground cover decreased from 90 to 40% when pastures were grazed from 7 to 3 inches stubble height.

In addition to the desirable characteristics described above, it has been observed that Jiggs has faster establishment than stargrass and other cultivars of bermudagrass, when planted with mature tops. Jiggs also has thin stems, which allow the grass to dry faster under field conditions when harvested for hay or haylage. The faster drying time is necessary to decrease the chances of adverse climatic conditions and maintain the green color of the dried material. The thin stems and green color are desirable attributes in the hay market, primarily for horse hay.

As with many bermudagrass cultivars in South Florida, Jiggs is susceptible to leaf rust when regrowth periods between harvests or grazing exceed approximately 6-7 weeks. The appearance of rust is conditional to the plant maturity and climatic conditions. Nitrogen fertilization can stimulate new growth and eventually decrease the rust symptoms; however, it is an expensive solution for the problem. Spraying copper sulfate has also being tried by producers with highly variable results. The best management practice to alleviate the rust problem is to harvest or graze the stand and allow new regrowth.

Recently, it was observed in Ona and Okeechobee that Jiggs stands were damaged by "bermudagrass stem maggot". The common symptom is the death of the top leaves of

the plant. The products used to control the maggot are similar to the products currently used for army worms.

It needs to be emphasized that Jiggs is a bermudagrass; like all bermudagrasses, Jiggs requires adequate pH and fertilization program, and will not tolerate overgrazing for long periods. Overgrazing Jiggs often results in an infestation of common bermudagrass, which is extremely difficult to control. A minimum of 7 inches stubble height is recommended to increase production and decrease weed infestation.

Although it was mentioned that Jiggs is adapted to poorly drained soils, it is not recommended to plant Jiggs in areas with frequent long periods of flooding (several weeks) because the persistence of Jiggs under this condition is unknown.

Time for Fall Soil and Tissue Testing

Maria Silveira

It is that time of the year again. Although soil samples can be collected any time of the year, fall is generally the most desirable time to sample your soil because it allows time for lime application and pH correction before spring fertilization.
Soil and tissue testing are critical components of a successful soil fertility program. Soil should be tested before spring fertilizer application to ensure that soil pH is within the optimum range for each specific forage crop. Most soils in Florida are acidic and will likely require lime application to increase the pH to the desirable levels.

Soil test results are only as good as the sample taken. It is very important to submit a soil sample to the laboratory that truly represents the area of interest so that a reliable test and recommendations can be made for the entire area. A minimum of 15 to 20 subsamples (0 to 6 inches in depth) should be collected from each field and composite into a single sample. Samples should be taken at random in a zigzag pattern over the entire area. Areas that are managed or cropped differently should be sampled separately. Similarly, areas that show clear signs of a problem (i.e., poor forage production, disease) should also be sampled and analyzed separately. **Collecting a good, representative soil sample is well worth the time and effort it requires**. Soil samples can be taken using a soil probe or a shovel. The most important point is to be consistent and collect every sample as close as possible to the same depth. Place all the subsamples (15-20) for each area in a clean plastic bucket and mix thoroughly. A hand full (approximately 1 pint) of soil should be sent to a reputable laboratory for analysis. If multiple samples are sent to the lab, pack them in sturdy containers to avoid cross-contamination among the samples.

Plant tissue analysis has been recently incorporated into the revised UF/IFAS fertilizer recommendations as a management tool to guide proper phosphorus fertilization in established bahiagrass pastures. Unlike soil sampling that can be done at any time of the year, tissue sampling should be done when the forage is actively growing. This can be challenging, especially during late fall and winter months when the majority of the forages cultivated in Florida are dormant. The best approach is to collect both plant

tissue and soil samples at the same time of the year (preferably before the first frost in the winter). Similar to soil testing, tissue samples must be representative of the field. The number of plants to sample in a specific area will depend on the general conditions of plant vigor, soil heterogeneity, and forage management. A truly representative sample can be obtained by sampling a large number of plants so that the sample represents the entire field. Collect at least 1 ounce (30 g) of fresh material. Sampling is not recommended when plants are injured by insects and diseases. To avoid contamination, plants should not be sampled soon after spraying pesticides or herbicides. Care should be taken to minimize soil contamination on the sampled plant material. In addition, plants should not be sampled under temperature or moisture stress. Ideally, samples should be collected during a time of the day when climatic conditions are mild, generally early to mid-morning or early evening. The plant part, maturity stage and time of sampling are also important factors that can affect plant nutrient composition. Forage grasses and hay fields should be sampled prior to seed head emergence. Care should be taken to select the plant part that accurately reflects the nutrient status of the plant**. The top portion of the plant (similar as the cattle would graze) should be sampled**. Do not sample seeds as they are not useful for assessing nutrient status of forage crops and may introduce large errors in the report interpretation. If deficiency symptoms are suspected, plants showing these symptoms should be sampled and analyzed separately from "normal" or healthy appearing plants. After sampling, tissue should be placed in properly labeled paper bags and sent immediately to a reputable laboratory for analysis. Avoid plastic bags because they can hold heat and moisture. The same precautions taken for collecting the plant material should be followed for handling the samples. Because fresh plant material may start decomposing shortly after collection, it is important that plant material be sent to the laboratory as quickly as possible. Prior to transporting the samples to the laboratory, plant material should be stored in a refrigerator at 41^{o}F (or 5^{o}C).

