UF/IFAS Range Cattle Research and Education Center
Research Update 2025

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The UF/IFAS Range Cattle Research and Education Center has a long history of service to the Florida Cattlemen. Since 1941, our research efforts have focused on relevant problems impacting beef production throughout Florida. We focus upon important issues spanning a broad scope of overlapping topics relevant to Florida's grazinglands such as forage and pest management, soil fertility and water quality, beef cattle management, wildlife, and beef cattle and forage economics.

Presently, the Center has 7 faculty programs with 18 support staff. In addition to research and extension projects, the Center's faculty mentor many MS and PhD graduate students and international exchange scholars and student interns. This article provides a highlight from each of the Center's faculty regarding work they are presently conducting in response to the research priorities of the Florida Cattlemen's Association.

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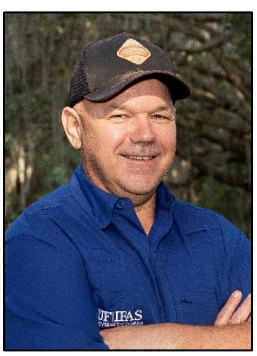
Brent Sellers, Professor and Center Director
Temnotfo "Tenzy" Mncube, Postdoctoral Associate/Visiting Scholar
Pasture and Rangeland Weed Management



Using Low Rates of Imazapyr to Control Newly Invading Cogongrass in Bahiagrass

Control of cogongrass has been studied for many years by researchers world-wide. Nearly all available herbicides have been tested on cogongrass, but few have been effective. For example, almost all of the commonly used pasture herbicides have no activity on cogongrass. Only glyphosate (Roundup, etc.) and imazapyr (Arsenal, Stalker, etc.) herbicides have been found to be effective, but long-term control is rarely achieved with a single application. Additionally, both are non-selective when applied at the recommended rates to control cogongrass.

Research in the mid-2000's found that low rates of imazapyr resulted in significant above-ground cogongrass kill, but bahiagrass groundcover was relatively unchanged in a reclaimed phosphate mine ecosystem. The question became – can we see the same results in a managed bahiagrass pasture? A trial was initiated in November to get some preliminary data on cogongrass control and bahiagrass injury. Imazapyr (Arsenal 2 SL) was applied at 8, 16, and 32 oz/A in November on established cogongrass and relatively new patches of cogongrass. Since we do not expect cogongrass to be controlled with a single application of imazapyr at the lower application rates, a sequential application will be applied in November 2024 to monitor cogongrass growth and bahiagrass injury in 2025.

Cogongrass was slow to respond to imazapyr as all rates provided less than 50% control 3 months after treatment; unfortunately, bahiagrass injury ranged from 60 to 85%. Bahiagrass started to regrow and cogongrass control increased as daytime air temperatures increased coupled with timely rainfall. Cogongrass control averaged 55, 75, and 82% with imazapyr applied at 8, 16, and 32 oz/A, respectively, at 6 months after treatment. There was no bahiagrass injury with imazapyr at 8 and 16 oz/A, but injury ranged from 0 to 55% at 32 oz/A at 6 months after treatment. By 12 months after treatment, cogongrass cover was reduced by 28, 17, and 69% following applications of 8, 16, and 32 oz/A, respectively. Cogongrass root biomass was reduced by 74 to 87% at 12 months after treatment with these rates of imazapyr.

We also looked at the impact of fertilization on bahiagrass recovery in the patches where cogongrass was just starting to invade bahiagrass (Figure 1). While it was difficult to determine statistical differences based on our small sample size, the visual response is striking. Encouraging the growth of desirable species will help avoid undesirable species.

We will continue these studies for an additional two to three years to understand the impact of sequential (annual) applications of imazapyr on cogongrass control and bahiagrass tolerance.

Questions, contact me at: sellersb@ufl.edu.

