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UF/IFAS Range Cattle Research and Education Center

Field Day & Ribbon Cutting Ceremony

April 5, 2018

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Schedule of Events

8:00 a.m. **Check in/Register**
Visit sponsor and program booths and view student posters

<u>Moderator, Bridget Stice, UF/IFAS Extension Polk County</u>

9:30 a.m. **Welcome Message & Special Remarks —**

John Arthington, Professor & Center Director,
UF/IFAS Range Cattle REC
Elaine Turner, Dean, UF College of Agricultural and Life Sciences
Ken Griner, President, Florida Cattlemen's Association

Faculty Presentations

Beef Cattle Market Outlook
Chris Prevatt, Livestock and Forage Economics

Nutrition of Beef Females – FCA studies
Philipe Moriel, Beef Cattle Nutrition and Management

Florida Calf Loss – Summary of Herd Results
Raoul Boughton, Rangeland Wildlife and Ecosystem

11:30 a.m. **Ribbon Cutting Ceremony— newly completed laboratories**

12:00 p.m. **Steak Lunch**
Visit Sponsor and RCREC Program Booths
Tour the new building (tours will depart every 15 min. from the picnic table)

1:15 p.m. **Field Tour of Beef Enhancement Projects**

Updates on Smutgrass Management
Brent Sellers, Pasture and Rangeland Weed Management

Warm-season Perennial Grass Establishment
Joao Vendramini, Forage Management

Land Application of Biosolids to Bahiagrass Pastures
Maria Silveira, Soil and Water Sciences

3:00 p.m. **Adjourn**

Welcome to Ona!

Established in 1941, the UF/IFAS Range Cattle Research and Education Center has a long history of service to Florida's cattle and land managers and a promising future ahead. Our mission is to provide science-based information to address the challenges affecting owners and managers of grazinglands. Through efforts centered on the enhancement of livestock, forages, and natural resources, our faculty programs, together with support staff, are dedicated to conducting beneficial research, offering engaging extension programs, and educating graduate students – tomorrow's science leaders. Situated on 2,840 acres in SW Hardee County, our faculty programs focus on beef cattle nutrition and management, economics, forages, soil fertility, pasture and rangeland weed management and rangeland ecosystems and wildlife.

At this field day you'll notice an emphasis on graduate student programs. Please take time to visit the program booths in the Grazinglands Education Building designed by students and staff and vote for your favorite. Students will be present to share about their research and discuss their scientific posters. You will also have an opportunity today to walk through the newly completed animal science and rangeland ecosystems and wildlife labs, student room, implement room, and the student collaboration room. These modern, well equipped spaces are a vital resource to student education, collaboration, and training.

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.

We thank you for coming and hope you enjoy your visit. 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/ or follow us on Facebook, Twitter, or Podbean. You may also feel free to contact us anytime at ona@ifas.ufl.edu or 863-735-1314.

The RCREC Faculty:

John Arthington
Raoul Boughton
Philipe Moriel
Chris Prevatt
Brent Sellers
Maria Silveira
Joao Vendramini

Footnote: This article was previously published in Feedstuffs 'Beef Bottom Line' November 6, 2017

Breed-related behavior differences in mineral feeder visits among grazing beef cattle

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[2]Professor and Center Director, Beef Cattle Nutrition and Management

Introduction

In almost all regions of the World, grazing cattle experience mineral imbalances. In many cases P, Na, Co, Cu, I, Zn, and Se are the mineral elements most likely to be lacking for grazing cattle, occasionally leading to mineral deficiencies (McDowell, 1996). Supplementation is commonly addressed by the provision of free-choice, salt-based mineral supplements, which are offered with the anticipation of adequate intake to offset deficiencies. However, variation in intake of free-choice supplements is a common problem that affects the efficiency of this supplementation strategy (Greene, 2000). Consumption variation can be impacted by many factors soil fertility, forage specie, forage dry matter, season of the year, supplement palatability, salt content of drinking water, and the availability of energy and protein supplements (McDowell, 1996; Arthington, 2015). The objective of this study was to evaluate the impact of breed on behavior patterns of cattle visits to a mineral feeder.

Radio frequency identification (RFID) systems employ low-frequency radio signals to transfer information between a transponder that contains the unique identification code and an antenna that collects the signal and transfers it to a decoder (McAllister et al., 2000). Working with commercially available RFID technology, we developed a system to accurately assess the frequency of animal visits to a mineral feeder. Each mineral feeder was custom-designed and equipped with a tag reader (i.e decoder) and every animal had its own numbered tag, coupled with a transponder (ID). Readers were set to read the same ID every 3 minutes. Although readers were able to read different IDs at the same time, the mineral feeders were built in a manner to avoid more than one animal per time at the feeder. Consequently, the IDs were only read when the cow had its head inside of the mineral feeder. Readings were collected every week, and readers were checked daily to confirm the interval between readings (3 minutes) and the battery capacity.

Animals, mineral supplements and locations.

Two experiments were conducted to evaluate the influence of period of day (morning, afternoon and night) on voluntary visits to the mineral feeder among beef heifers (Exp. 1) and cows (Exp. 2) of differing breeds. The mineral feeder provided continuous, free-choice access to a salt-based mineral supplement containing 1,750, 5,000, 60, and 60 mg/kg of Cu, Zn, Co, and Se. The salt inclusion was 63 and 21% for Exp. 1 and 2, respectively. Target intake was 50 g/d.

In Exp. 1, visits were recorded over a 47 day monitoring period from May to July. During the length of the experiment, Braford, Brahman, and Ona White Angus heifers (n = 12; 4/breed) were allocated in a single bermudagrass pasture with access to one RFID-equipped mineral feeder. A total of 1400 visits to the mineral feeder were recorded. The Ona White Angus was developed by the UF Range Cattle Research and Education Center, Ona. It is a distinct beef cattle phenotype with > 75% Black Angus genetics but possessing white hair and dark skin.

In Exp. 2, visits were recorded over a 35 day monitoring period from September to October. Purebred Brahman and Black Angus cows (n = 19 and 15, respectively) were allocated in a single bermudagrass pasture with access to one RFID-equipped mineral feeder. A total of 686 visits to the mineral feeder were recorded.

Results

In Experiment 1 (Table 1), mineral feeder visits were consistently distributed throughout the day. There were no differences (P = 0.89) in the number of visits when comparing morning and afternoon periods, however; both periods had a greater ($P \leq 0.05$) number of visits when compared to the night period. In the morning period, Brahman and Braford heifers had a greater ($P \leq 0.05$) number of visits when compared to Ona White Angus heifers. During the afternoon period, Brahman heifers had a greater ($P \leq 0.05$) number of visits compared to Braford heifers and tended (P = 0.08) to have a greater number of visits compared to Ona White Angus heifers. For the night period, Ona White Angus heifers had a greater ($P \leq 0.05$) number of visits compared to Brahman heifers. Preferences within breed for each period were also evaluated. Braford heifers, had a greater ($P \leq 0.05$) number of visits to the mineral feeder in the morning vs. night periods with no differences between morning and afternoon periods (P = 0.40) or afternoon and night periods (P = 0.16). Brahman heifers preferred morning and afternoon mineral feeder visits compared to night ($P \leq 0.01$). There were no differences (P = 0.32) among periods for Ona White Angus heifers. Mineral supplement intake was recorded and calculated by the disappearance rate. Daily mineral supplement intake ranged from 38 to 130 g/heifer, resulting in an average of 79 g/heifer daily.

In Experiment 2 (Table 2), Brahman cows visited the mineral feeder twice as many times during a 24-hour period with more than 3.5X ($P \leq 0.01$) the number of visits in the afternoon compared to the Black Angus cows. There were no differences (P = 0.21) in number of visits among Black Angus and Brahman cows during the night period. The preferences within breed for each period revealed that Brahman cows made a greater ($P \leq 0.01$) number of visits to the mineral feeder in the afternoon compared to the morning period. There was also a tendency (P = 0.07) for Brahman cows to have a greater number of visits to the mineral feeder during the afternoon vs. night period. Mineral supplement intake ranged from 15 to 54 g/cow daily, resulting in an average of 30 g/cow daily.

According to Braghieri et al. (2011), cows are more active during the morning and afternoon and thus more prone to visiting the mineral feeder during these daylight hours. Nonetheless, breed differences appear to exist. In support of the current experiments, a similar behavior patter was reported by Cockwill et al. (2000) when evaluating Angus and Brahman cattle, suggesting that Brahman cattle are more resistant to the pressures of heat and humidity present in the afternoon. Manzano et al. (2012) suggests that attendance to the mineral feeder is affected by sunlight, temperature, and grazing patterns. Accordingly, the pattern of visits observed for the two breeds in this experiment, is likely explained by differences in an ability to cope with the heat of the day. Brahman cattle are more tolerant to heat when compared to Angus

(Hammond et al., 1996) due to *Bos indicus* breed characteristics, such as lower tissue resistance to heat flow from the body core to the skin, smooth hair coats, and greater size and density of sweat glands (Hansen, 2004).

Summary

These data imply that Angus cattle (Ona White Angus heifers and Black Angus cows) have a more evenly distributed behavior for daily visits to the mineral feeder, whereas Brahman heifers and cows appear to favor the afternoon period. Further studies are warranted to better understand behavior differences in free-choice mineral intake among cattle breeds. Ultimately, this knowledge could be used to adapt supplementation strategies that seek to optimize the mineral nutrition of grazing cattle.

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Table 1. Effect of breed and period of the day on the number of weekly visits to the mineral feeder among yearling beef heifers; Exp. 1[1].

	Periods[2]		
Breed	Morning[4]	Afternoon[4]	Night[4]
Braford	7.03[a,d]	5.60[b,d,e]	3.25[a,b,e]
Brahman	7.96[a,d]	8.32[a†,d]	2.15[b,e]
Ona White Angus	4.78[b,d]	6.43[a,b,d]	4.75[a,d]

[1]Data collected over 47 days from May to July 2016. Heifers were grazing fertilized 'Jiggs' bermudagrass pasture. Visits are present as the average of weekly visits per period. Largest SEM = 0.69 and 1.02; respectively for breed and period.
[2]Distribution of visits were reported in 8 h intervals; Morning = 0500 to 1259 h, Afternoon = 1300 to 2059 h, and Night = 2100 to 0459 h.
[a,b] Number of visits in a column with different superscript differs ($P \leq 0.05$).
[d,e,] Number of visits in a row with different superscript differs ($P \leq 0.05$).
[†] Brahman heifers tended ($P = 0.08$) to visit the feeder more in the afternoon when compared to the White Angus heifers.