Lime Application

For acidic soils, soil test results typically contain information regarding buffer pH and lime requirement recommendation. When planning lime application, one important aspect to consider is that time that the liming material will require to react with the soil. In general, liming materials such as dolomite or calcitic limestone react relatively slowly in the soil. Depending on the moisture conditions and the characteristics of the liming

material such as purity and particle size, it may take from 3 to 6 months for the liming material to react with the soil and increase the pH. The finer the particle, the faster the material will react. There are a number of by-products such as lime-stabilized biosolids that contains alkaline compounds (i.e. calcium carbonate, calcium hydroxide) and may also be used as a soil amendment to increase soil pH. The decision to whether use a slow- or quick-acting liming material can be challenging. If lime can be applied at least 3 months prior to the spring nitrogen fertilization, then more coarse liming materials can be used. On the other hand, pulverized lime, slaked lime, and burnt or hydrated liming materials can react quickly in the soil, so the soil acidity is reduced faster. The down side is that the effects of these "fast-reacting" materials typically last less than one year. Lime application is relatively easy unless the liming material is exposed to rainfall or excessive moisture. When liming material contains excessive moisture, it may not flow easily through the spreading equipment, which may result in a non-uniform distribution.

Soil type, fertilizer management and cropping intensity are factors that determine the liming frequency. In general, hayfields require more frequent lime applications as compared to grazing pastures because of the greater crop removal and fertilizer application rates. Despite the fact that sandy soils typically require lower lime application rate, more frequent lime application may be needed to maintain the soil pH at the desirable levels.

The amount of lime required to raise the pH will depend on the soil acidity and the solubility and purity of the material. The lower the soil pH (more acidic conditions), the more lime will be required. In addition, soil organic matter levels and soil texture also affect the amount of lime needed. Lime recommendations based on soil testing generally assumes that a pure liming material (calcium carbonate equivalent or CCE of 95 to 100%). Application rates should be adjusted according to the CCE of the liming material that will be applied. For instance, if soil test report recommends 2 ton per acre and quick lime with a CCE of 160 is used, then application rate should be reduced to 1.2 ton per acre.

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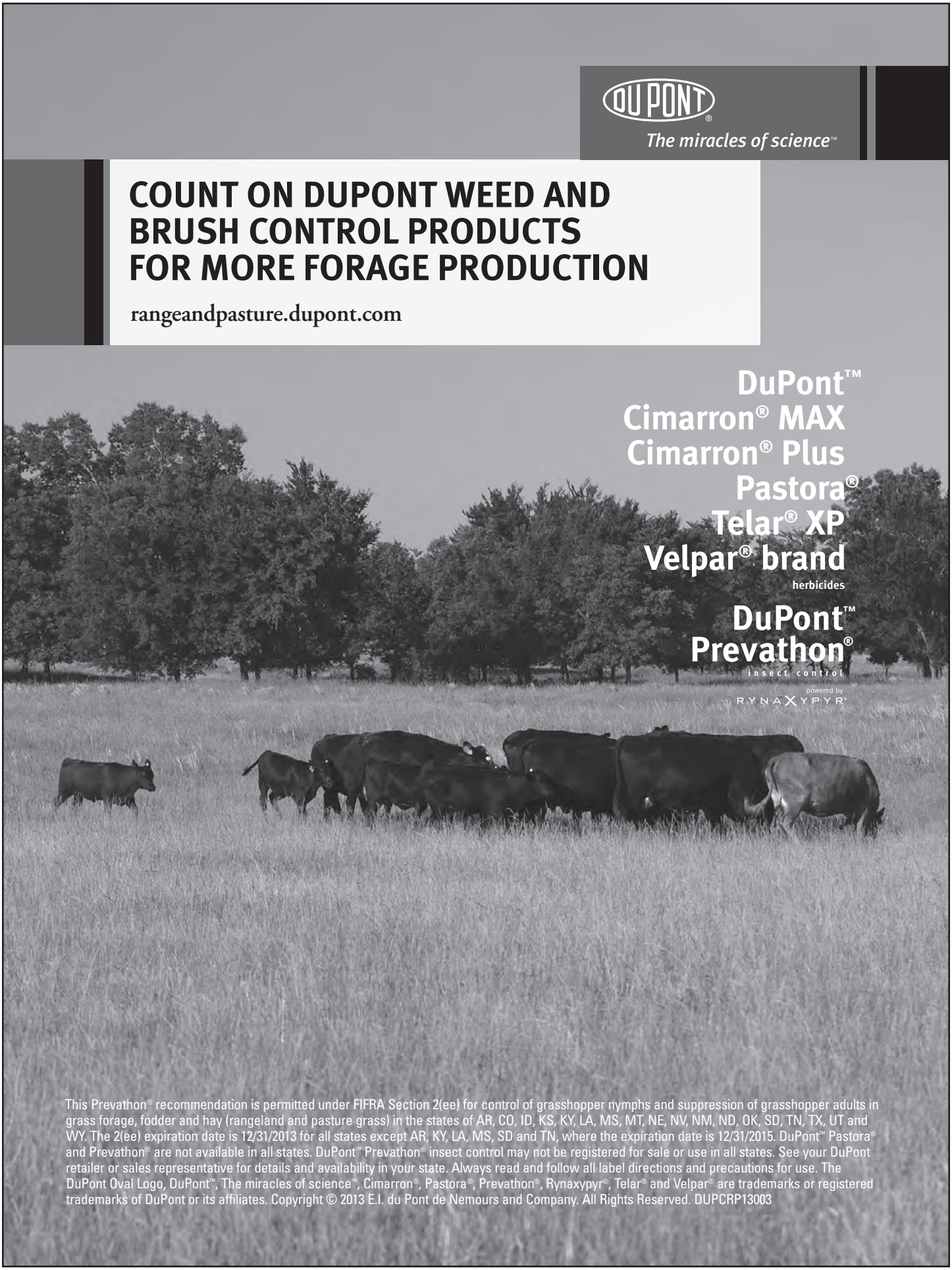

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