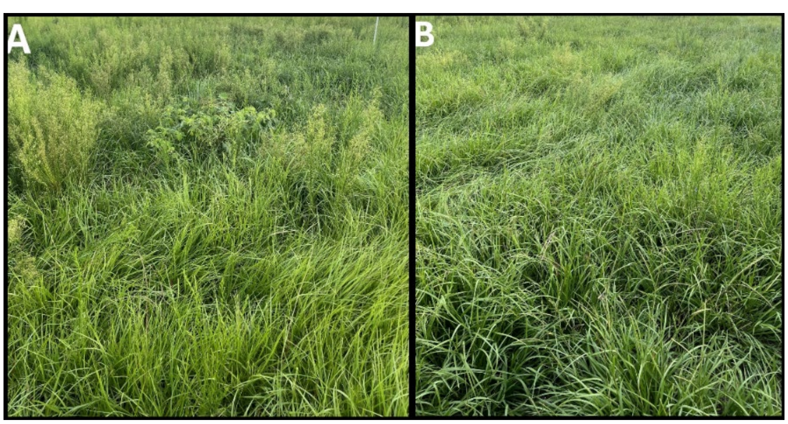


Figure 1. Impact of Imazapyr (2 lb Arsenal™ formulation) applied to newly invading cogon grass in bahiagrass pastures. Arsenal was applied at 32 oz/A followed in November by spring N fertlization at 50 lb/A on 50% of the plot area. Note that the weeds are more prevalent on the non-fertilized portion of the patch (A) vs the fertilized portion of the patch (B). Photograph was taken 10 months after treatment.

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Hance Ellington, Assistant Professor
Rangeland Wildlife Ecology

Coyotes in Florida: A Closer Look at Their Behavior

Coyotes are medium-sized, dog-like carnivores that typically weigh between 20 and 40 pounds. They are relatively new to Florida. Historically found west of the Mississippi River, coyotes expanded eastward due to land use changes and the loss of large predators in the eastern U.S. They arrived in Florida in the 1960s and 1970s and, by the late 1990s, had spread statewide.

Because coyotes weren't brought to Florida by humans – intentionally or accidentally – they aren't considered invasive. Their presence is seen as a natural range expansion. Highly adaptable, coyotes thrive in nearly every terrestrial ecosystem in Florida. They eat a wide variety of foods, and efforts to eliminate them across the U.S. have failed. Instead of removal, management efforts now focus on understanding their behavior and reducing human-wildlife conflict.

Since January 2024, the Rangeland Wildlife Ecology Lab has studied coyote behavior in central Florida's rangelands and north Florida's timberlands. In 2025, our study expanded to include suburban areas in south Florida. We have placed GPS collars on 50 coyotes across these regions. The collars record each coyote's location every 15 minutes, allowing us to estimate home ranges and observe behaviors like hunting, resting, traveling, and denning.

Preliminary results show coyotes use space in varied ways. While all coyotes seek mates and attempt to raise young, only those holding a territory succeed. These **resident** coyotes live in stable family groups – usually a breeding pair, their pups, and occasionally older siblings from past litters. They consistently reuse specific areas and travel paths.

Most pups are forced to leave their family's territory around nine months of age. These young, non-territorial coyotes, called **transients**, search for open territory and mates while avoiding resident coyotes.

There are two main types of transients. **Local transients** stay near where they were born, roaming familiar ground while avoiding territorial boundaries. They may revisit certain places and appear to wait for a chance to claim territory. **Long-distance transients** leave the area entirely. They rarely return to the same spot and live in unfamiliar areas, increasing their risk of death due to dangers or limited resources.

This research is just beginning. Future work will explore how coyotes interact with other wildlife and livestock, such as cattle, to better understand their role in Florida's rural and urban ecosystems.

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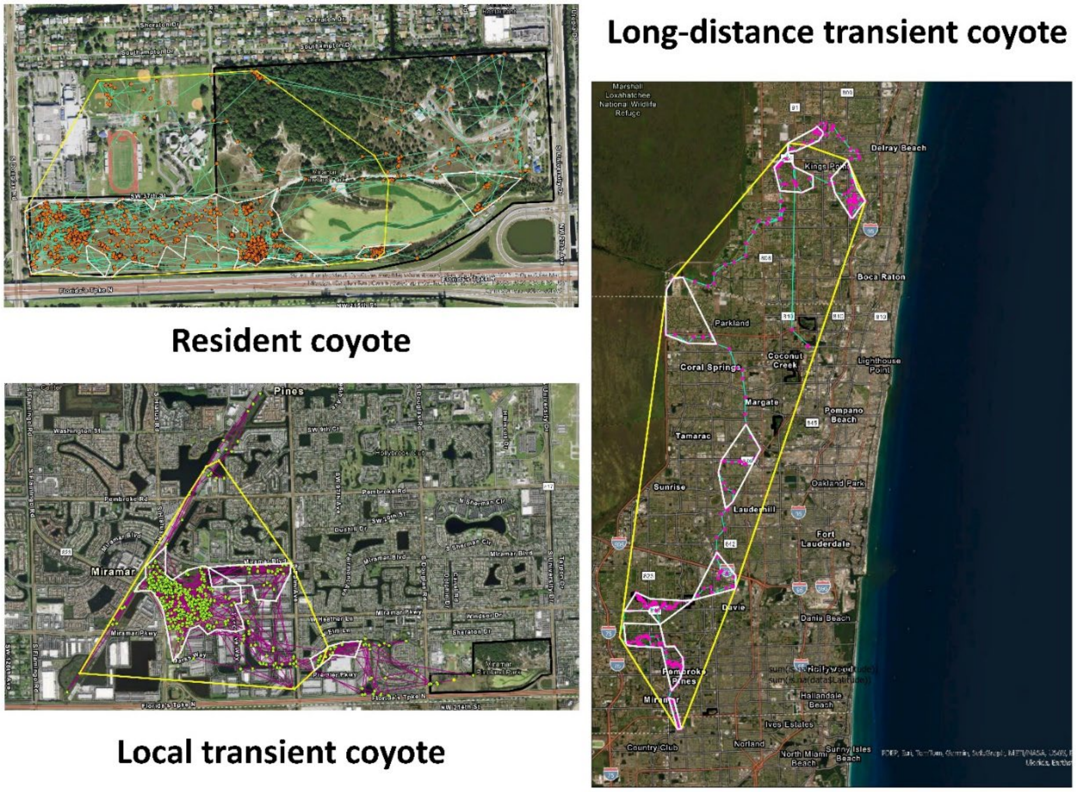