Table 2. Effect of breed and period of the day on the number of weekly visits to the mineral feeder among purebred Brahman and Black Angus cows; Exp. 2[1].

	Periods[2]		
Breed	Morning[4]	Afternoon[4]	Night[4]
Black Angus	0.35[a,d]	0.45[b,d]	0.70[a,d]
Brahman	0.70[a,e]	1.70[a,d†]	1.10[a,d,e]

[1]Data collected over 35 days from October to December 2016. Cows were grazing fertilized 'Jiggs' Bermudagrass pasture. Visits are present as the average of weekly visits per period. Largest SEM = 0.1433 and 0.2027; respectively for breed and period.
[2]Distribution of visits were reported in 8 h intervals; Morning = 0500 to 1259 h, Afternoon = 1300 to 2059 h, and Night = 2100 to 0459 h.
[a,b] Number of visits in a column with different superscript differs ($P \leq 0.05$).
[d,e] Number of visits in a row with different superscript differs ($P \leq 0.05$).
[†] Brahman cows tended ($P = 0.07$) to visit the feeder more often in the afternoon when compared to the night period.

2018 Beef Cattle Market Outlook

Chris Prevatt, State Specialized Agent II, Livestock and Forage Economics

By many measures, the 2017 beef cattle market looks very similar to what was seen in 2016. Both fed cattle and feeder cattle prices posted annual averages very close to year-ago levels. However, comparing prices year-over-year seldom tells the full story and this year is a classic case of why that is so. A combination of decreasing slaughter weights, stronger export levels, and cheaper grain prices has the left the current feel of the cattle markets far more optimistic than what was felt in fall 2016.

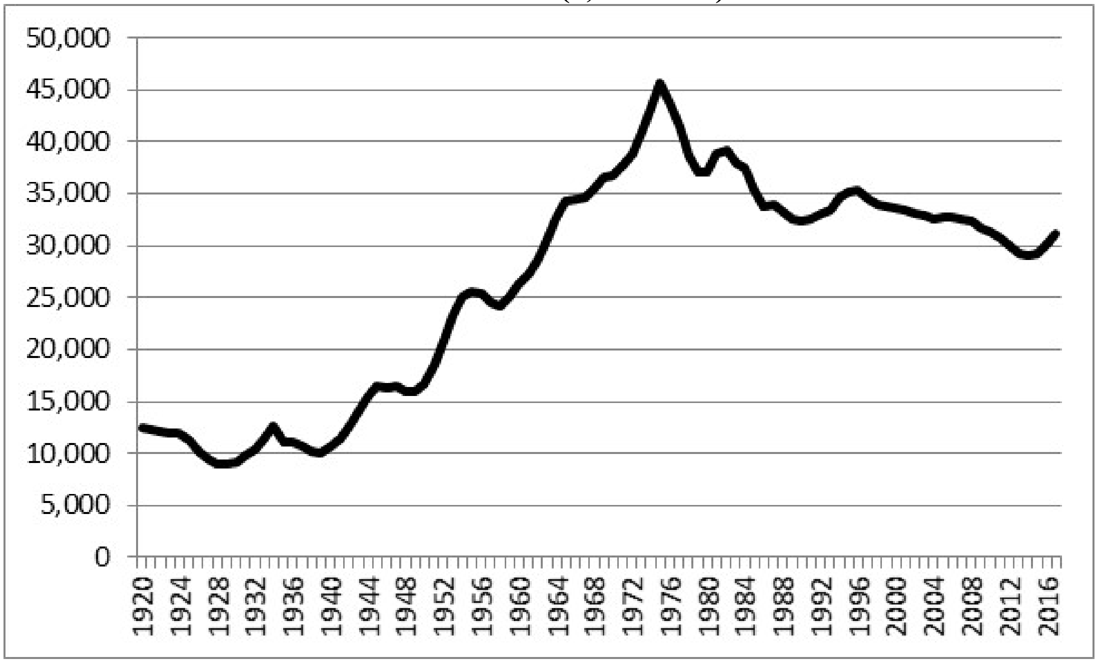
While most cattle producers in the southeast are active in calf and feeder cattle markets, there are a large numbers of feedlots in the western part of the region. Further, fed cattle markets are one of the primary drivers of feeder cattle values and a logical place to start as we begin breaking down the current market. While the average annual price for 2017 may be very similar to that of 2016, the 5 Area weekly weighted average price is currently nearly $19 per cwt higher than what was seen this time last year.

Larger cattle slaughter has been somewhat tempered by lower slaughter weights and strong export levels. Beef exports for 2017 are likely to end the year around 10% higher than 2016 levels. In addition to stronger fed cattle prices, the feeder cattle market has also been supported by cheaper feed and good fall grazing conditions. While flooding from major hurricanes created challenges for many in the region, exceptional fall moisture and temperatures led to opportunities for others. Good forage conditions have generally delayed calf runs that are often seen as fall sets in. At the same time, another large corn crop has resulted in a continued decrease in feed prices that has improved margins and raised feeder cattle bids for both feedyards and winter backgrounders.

Beef cow inventory going back to 1920 as well as multiple cattle cycles can be seen in figure 1. For example, note the cattle cycle that began in 1990 and ended in 2004 in comparison to our most recent full cycle that began in 2004 and ended in 2014. This most recent cattle cycle seemed to be plagued with outside forces from the start. Weather challenges, high grain prices, and eventually recession likely cut the expansion phase of this last cattle cycle short by a couple years as we really only saw two years of beef cow herd expansion.

The contraction phase of this cycle was also impacted by outside forces. Severe drought in the southern plains from 2011 through 2013 led to sizeable reductions of beef cow numbers. At the same time, grain prices following the 2012 drought were so high that a lot of pasture ground was converted into row crops in response to the high profit levels in grain production. The end result was that the contraction phase of that last cattle cycle probably lasted longer than it would have otherwise. So, the beef cow herd size was reduced beyond what would have been expected under normal weather conditions.

Figure 1. Annual US Beef Cow Inventory
1920 to 2017 (1,000 cows)



Source: USDA-NASS, Livestock Marketing Information Center

Table 1 captures some of this dynamic reasonably well for the region as it compares January 2017 beef cow inventory to January 2006 for some key states in the south. The year 2006 is chosen because that was the peak of U.S. beef cow inventory from our last cattle cycle and may provide some indication of capacity by state. With the exception of Oklahoma, all states listed have fewer beef cows now than they did in 2006. And with the exception of Florida, those states that are down in beef cow inventory are down significantly. Texas, Tennessee, and Georgia jump off the page in terms of percentage change and the decrease of nearly 900,000 cows in Texas is very telling. I think this provides some evidence of where we are likely to see beef cow herd growth occur in the region over the next few years, with the caveat that much of the loss in beef cow inventory that occurred due to loss of pasture acres to row crop is not likely to return to pasture any time soon.

Table 1. Beef Cow Inventory in Key Southern States

	2006 Beef Cows	2017 Beef Cows	% Change from 2006
Texas	5,350	4,460	-17%
Oklahoma	2,045	2,095	+2%
Florida	916	908	-1%
Georgia	592	497	-16%
Tennessee	1,080	1,023	-16%
Kentucky	1,118	1,023	-9%
United States	32,702	31,210	-6%
Source: USDA-NASS, Livestock Marketing Information Center, author calculations			

As difficult as it may be, it is likely best to put the roller coaster ride of the last several years behind us and focus on where we are now and where we are heading. First, it is important that we recognize that the beef herd is still expanding. U.S. beef cow inventory reached a 52 year low in 2014 causing cow calf operators to see unprecedented profit levels. As of January 1, 2017, US beef cow inventory had increased over 7% from 2014. It would be shocking if January 1, 2018 numbers didn't suggest that 2017 was our fourth year of expansion in this cattle cycle. It is possible that the pace of expansion may slow somewhat from the 3.5% increase seen during 2016, but it is very likely that this cow herd is still increasing in size.

A growing cow herd means larger calf crops and the fact that calf crops have been growing for a few years now means that beef production is going to continue to increase. This alone will put downward pressure on boxed beef prices, which will impact fed cattle prices and eventually negatively affect feeder cattle prices. However, it is important to realize that the production levels of competing meats also impact cattle prices and production increases are currently being forecast for both pork and poultry. Expected increases in production for the three major meats are shown in Table 2 for both 2017 and 2018. While there is a chance for exports to help offset some of this, it is very likely that per capita consumption of meat is going to rise next year, which will tend to put downward pressure on prices.

Table 2. ERS Forecast Production Increase from Previous Year

	2017 vs. 2016	**2018 vs. 2017**
Beef	+3.6%	+2.1%
Pork	+0.6%	+2.1%
Broilers	+0.9%	+1.0%
Source: ERS Livestock, Dairy, and Poultry Outlook. October 2017.		

Since cow herd expansion is ongoing, and production of all three major meats is on the rise, is it very difficult to paint a picture of higher prices for 2018. Producers at the cow-calf level should plan for lower prices year-over-year and margin operators (stockers, feedlots, etc.) should plan for a general downtrend in the market prices. There likely is still some room for growth in the cow herd, especially in some areas where beef cow numbers are still well below long term trends. Weather permitting, herd expansion will continue until profitability is such that the incentive to expand is no longer there.

Cattle producers in this type of environment should look for opportunities to increase profits where possible. A good first step is to realistically access the costs of their cow-calf operation in order to understand how profitable they are in the current market. Some producers may determine that they are profitable and can handle lower prices ahead. Others may determine that they need to make some changes now in order to remain profitable in the future.

A common strategy in challenging markets is to cull deep and run fewer cows in order to stretch the grazing season and decrease winter feeding days. This strategy essentially attempts to increase profitability per head on a smaller number of cows. Others may want to consider preconditioning and or backgrounding as a way to add value to the calves they produce. Larger calf crops typically allow feedlots to be a bit more selective and market separation does appear to exist between weaned calves and green calves in the marketplace. Still, others may see the impending lower prices as an opportunity and start holding heifers in order to expand and have a larger cow herd when prices begin to trend up in the future. Regardless, producers need to understand the profitability of their current operation before they can make long term decisions that will impact the financial success of their operation.

Florida beef enhancement studies – Will nutritional management of pregnant beef cows impact future calf performance?

Philipe Moriel, Assistant Professor, Beef Cattle Nutrition and Management
Julie Warren, Marcelo Vedovatto, Matheus Piccolo, Miguel Miranda, Juliana Ranches

In 2016, *The FL Beef Enhancement Board* announced that our nutrition program at Range Cattle REC successfully obtained funds for 2 multi-year projects. Study #1 was called ***Does year-round supplementation of cows pay off?*** and study #2 was called ***Evaluating cost-effective supplementation programs for cows during late-gestation***. Both studies will address the FL Cattlemen's Association Priorities #3 (Calf loss), #7 (Animal herd nutrition – mineral and winter supplementation), and #8 (Animal health). In this report, we will provide a summary of the results currently available for both studies.

STUDY #1 – Does year-round supplementation of cows pay off?

Body condition score at calving is the most important factor that influences overall pregnancy rate and calving distribution of beef cows. Most FL cow-calf operations provide year-round supplementation of trace minerals, but provide protein and energy supplementation only during early-lactation (winter time). However, inadequate energy/protein intake before calving lowers reproduction even if the amount of energy and protein consumed after calving is sufficient to meet the demand. Also, recent studies showed that poor nutrition during gestation can alter fetal organ formation and decrease offspring's future growth performance and health (a process called fetal-programming).

Cows supplemented year-round might achieve a greater body condition score at calving without increasing the annual supplement amount. Another advantage is that the trace mineral salt can be mixed into the supplement, reducing annual fluctuations in voluntary intake and waste of free choice trace mineral formulations, improving cow trace mineral status. We believe that year-round supplementation of molasses or range cubes will increase body condition score at calving and trace mineral status of cows throughout the year. In addition, year-round supplementation of molasses and range cubes will improve calf development during pregnancy, and then, improve calf health, survivability, and growth after birth.

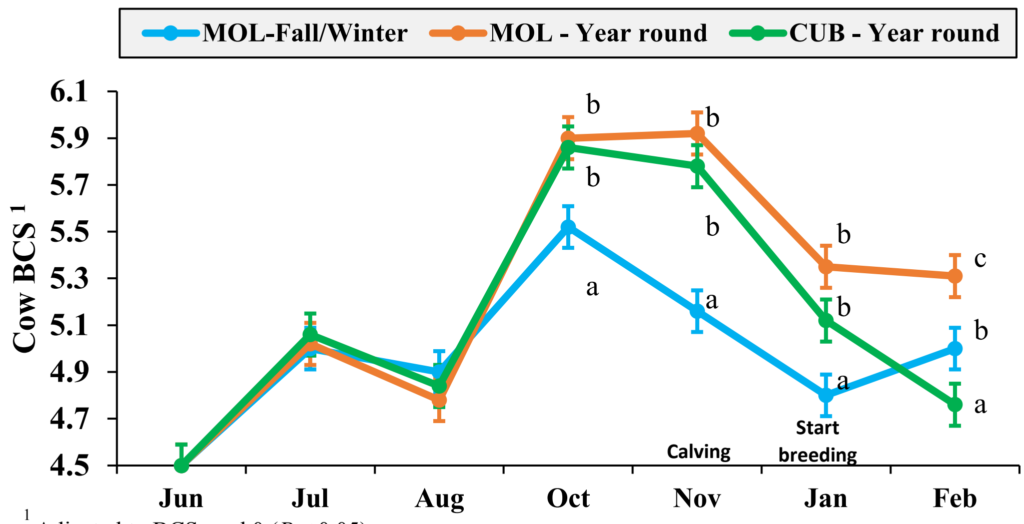
<u>Research approach</u>:

In June, mature Brangus cows were allocated into bahiagrass pastures (84 pairs/year). Treatments consist of control cows supplemented with molasses from calving until end of breeding season (only from November 2017 to April 2018), or cows receiving year-round supplementation of molasses or year-round supplementation of range cubes-based formulations (June 2017 to May 2018). Total annual amount of supplement will be similar among all treatments (600 lb of supplement/cow annually; Table 1). Supplements are being offered twice weekly (Mondays and Thursdays) and were formulated to provide similar amounts of energy and protein. Trace mineral/vitamin supplementation is being provided during the entire year in a loose meal form for control cows or mixed into the molasses or range cubes for cows assigned to year-round supplementation.

Table 1. Supplement dry matter intake (lb/cow daily) of cows offered molasses during Fall/Winter only or year-round supplementation of molasses or range cubes.

Treatments [a]	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
	lb of dry matter/cow daily											
Year-round Molasses	0.5	0.5	1.5	1.5	1.5	2.5	3.0	3.0	2.5	2.5	0.5	0.5
Year-round cubes	0.5	0.5	1.5	1.5	1.5	2.5	3.0	3.0	2.5	2.5	0.5	0.5
Fall/Winter Molasses	0	0	0	0	0	4.0	4.0	4.0	4.0	4.0	0	0

Figure 1. Body condition score (BCS) of cows offered molasses from calving until the end of the breeding season (MOL-Fall/Winter; November 2017 to April 2018) or year-round supplementation of molasses (MOL-Year round) or range cubes (CUB-Year round).



[1] Adjusted to BCS on d 0 ($P \leq 0.05$)

[a-b] Within a month, means without a common superscript differ ($P \leq 0.05$).

Table 2. Growth performance of cows offered molasses only from calving to the end of the breeding season (MOL-Fall/Winter; November 2017 to April 2018) or year-round supplementation of molasses (MOL-Year round) or range cubes (CUB-Year round).

Item	Treatments			SEM	*P*-value
	Fall/ Winter Only	Year-round Molasses	Year-round Cubes		
Cow BCS change					
June to July (d 0 to 56)	0.55	0.61	0.66	0.074	0.65
July to August (d 56 to 74)	-0.12	-0.22	-0.21	0.072	0.58
August to October (d 74 to 122)	0.64 ^{a}	1.11 ^{b}	1.01 ^{b}	0.093	0.04
October to November (d 122 to 161)	-0.33 ^{a}	0.07 ^{b}	-0.09 ^{b}	0.093	0.04
November to January (d 161 to 217)	-0.31 ^{b}	-0.58 ^{a}	-0.69 ^{a}	0.109	0.02
January to February (d 217 to 241)	0.20 ^{a}	-0.04 ^{ab}	-0.37 ^{b}	0.109	0.09

[a-b] Within a row, means without a common superscript differ ($P \leq 0.05$).

Molasses or range cubes supplementation (0.5 lb/cow daily) was not sufficient to improve the body condition score change of cows from June to August compared to cows receiving no supplementation until calving (Fall/Winter cows; Figure 1). As shown in Table 1, the amount of molasses and cubes supplement was increased to 1.5 lb of dry matter per cow daily from August to November, which significantly improved cow body condition score (Figure 1). Molasses and range cubes supplementation increased cow body condition score in October and at calving (November) compared to cows receiving no supplementation before calving

(Figure 1). Hence, a relatively small amount of supplementation from August to November (1.5 lb of dry matter of molasses or range cubes per cow daily) improved the nutritional status of cows leading to better body condition score at the time of calving. Although cows assigned to year-round supplementation of molasses and range cubes lost more body condition score from calving to start of the breeding season (Table 2), both treatments still had greater body condition score at the start of breeding season compared to cow offered molasses only after calving (Figure 1). It is expected that such improvement in body condition score of cows at the time of calving and at the start of the breeding season will improve the reproductive performance of cows and calf development during late gestation, which might increase calf growth after birth. After calving, we will evaluate the health, immunity and growth performance of all calves. Then, steers will be sent to a feedlot for finishing and carcass data collection, and heifers developed until the end of their first breeding season.

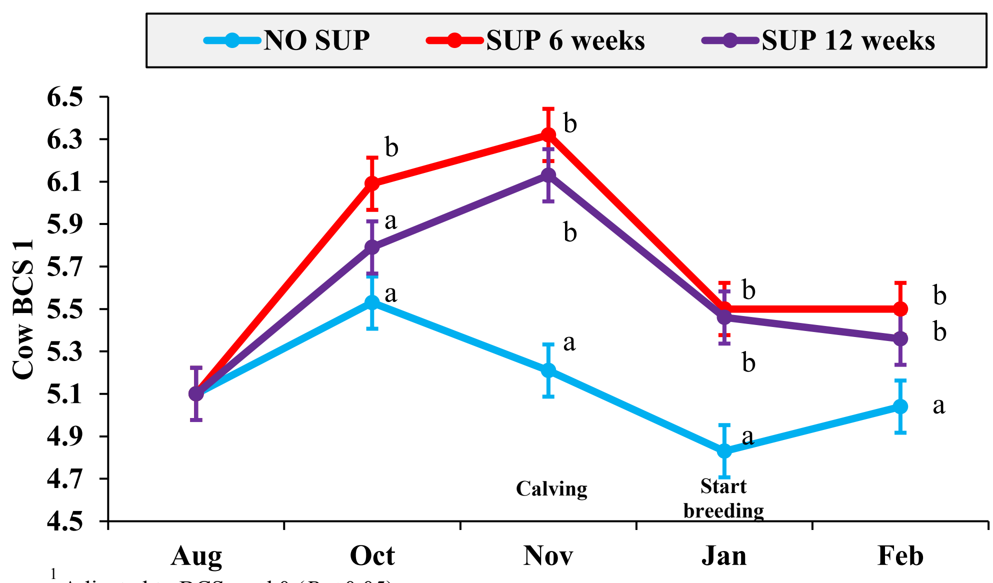
STUDY 2 – *Evaluating cost-effective supplementation programs for cows during late-gestation*

This study will: **(1)** evaluate if dry distillers grains (DDG) supplementation of Brangus cows during the entire late-gestation **(2.25 lb/day for 12 weeks = 189 lb per cow; August to November)** will increase cow reproductive success and calf performance after birth to levels higher than the cost of this supplementation strategy, and **(2)** investigate if concentrating cow DDG supplementation during the period of lowest nutrient demand (first 6 weeks after weaning) will be more cost-effective than cows supplemented during the entire late-gestation. First, we believe that cows supplemented during late-gestation, regardless of length of supplementation, will have greater profitability than non-supplemented cows due to improvements on cow reproduction and calf performance. Second, we believe that supplementing **4.50 lb/day for 6 weeks after weaning (August to October)** will reduce feeding costs, have the greatest improvement on cow weight gain and reproduction success, but not cause fetal-programming effects (due to the shorter supplementation period), whereas the supplementation of **2.25 lb/day for 12 weeks** will increase feeding costs, provide less improvement on reproduction, but enhance calf development during gestation and performance after birth.