Figure 1. Locations and movement paths of a resident (orange and blue), local transient (green and purple), and long-distance transient coyote (pink and blue) in suburban Broward County in March 2025. White and yellow polygons represent different ways of estimating boundaries of the territory of the resident coyote and the areas of frequent use by the transient coyotes.

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Golmar Golmohammadi, Assistant Professor
Watershed Hydrology and Water Quality

Summer Hot Day Patterns and Temperature Variability in Florida

The Global warming, marked by a noticeable increase in Earth's average temperature, is reshaping our climate and posing growing risks substantial risks to both the environment and the global economy. Understanding and mitigating the adverse effects of climate change requires an in-depth examination of long-term temperature trends and their local impacts.

In our recent study, we analyzed data from 28 weather stations across the state, spanning Pensacola to Key West (1959–2022) to quantify “hot days” (HDs) and explore their relationship with Summer Daily Maximum Temperature (SDMT). We defined HDs as days with a maximum temperature of 91°F or above. Although 91°F may feel routine in Florida, an increasing number of such days intensifies heat stress on cattle, ranch workers, and forage crops.

Using an exceedance-probability model—the first of its kind applied to Florida’s summer climate—we produced reliable forecasts of HD occurrence even in regions with sparse data. We complemented this with a clustering analysis to reveal how temperature-change patterns vary across the state.

Below are some key findings of our study:

- **Rising hot-day frequency.** Over the past 60 years, Florida has averaged roughly 2.5 additional HDs per decade. If this rate continues, we could see 25 more HDs each summer by the end of the century.
- **Reduced temperature variability.** As mean SDMT increases, day-to-day temperature swings decline, indicating longer, more persistent heatwaves.
- **Projected trends through 2050** suggest a continued rise in HD across Florida, classified into three severity categories: severe, moderate, and mild.

These findings can have serious effects on people's health, the environment, and the economy. Some important implications for cattlemen and resource managers, including but not limited to animal health and productivity, labor and operations, energy and water use, and forage and water resources.