Dried Distillers grains

Six weeks after weaning, cows supplemented with 4.5 lb/day of DDG had greater body condition score in October compared to the other treatments (Figure 2). Cows receiving 2.25 lb/day of DDG also demonstrated a small improvement on body condition score in October compared to cows receiving no supplementation, but it was not sufficient to achieve statistical differences. From October to mid-November, only cows assigned to a 12-week supplementation period continued to receive DDG supplementation (SUP12 cows). At the time of calving (November), cows that received DDG supplementation for 6 weeks or 12 weeks had similar body condition scores (Figure 2). This response indicates that a 6-week period of supplementation was more cost effective than a 12-week supplementation period, because cows supplemented for 6 weeks achieved the same body condition score at calving and had half of the feeding labor costs compared to cows supplemented for 12 weeks. In addition, cows supplemented for 6 weeks or 12 weeks had greater body condition score at the time of calving AND at the start of the breeding season compared to control cows that did not receive supplementation before calving. Hence, we expect that all cows that received supplementation after weaning (6 weeks or 12 weeks after weaning) will have greater reproductive performance during the 2018 breeding season due to the greater body condition score at the time of calving and at the start of the breeding season compared to cows that did not receive supplementation before calving. We also believe that the greater nutritional status of cows supplemented before calving will cause fetal programming effects on calf performance after birth.

Figure 2. Body condition score (BCS) of cows that received no supplementation before calving (No SUP), and cows that were supplemented with 4.50 lb/day of dried distillers grains for 6 weeks after weaning (SUP 6 weeks) or with 2.25 lb/day of dried distillers grains for 12 weeks after weaning (SUP 12 weeks). After calving, all cows received 4 lb/day of molasses dry matter until the end of the breeding season.



[1] Adjusted to BCS on d 0 ($P \leq 0.05$).

[a-b] Within a month, means without a common superscript differ ($P \leq 0.05$).

Table 3. Body condition score (BCS) change of cows that received no supplementation before calving (No SUP), and cows that were supplemented with 4.50 lb/day of dried distillers grains for 6 weeks after weaning (SUP 6 weeks) or with 2.25 lb/day of dried distillers grains for 12 weeks after weaning (SUP 12 weeks). After calving, all cows received 4 lb/day of molasses dry matter until the end of the breeding season.

Item	Treatment			SEM	*P*-value
	No SUP	**SUP 12 weeks**	**SUP 6 weeks**		
Cow BCS change					
August to October (Week 1 to 6)	**0.54 [a]**	**0.74 [b]**	**1.06 [c]**	0.095	0.0001
October to November (Week 6 to 12)	**-0.32 [a]**	**0.37 [b]**	**0.17 [b]**	0.102	<0.0001
November (calving) to January (start breeding)	**-0.37 [b]**	**-0.66 [a]**	**-0.88 [b]**	0.103	0.009
January to February	**0.20**	**0**	**-0.08**	0.111	0.33

[a-b] Within a row, means without a common superscript differ ($P \leq 0.05$).

Florida Calf Loss - Summary of 2017-2018 Herds - So far!

Raoul Boughton, Assistant Professor, Rangeland Wildlife and Ecosystem

Project Overview

As a collaborative effort using cutting edge technology, the calf loss project aims to quantify and understand the causes of calf loss in the Florida cow-calf industry. Calf loss has been documented ranging from 6% to 20% on Florida cattle ranches. The project is examining all causes of calf loss from late term gestation through birth to weaning; ultimately, to establish the most common causes of calf loss in Florida beef cattle. The multi-disciplinary team hopes to use these findings to provide sound advice to reduce calf loss and economic losses for Florida cattlemen. Currently, the project is in phase 2 of its four-phase approach. We have deployed birthing sensors and began tracking calf mortality events at three ranches: Big Cypress, Longino Ranch, and Buck Island Ranch. Phase three, the redeployment of birthing and mortality equipment at three ranches, is set to begin August of 2018.

Methods and Background

At each of the three ranches 110 cows are confirmed pregnant through ultrasound by veterinarians, and birthing sensors inserted against the cervix. On expulsion during parturition, sensors signal via radio signal and cellular gateway that a birthing event has occurred. Research personnel respond to alerts and monitor cow and calf. Early death or stillborn calves are collected for necropsy and immediately transported on ice to partners at the Bronson Animal Disease and Diagnostic Laboratory (BADDL), Kissimmee. Healthy calves are fitted with a VHF eartag with an accelerometer. When no movement is detected for a period of 2 hrs, the VHF tag switches into mortality alert signal. Research personnel monitor mortality alerts through onsite continuous data-loggers and direct tracking to the eartag location using Yagi antennas. Calves found dead are immediately transported to BADDL. Unhealthy calves are monitored until death is imminent at which point samples are taken and the calf is also delivered for necropsy.

Initial setup involves mapping signal strength across the pastures of interest. Through this study technology has been shown to work over a 400ac footprint (Fig 1). A centralized receiving and transmission tower is setup to collect information from sensors and eartags, store data, and communicate through the cellular network to inform staff of alerts (Fig 2).

Figure 1: Pasture overview of Longino Ranch ~400 acres split into three pastures

Figure 2: Erecting Tower Gateway and Data-loggers

The collaborative team works cattle during pregnancy checks to collect cow herd metrics, insert sensors, and take samples (Fig 3). This step occurs 30-60 days before the 1st calf is expected, and means for late birthing cows in a 90 day breeding season, sensors must be retained for up to 120-150 days. This was tested in phase one of the study and was successful.

Figure 3: Working cows, inserting sensors and taking samples.

Monitoring of birthing alerts is a 24hr job with field technicians responding at all times to find cows and calves. Healthy calves are tagged with ID (left ear) and VHF (right ear, Fig 4), and expelled sensors searched for and hopefully found (Fig 5).

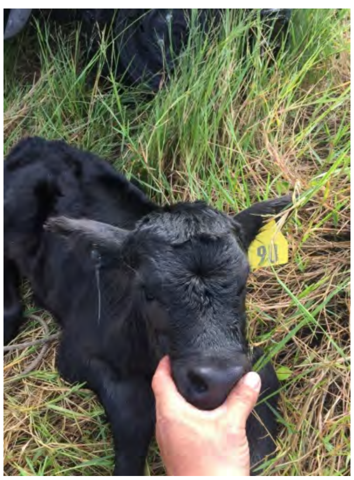


Figure 4: Newly born healthy calf with tags.

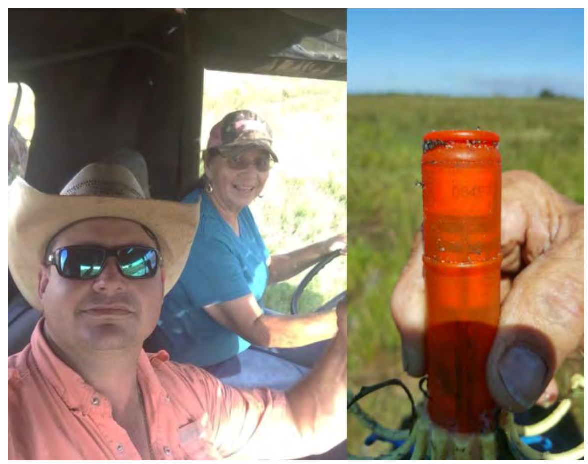


Figure 5: Mary Jene Koenes and Heith Crum on call after alert, successfully recovering sensor.

Monitoring has allowed calves to be found early, but even with alerts it can be hard to find all calves immediately. One of the first dead calves found was just over 24hrs since birthing alert and neither cow nor calf could be found the first evening or night. During the second day the calf was eventually found in a dense bay head with cow still present. Vultures had been at the carcass and it was determined to have been a stillborn (Fig 6). Another stillborn calf recently found only several hours after birth already had eyes removed (Fig 7), emphasizing the need for rapid detection and collection.

Figure 6: Calf carcass, still born 24-36hrs after death

Figure 7: Calf carcass, stillborn 2-6hrs after birth.

Preliminary Results of Herds

Through the ability to track late abortions, still births, and calf mortality, we can fairly confidently capture almost all calf loss. Identifying cause of calf loss is considerably more difficult and not always possible. The following figures show current calf mortality based on age of calf for two of the completed herds, a third herd, Buck Island Ranch is only 1/3 of the way through calving and results are not shown.

Our first herd calved during the fall, Oct. to early Jan. Of the 79 cows that entered the study one died in the pens and was excluded from further analyses. Of the remaining 78 cows, 77 calved and one cow failed to expel sensor and no fetus was present at end of calving. This final cow was determined to have either absorbed fetus or was misdiagnosed as pregnant during initial ultrasound. Thirteen calves either died in pasture or would have died and were removed from the herd for treatment. Seven calves were stillborn or died during the first 24hrs, another 2 calves died by 5 days of age, and the last 4 calves died/removed at the age of 30 days or more.

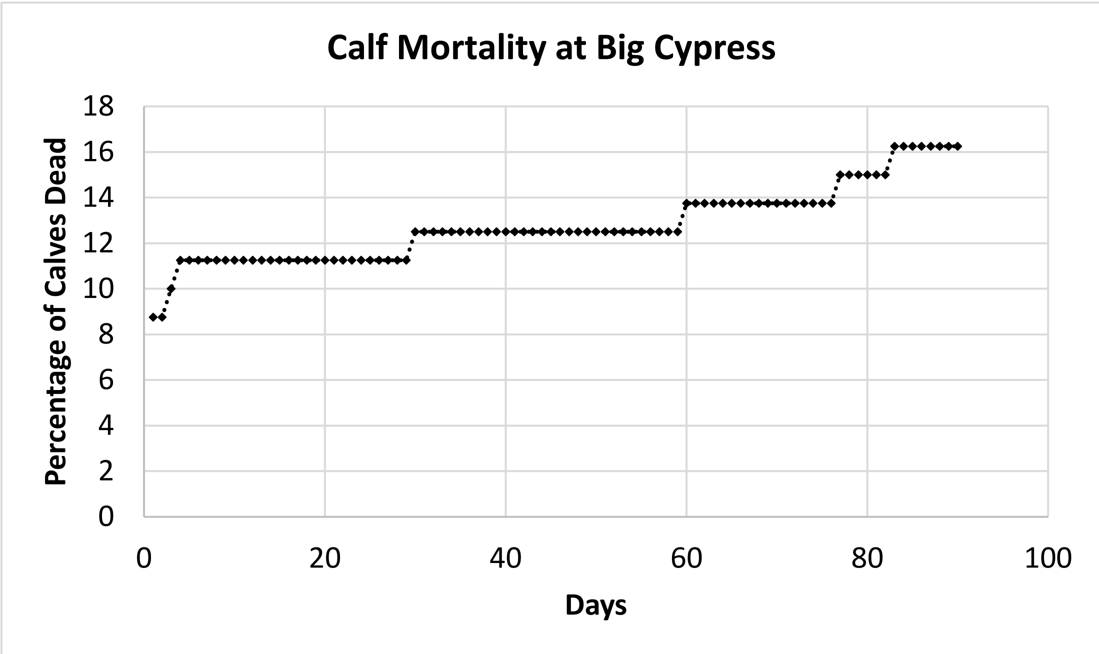


Figure 8: Mortality curve over time. Total mortality over 100 days was 16.25%.

Causes of mortality

Early losses (<7days) have been associated with either dystocia, or a bacterial infection that has gained entry through the navel/umbilical cord area. The bacteria associated with death have been *Trueperella pyrogens, Mannheimia haemolytica, Klebsiella pneumonia* and *Eschreria coli,* often with multiple species infections at once. One calf that died at 4 weeks was positive for Infectious Bovine Rhinotrachetis (IBR) with additional bacterial infections. The last 3 older sick calves were removed from the herd because of failing to thrive, given antibiotics and bottle fed.

Mineral status of necropsied calves varied with no consistent deficiencies among calves. One calf was deficient in copper and iron, one calf deficient in selenium, and another had high levels of zinc and cobalt. Although, mineral deficiencies may attribute to certain calf deaths it was not a consistent finding.

Our second herd calved late fall into early winter, from 110 cows 111 calves were produced of which 6 died (5.4% calf loss). Three calves were still born and 2 more died from complications by age 9 days. The latest death occurred at age 39 days at a weight of 115 lbs.

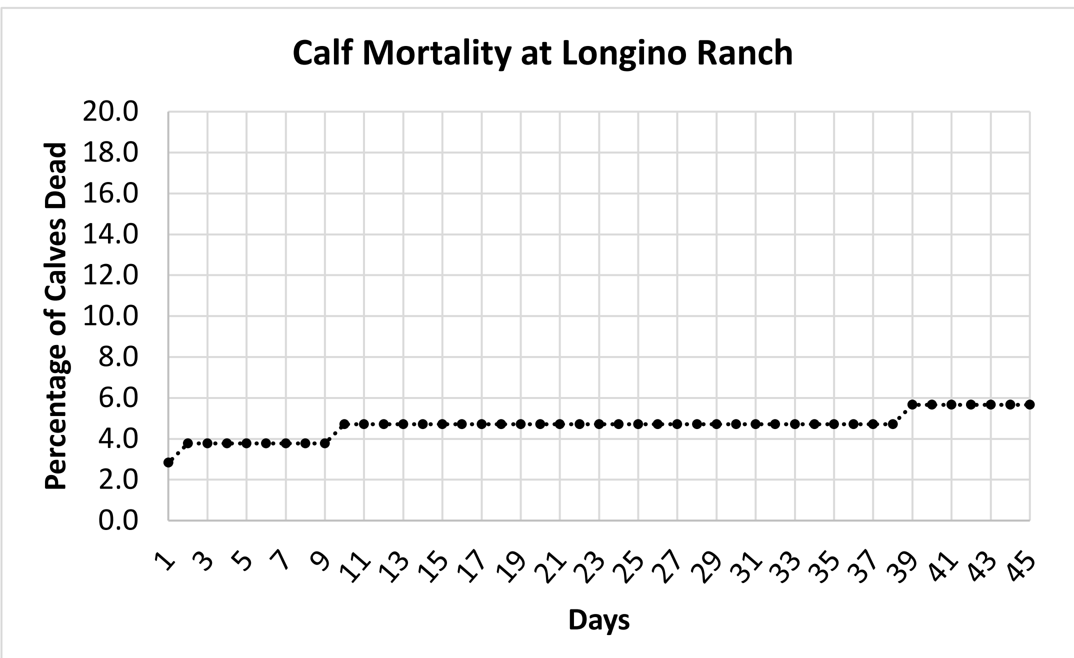


Figure 2: Mortality curve over 45 days. Total loss over 45 days was 5.4%.

Causes of mortality

Similarly to our first herd, the second herd causes of death were associated often with bacterial infections, many of which were contracted in utero and seen in stillborn calves. Calves presented with the same types of bacteria *Trueperella pyrogens, Mannheimia haemolytica, Klebsiella pneumonia, Klebsiella variicola* and *Eschreria coli.* In one case one calf presented with severe selenium deficiency. One calf is presumed to have been depredated as its VHF mortality eartag was found ½ a mile from pasture with no sign of calf. Interestingly, out of all the calf deaths we have only recorded one predator event. It is suspected that our increased presence may be impacting predator behavior in study herd pastures.

A Collaborative Study

This ongoing study would not have been possible without the collaborative and outstanding effort of many people including the following:

Mary Jene Koenes (Big Cypress SIR), Lin Tindall (Big Cypress SIR), Lindsey Wiggins (UF IFAS), Heith Crum (Big Cypress SIR), Alex Johns (Big Cypress SIR), Cliff Coddington (Longino Ranch), Kelly Koriakin (UF RCREC), Ke Zhang (UF RCREC), Alex Swain (UF RCREC), Gene Lollis (Buck Island Ranch), Laurent Lollis (Buck Island Ranch), Elizabeth Boughton (MAERC), Dr Liz Steele (Ridge Large Animal), Dr John Yelvington, Dr Reddy Bommineni (BADDL), Dr Gizela Maldonado (BADDL), David Shindle (USFWS), David Onorato (FFWCC)

Impacts of Rainfall on Smutgrass Control with Hexazinone

Brent Sellers[1] and José Dias[2]
[1]Professor and Associate Center Director, Pasture and Rangeland Weed Management
[2]Ph.D. Student, Agronomy

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 recent 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 relatively high. 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 if soil moisture is adequate. Therefore, prevention of seed production is necessary to limit the amount of smutgrass spread. Preventing seed production, however, is extremely difficult considering that seeds are produced as early as March in south Florida, and mowing tends to stimulate seed-head production.

Currently, the only viable option for smutgrass control is applying an equivalent rate of 1.0 lb/acre hexazinone (2 qt/A Velpar/Tide Hexazinone or 1.67 qt/A Velossa) during the rainy season (July through September). This amount of hexazinone is quite expensive relative to other weed control products and optimizing control with this herbicide must be taken into consideration. Rainfall after application is essential since hexazinone has relatively no leaf activity on smutgrass and must be absorbed by the roots. This being the case, no additional surfactant is needed when applying hexazinone. However, the amount of rainfall after application that results in control failures is not well understood, and this may be the main reason behind the observed variability in smutgrass control with hexazinone across the state.

Greenhouse and field studies were conducted in 2016 and 2017 to evaluate the effects of rainfall after hexazinone application on smutgrass control. Smutgrass plants were established in gallon-sized pots in the greenhouse for at least four months prior to hexazinone application at 1 lb/acre. After allowing the hexazinone to dry for four hours, rainfall was simulated at 0, 0.25, 0.5, 1, 2, 4, and 8 inches. To evaluate the effects of rainfall under field conditions, a smutgrass infested bahiagrass pasture was treated weekly with hexazinone at 1 lb/acre beginning the last week of April and ending the last week in August. Rainfall was collected weekly to evaluate the effects of rainfall on smutgrass control.

Data from the greenhouse study indicated that the amount of rainfall after hexazinone application significantly impacts smutgrass control. Rainfall amounts equal to 0.25, 0.50 and 1.0 inches provided good to excellent control of smutgrass at 30 days after treatment, however, rainfall greater than 1 inch provided insufficient control or complete failure (Figure 1). While this greenhouse data provides some beneficial information for the effects of rainfall on smutgrass control with hexazinone, we expect that soil micro- and macro-pores will be substantially different under field conditions, resulting in different levels of rainfall required for optimum control of smutgrass.

Rainfall occurred throughout the spring in 2016 resulting in early season growth of smutgrass. Nearly 1 inch of rainfall fell within 7 days after our initial application of hexazinone on April 22, which resulted in approximately 65% control 30 days after treatment (Figure 2).

However, when no rainfall was recorded the week following the April 29 application, only 20% smutgrass control was observed. Only 50% control was observed following application on June 3 when over 5 inches of rainfall were recorded the week following application, and after July 1 when no rainfall was recorded the week following application. In general, we observed acceptable levels of smutgrass control when rainfall was above 0.25 inches and below 3.0 inches under field conditions. Results appear to be similar from the 2017 study, with the exception of the very dry spring that resulted in nearly no control prior to the beginning of rainfall in late May and early June. However, we have yet to record the year after treatment data for the 2017 applications.

From these data, it appears that a minimum of 0.25 inches of rainfall is necessary to incorporate the herbicide within the root zone and rainfall in excess of 3.0 inches typically resulted in reduced control. We also observed that smutgrass control is reduced even when rainfall is recorded the second week after application, indicating that we may have a short window for rainfall to occur following hexazinone application for optimum smutgrass control. A portion of this work was funded through the Florida Cattlemen Enhancement Board. For our current recommendations on smutgrass management in pastures, please see our factsheet on EDIS (http://edis.ifas.ufl.edu/aa261) or contact your local county extension agent.

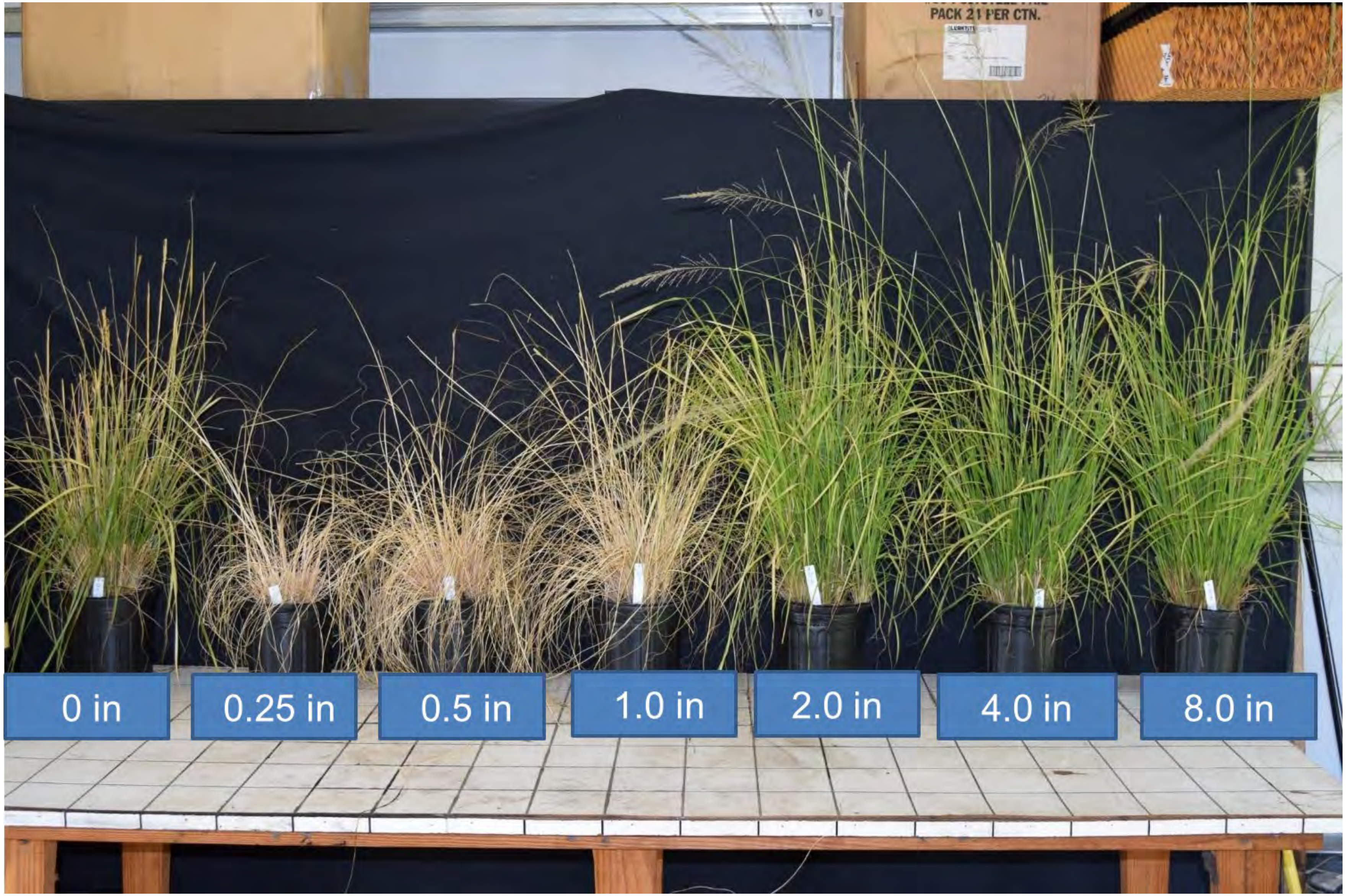


Figure 1. Response of smutgrass at 30 days after treatment with 2 qt/A hexazinone following simulated rainfall. Rainfall was simulated from 0 to 8 inches approximately 4 hours following hexazinone application.

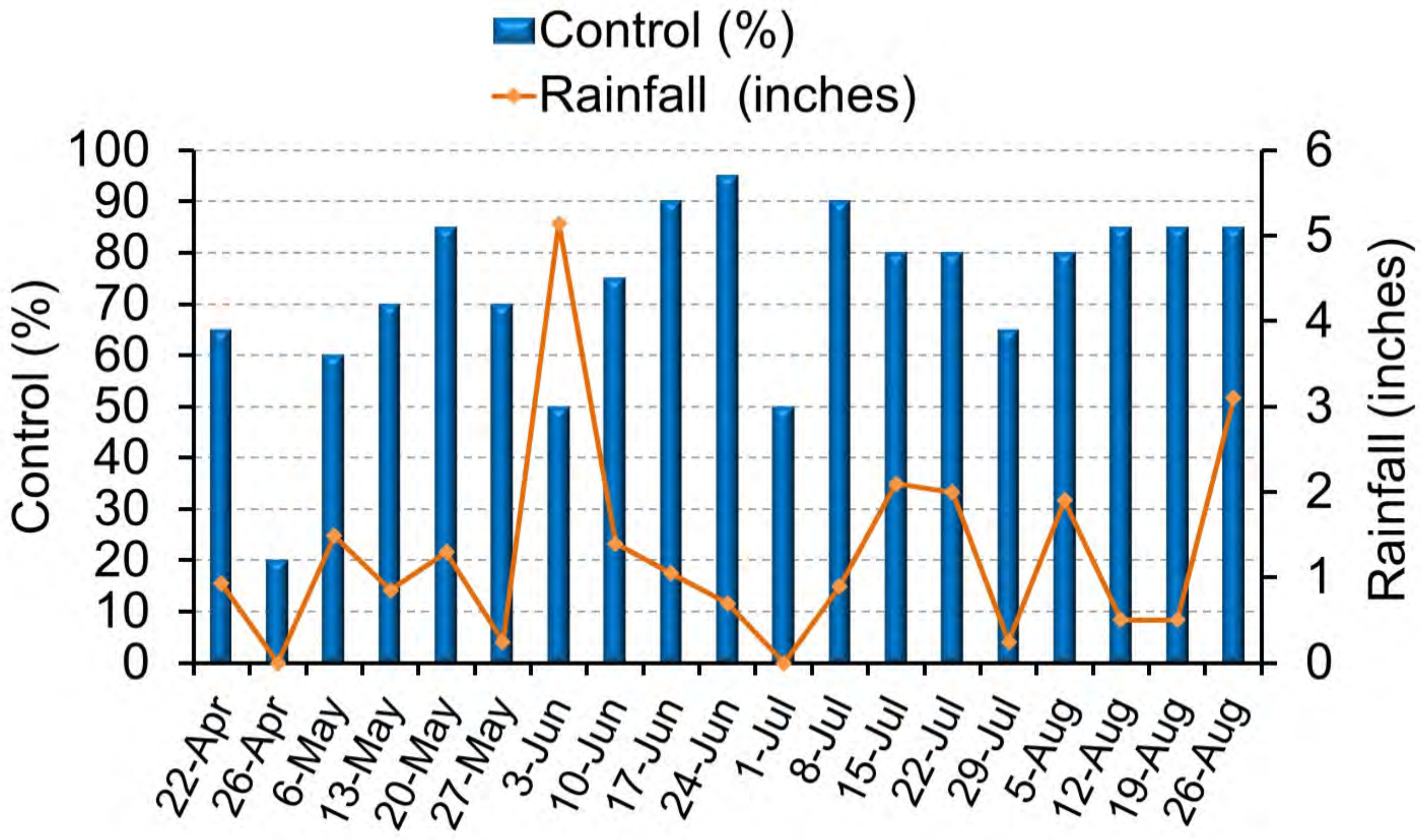


Figure 2. Response of giant smutgrass to 2 qt/acre hexazinone (1 lb/acre) under field conditions 30 days after treatment in 2016. Rainfall was collected weekly; rainfall amounts indicated on each day of application represents the total rainfall recorded for 7 days following hexazinone application.

Establishment of Warm-Season Perennial Pastures with Forage Mixtures

Joe Vendramini, Associate Professor, Forage Management

Establishment of new pastures and hayfields is one of the most costly management practices in forages and livestock operations. It is estimated that the cost to establish a warm-season perennial grass pasture in Florida is approximately $600.00/acre. In addition, a detrimental factor in establishing new forage fields is the extended time required for the grass to fully establish and be productive; which can take from 2-6 months.

Bahiagrass (*Paspalum notatum*) has been the most used forage for grazing in Florida due to its persistence under low-input systems. However, it has been observed that it may take from 6-12 months to have a fully established bahiagrass pasture after seeding. Besides the lack of forage production during the establishment time, the slow establishment of bahiagrass gives the opportunity for weeds to encroach and may increase the cost of establishment due to additional weed control. The presence of weeds in newly established bahiagrass pastures is particularly problematic because there are no herbicides recommended for newly established bahiagrass. Other warm-season perennial grasses, such as the brachiariagrass (*Brachiaria* spp), also have slow establishment, which may incur with similar problems.

Warm-season annual grasses have not been extensively cultivated in South Florida due to short growing season and difficult management in the summer. However, warm-season grasses, such as sorghum and millet, have fast establishment and superior forage nutritive value and may be a valuable forage resource during periods of shortage of forage.

Recently, some species of warm-season annual legumes have been tested in South Florida. Cowpea (*Vigna unguiculata*) and sunnhemp (*Crotalaria juncea*) are legumes with fast establishment and superior nutritive value; however, they are not persistent under grazing.

Therefore, a research project was conducted from April to September 2017 to collect preliminary data about mixing warm-season perennials and warm-season annual forages during the establishment of warm-season perennial pastures. The experiment was conducted in Ona, FL and the treatments were:

- Cayman Brachiaria (warm-season perennial grass)
- Cayman Brachiaira + Sorghum Sudangrass + Sunnhemp (1/2 seeding rate)
- Cayman Brachiaira + Sorghum Sudangrass + Sunnhemp (Full seeding rate)

Full seeding rates were 10 lb/acre Cayman, 25 lb/acre Sorghum Sudangrass and 25 lb/acre sunnhemp. Plots were harvested every 6 weeks after seeding.

The mixture at half seeding rate had the greatest annual herbage accumulation (Figure 1). The sorghum and sunnhemp were the major portion of the forage production in the first harvest, while the Cayman was the only forage species left in the third and fourth harvest. The half mixture produced 75% greater herbage accumulation than the Cayman treatment. In addition, the forage produced in the first harvest had the greatest nutritive value. The final establishment of the Cayman was not negatively affected by the half mixture treatment; however, the full mixture had decreased Cayman forage production in the last harvest (Figure 2).

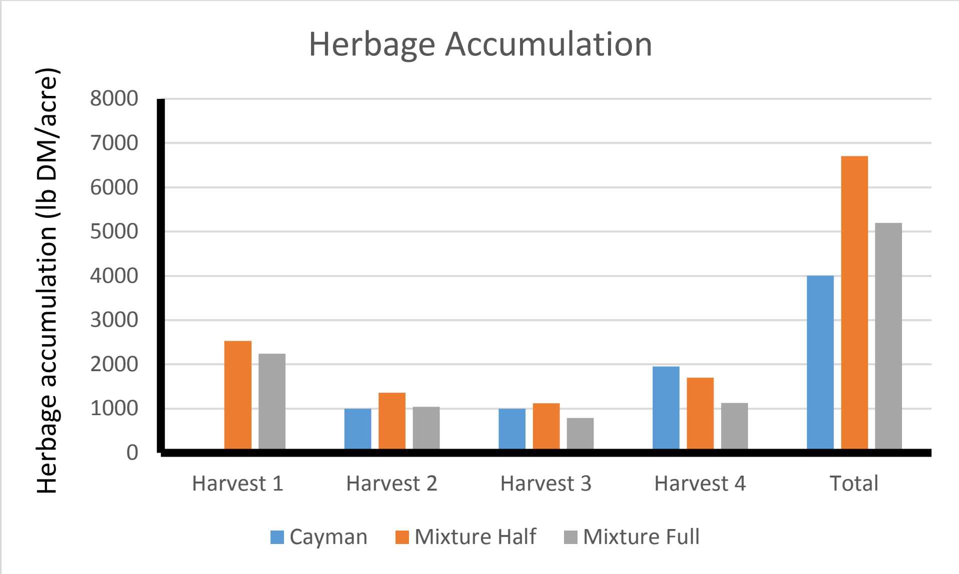


Figure 1. Herbage accumulation of Cayman, Cayman + Sorghum + Sunnhemp (1/2 seeding rate), or Cayman + Sorghum + Sunnhemp (Full seeding rate) during 4 harvests with 6 weeks regrowth interval.

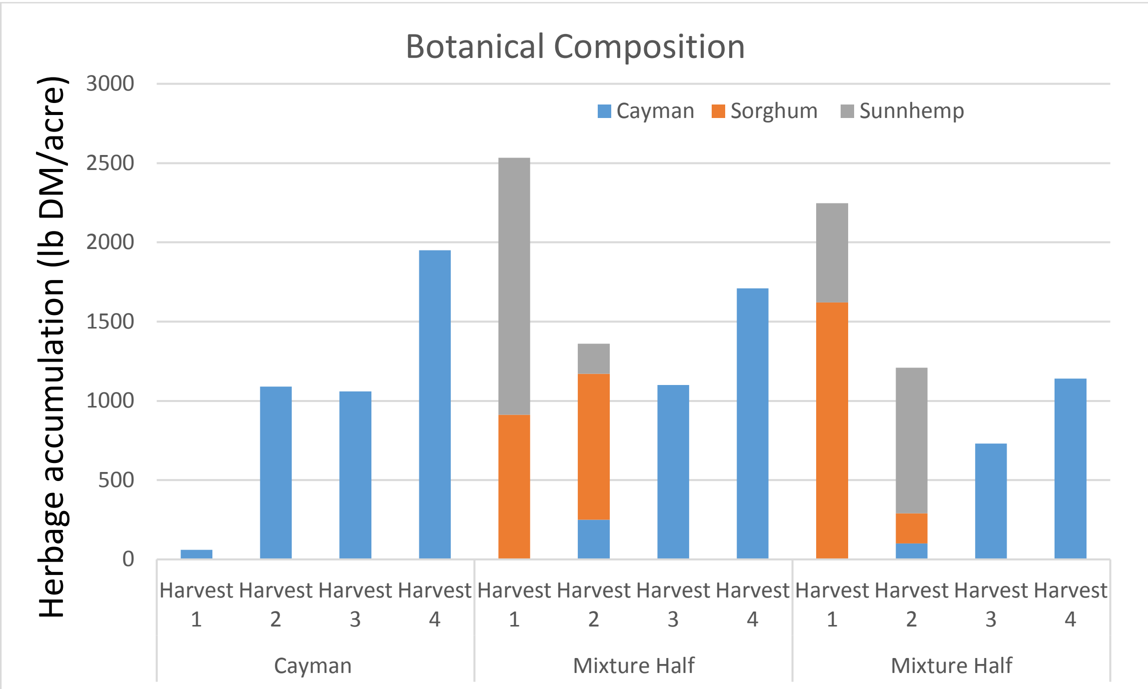


Figure 2. Botanical composition of the forage harvested from Cayman, Cayman + Sorghum + Sunnhemp (1/2 seeding rate), or Cayman + Sorghum + Sunnhemp (Full seeding rate) plots. The harvest occurred every 6 weeks after seeding.

Table 1. Crude protein of plots established with different forage species

Treatment	Harvest 1	Harvest 2	Harvest 3	Harvest 4
	CP (%)			
Cayman	-	11.1	11.9	15.1
Mixture Half	20.5	10.1	12.9	16.2
Mixture Full	21.8A	13.1	12.5	15.2

Table 2. In vitro organic matter digestibility of plots established with different forage species

Treatment	Harvest 1	Harvest 2	Harvest 3	Harvest 4
	IVDOM (%)			
Cayman	-	60	55	55
Mixture Half	68	61	55	58
Mixture Full	66	64	58	55

Conclusions

Mixing warm-season annual forage with a warm-season perennial grass at the time of establishment is a feasible management practice to have greater forage production in the year of establishment. The warm-season annual forage species produced the majority of the forage in the first 6 weeks after establishment, while the perennial forage had greater forage production 18 and 24 weeks after establishment. The half seeding rate mixture did not decrease the perennial forage establishment and has potential to be used as a management practice to establish warm-season perennial pastures.

Agronomic and environmental impacts of land application of biosolids to bahiagrass pastures in Florida

Maria L. Silveira, Associate Professor, Soil and Water Sciences
Collaborators: Joao M. Vendramini, and George A. O'Connor

Project overview

Biosolids have clear agronomic benefits, but concerns over nutrient accumulation in soils and subsequent impacts on water quality can limit land application in Florida. The ***objectives*** of this project are *(1) to establish a long-term, instrumented, research and demonstration field trial designed to evaluate the agronomic benefits of biosolids and biochar application on bahiagrass production and nutritive value, (2) to monitor the potential effect of biosolids application on water quality, and (3) to evaluate greenhouse gas (carbon dioxide, nitrous oxide, and methane) emissions and the potential impacts of biosolids and biochar application on soil chemical, physical and biological properties.* Our principal hypothesis is that most biosolids applied to pastures convey significant agronomic benefits and that they behave as "slow release" nutrient sources with minimal negative environmental impact.

Project activities

Biosolids (Class AA and B materials) were surface applied to the experimental area on April 2016 and 2017 and compared to nutrition provided with mineral fertilizers. Biosolids sources were applied either alone or in combination with biochar to supply an estimated rate of 160 lb plant available N/acres/yr, which correspond to UF/IFAS high N option for established bahiagrass and the most common application rate used by commercial cow-calf operations in Florida. The availability of the N in the biosolids was estimated using Florida -DEP factor of 1.5. Biochar was also applied in April 2016 and 2017 at 20 Mg ha^{-1} rate, which corresponds to an application rate of ~ 1% (wt. basis). Control treatments included plots receiving inorganic commercial fertilizer (ammonium nitrate + triple superphosphate alone and in combinations with biochar) and pastures receiving no biosolids, fertilizer, or biochar. Forage, soil, water quality, soil moisture, ground water levels, and gas emissions were monitored during the 2016 and 2017 growing seasons. Soil samples were collected at the beginning of the experiment and at the end of 2016 and 2017. Analyses included soil pH, Mehlich-3 extractable P, K, Ca, Mg, Fe, and Al and total C, N, P, and trace element concentrations. Extractable NO_3-N and NH_4-N will also be determined. For each soil depth, the P saturation ratio [PSR = Mehlich-3-P / (Mehlich-3-Al + Mehlich-3-Fe)] was calculated. The PSR relate to soil P retention capacity. Leachate N and P were monitored in the treatments receiving the class B Bradenton biosolids and commercial fertilizer (total of 24 plots: 1 biosolids material + 1 commercial fertilizer, with or without biochar + 2 control * 4 replicates = 24). Groundwater level, soil moisture content, and weather data were continuously monitored in the experimental site. Leachate samples were collected at 2- or 4-wk intervals and analyzed for total and inorganic P, total N, NO_3-N and NH_4-N concentrations. Greenhouse gas fluxes were measured (same treatment as the water quality monitoring) using the static chamber technique. Gas samples were collected at 14-d intervals and analyzed for carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) concentrations.

Results summary

<u>Bahiagrass Responses -</u> Compared to control treatments (no N or P added), addition of fertilizer (either as commercial N and P fertilizer or biosolids) increased annual bahiagrass

herbage accumulation by an average of 68%; however, no difference between inorganic fertilizer vs biosolids treatments was observed (Figure 1). Although inorganic fertilizer resulted in greater bahiagrass herbage accumulation in the first harvest, at the end of the growing season (harvest 3), greater bahiagrass herbage accumulation was associated with treatments receiving biosolids. This response was due to the slow release nature of nutrients present in biosolids. Similarly, no differences in bahiagrass crude protein and digestibility were observed among fertilizer and biosolids treatments. Results from this study indicated that biosolids application can supplement or replace inorganic fertilizer in bahiagrass pastures, with the added benefit of providing a more continuous supply of nutrients throughout the growing season. No effect of biochar on bahiagrass responses was observed.

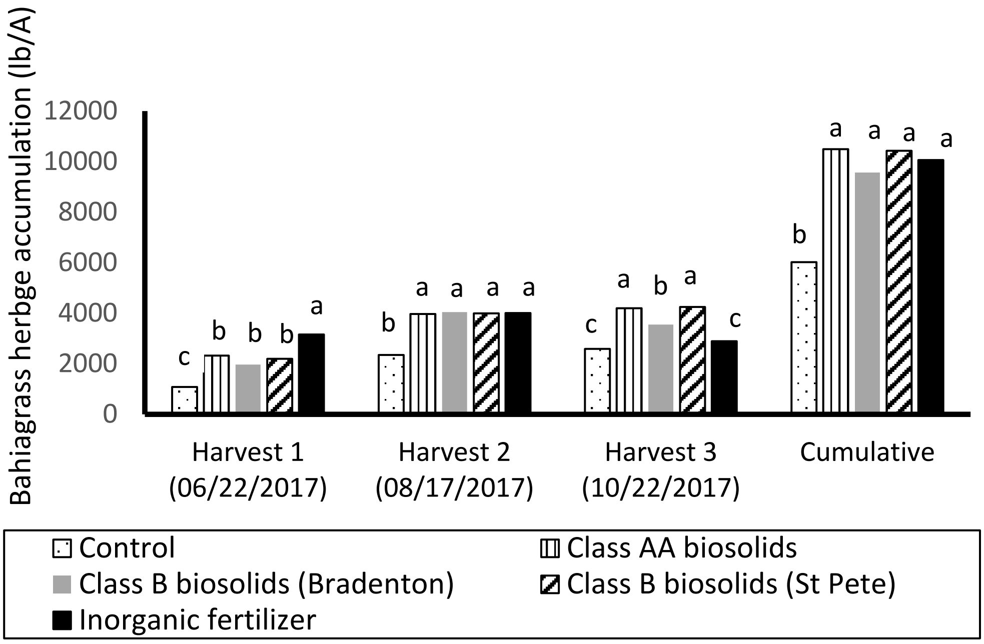


Figure 1. Bahiagrass herbage accumulation in 2017 as affected by biosolids and fertilizer application.

Water Quality and Greenhouse Gas Responses

Application of biosolids (either alone or in combination with biochar) had no significant impact on water quality and greenhouse gas emissions. However, when bahiagrass received commercial inorganic fertilizer, large pulses of N and P were observed immediately after fertilizer application. Similar responses were also observed for nitrous oxide emissions. Greater nitrous oxide emissions were generally associated with the treatments receiving commercial fertilizer, particularly during the first few weeks following fertilization application. These results indicated that N and P losses associated with treatments receiving biosolids can be lower than commercial fertilizer. Results also indicated no potential benefit of biochar in reducing N and P losses. Fertilizer and biosolids will be land applied in April 2018 and forage and environmental responses will be evaluated during the 2018 growing season.

ACKNOLEDGEMENTS -We thank the Florida Cattlemen's Association for providing the funds to support this project. We also want to extend our appreciation to H&H Liquid Disposal for their assistance obtaining and hauling the biosolids materials to the study site.

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OTHER SUBSTANCES:
Chlorocresol 0.1% w/v (as preservative).

DOSAGE RECOMMENDATIONS:
CALVES: Up to 1 year .... 1 mL/per 100 lbs. bodyweight
CATTLE: From 1-2 years .... 1 mL/per 150 lbs. bodyweight
CATTLE: Over 2 years .... 1 mL/per 200 lbs. bodyweight

PRECAUTION:
Selenium and copper are toxic if administered in excess.

Always follow recommended label dose.

Do not overdose.

It is recommended that accurate body weight is determined prior to treatment.

Do not use concurrently with other injectable selenium and copper products.

Do not use concurrently with selenium or copper boluses.

Do not use in emaciated cattle with a BCS of 1 in dairy or 1-3 in beef.

Consult your veterinarian.

CAUTION:
Slight local reaction may occur for about 30 seconds after injection. A slight swelling may be observed at injection site for a few days after administration. Use standard aseptic procedures during administration of injections to reduce the risk of injection site abscesses or lesions.

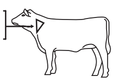
DIRECTIONS:
This product is only for use in cattle.

MULTIMIN® 90 is to be given subcutaneously (under the skin) ONLY.

It is recommended to administer the product in accordance with Beef Quality Assurance (BQA) guidelines. Minimum distance between injection sites for the MULTIMIN® 90 product and other injection sites should be at least 4 inches.

Inject under the loose skin of the middle of the side of the neck. Max volume per injection site is 7 ml.

Subcutaneous injection in middle of side of neck.



Store Between 15°C and 30°C (59°F and 86°F).

SUPPLEMENTATION PROGRAM	
BULLS	3 times per year
BEEF COWS	4 weeks before breeding 4 weeks before calving
DAIRY COWS	4 weeks before calving 4 weeks before insemination at dry-off
CALVES	at birth at 3 months and/or weaning
HEIFERS	every 3 months – especially 4 weeks before breeding
(program gives planned dates that can be varied to suit management programs)	

DOSAGE TABLE

ANIMAL WEIGHT (lbs)	CALVES UP TO 1 YEAR 1 ml/100 lb BW	CATTLE 1 - 2 YEARS 1 ml/150 lb BW	CATTLE > 2 YEARS 1 ml/200 lb BW
50	0.5 ml	-	-
100	1 ml	-	-
150	1.5 ml	-	-
200	2 ml	-	-
300	3 ml	-	-
400	4 ml	-	-
500	5 ml	-	-
600	6 ml	-	-
700	7 ml	-	-
800	-	5.3 ml	-
900	-	6 ml	-
1000	-	6.6 ml	5 ml
1100	-	-	5.5 ml
1200	-	-	6 ml
1300	-	-	6.5 ml
1400	-	-	7 ml

Packaged in 100 mL & 500 mL size
NDC No. 49920-006-01 NDC No. 49920-006-05

TAKE TIME OBSERVE LABEL DIRECTIONS

MANUFACTURED FOR:
MULTIMIN NORTH AMERICA, INC.
Fort Collins, CO 80528

℞

GET THE COMPETITIVE ADVANTAGE!

WHAT CATTLE PRODUCERS ARE SAYING

"OUR MULTIMIN® 90 CATTLE ARE HEALTHIER. IT'S A FACT THAT HEALTHY CATTLE EAT BETTER AND GAIN MORE. EVERY TIME I DON'T USE MULTIMIN® 90, I LOSE MONEY."

Perry Owens
Manager, Ottawa County Feeders, Inc. Minneapolis, KS

"MULTIMIN® plays a major role in improving the health and appearance of our cattle, while reducing antibiotic usage and the costs associated with pulls and sickness. Between these savings and increased fertility and conception rates, MULTIMIN® easily pays for itself."

Jonathan Perry
General Manager, Deer Valley Farm, Fayetteville, TN

"MULTIMIN® 90 more than pays for itself in the herd health and reproduction improvements that we're seeing, plus treatment costs have decreased with MULTIMIN® 90."

Danny Poss
Poss Angus, Scotia, NE

MULTIMIN 90

Sure Trace Mineral Supply by Timed Injection

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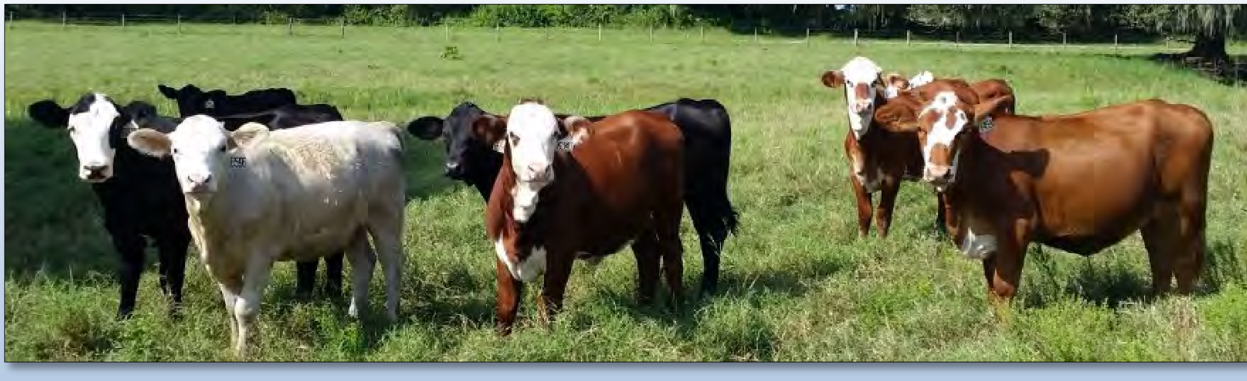

Checkout the - *Joe What? Podcast*

Joao ‘Joe’ Vendramini, faculty member at the UF/IFAS Range Cattle Research and Education Center, interviews leaders in agriculture and science about current challenges and opportunities in beef cattle production. Monthly podcasts can be found at http://ufifasrcrec.podbean.com


Jim Strickland


George Kempfer

Reinaldo Cooke


Erik Jacobsen


Todd Clemons


Jim Handley

Zach Adams


Ralph Pelaez


Michael Vieira

For more information contact Joe at 863-735-1314 or jv@ufl.edu.

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Ona Program Highlights

We invite you to join us each month for an engaging and educational presentation. Learn about research being done by RCREC faculty and graduate students and hear from an occasional guest presenter.

Typically held on the 2nd Tuesday of the month, these presentations are given in the Grazinglands Education Building at 11:00 a.m. and last 30-45 minutes. You may attended in person (call to register: 863-735-1314) or by webinar. Visit http://rcrec-ona.ifas.ufl.edu/events.shtml to register online.

Past webinars (recordings and slides) are available on the RCREC website, go to: http://rcrec-ona.ifas.ufl.edu/ look under Extension in the left navigation panel and then visit the "Virtual Classroom."

2018 Schedule

1/22 - John Arthington, Professor, Beef Cattle Nutrition and Management

2/13 - Maria Silveira, Associate Professor, Soil and Water Sciences

3/13 - Philipe Moriel, Assistant Professor, Beef Cattle Nutrition and Management

4/10 - Joao Sanchez, PhD Student (Advisor: Joao Vendramini)

5/15 - Brent Sellers, Professor, Pasture and Rangeland Weed Management

6/12- Mario Binelli, Assistant Professor, Physiology (UF Animal Sciences Dept.)

7/10 - Chris Prevatt, State Specialized Agent II, Livestock & Forage Economics

8/14 - speaker TBD

9/11 - Joao Vendramini, Associate Professor, Forage Management

10/9 - Liz White & Wes Anderson, PhD students (Advisor: Raoul Boughton)

11/13 - Long-term Agroecosystem Research Network (LTAR) - speaker TBD

12/11 - Raoul Boughton, Assistant Professor, Rangeland Wildlife and Ecosystems

Body Condition Score Training - Coming Soon!

In the near future an online training course will be released that will provide instruction in body condition scoring beef cattle. It will be available on the RCREC website virtual classroom and can be completed anytime with internet on a computer, tablet, or phone. The course will contain two parts:

Part 1: Learn about the importance of body condition score (BCS) and its impact on fertility and profitability. Take the pre-test.

Part 2: View and print helpful resources, learn about the BCS system, practice scoring, and test your skills.

This course is the product of a collaborative effort. Meet the team:

SAVE THE DATE!

UF/IFAS Range Cattle

Research and Education Center

Youth Field Day

Thursday, June 28, 2018