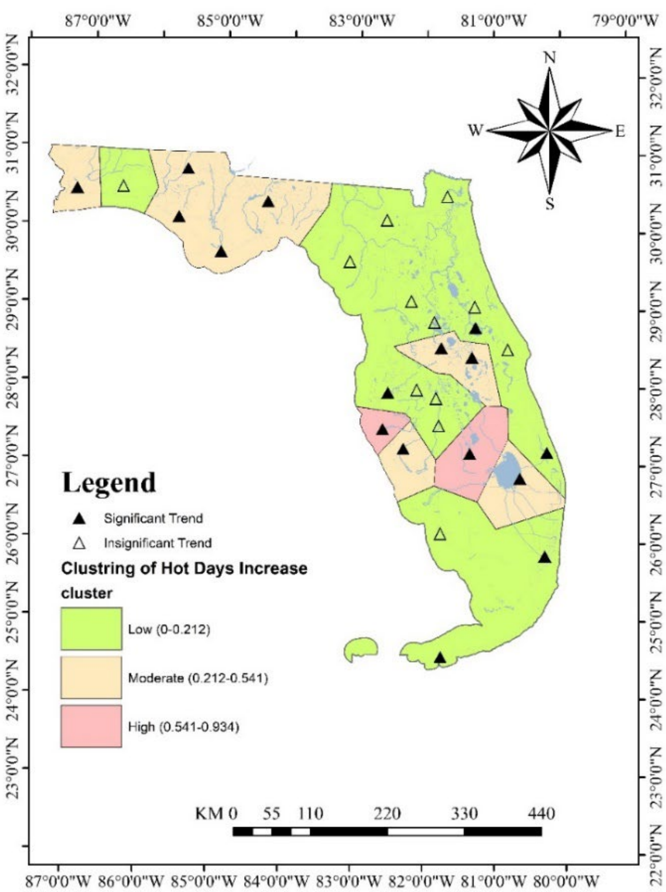

Figure 1. Zoning of Meteorological Stations – Increase in Number of Hot Days in Summer for the State of Florida, based on the K-means Clustering Algorithm.

These results underscore the urgency of targeted climate-adaptation strategies. Moreover, our work highlights the need for improved hydrological forecasting tools that integrate temperature projections, ensuring ranchers can manage water resources effectively under a warming future. Embracing these findings could help to safeguard animal welfare, optimize production, and maintain the resilience of our ranching communities in the decades ahead.

For more information on this research and education program, please contact Golmar Golmohammadi at g.golmohammadi@ufl.edu.

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Philipe Moriel, Associate Professor
Beef Cattle Nutrition and Management

Direct-Fed Microbials (DFM) Supplementation for Pregnant Beef Heifers

In cattle nutrition, adding direct-fed microbials (DFM) like *Bacillus* bacteria is being explored as a natural alternative to antibiotics. These microbes can help improve digestion, support good bacteria in the rumen, and enhance nutrient absorption. They may also help reduce harmful pathogens, improve gut health, and boost the production of digestive enzymes and anti-inflammatory molecules. The gut of mammals is sterile before birth but quickly becomes colonized by microbes after birth, which is vital for the development of both the gut and immune system. The health of the calf is influenced by the microbes they inherit from the mother, and early diet plays a significant role in this process. However, there are few studies on how feeding *Bacillus* DFMs to mothers during pregnancy and early lactation impacts both the mothers and their calves. This is especially true for *Bos indicus* breeds, which have different metabolic needs compared to other cattle. We believe that giving *Bacillus*-based DFMs to cows before and after birth could improve their health, body condition score, and the overall growth and immune function of their calves.

At about 139 days before calving, 72 Brangus crossbred heifers pregnant with their first calf were assigned to bahiagrass pastures. One group received 1 kg/day of soybean hulls without DFM, whereas the second group received 1 kg/day of soybean hulls with *Bacillus* bacteria (DFM) from 139 days before calving until 104 days after calving (total of 243 days of supplementation). The DFM supplement cost is approximately 5 cents per heifer per day (total cost of $12 per heifers for the entire study). All calves were early weaned at approximately 90 days of age and then were assigned to a drylot period consuming concentrate for 60 days. Overall, heifers offered DFM had greater body condition score at calving (6.37 vs. 6.09). These heifers also had greater plasma concentration of glucose during the precalving period, which is essential for normal fetal growth. Pregnancy rates of heifers were not impacted by DFM supplementation. In terms of calf performance, calves born from heifers that consumed the DFM supplement had similar body weight at birth, but greater growth performance during the drylot period compared to calves born from heifers that did not receive DFM supplementation. Moreover, calves born from heifers that consumed the DFM supplement also had greater antibody titer production and vaccine response against bovine respiratory disease pathogens compared to calves born from heifers that did not receive DFM supplementation. Therefore, DFM supplementation for pregnant beef heifers is a viable strategy to improve the performance of cow-calf pairs in Florida.

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Maria Silveira, Professor
Soil and Water Science

Pasture Management Strategies to Increase Soil Carbon Sequestration and Greenhouse Gas Mitigation

Pasture-based systems used for beef cattle production offer important environmental benefits. Well-managed pastures support soil health, reduce erosion, improve water infiltration, and increase biodiversity. Pastures also sequester carbon in soils through root biomass and organic matter accumulation, contributing to climate change mitigation. In addition, grazing systems can help maintain open spaces, preserve wildlife habitat, and promote long-term land stewardship. When properly managed, pasture-based beef production can be both productive and ecologically sustainable.

Beef sustainability in the U.S. remains a complex issue. The industry contributes significantly to the economy and food security but faces scrutiny over environmental impacts. While it's estimated to account for 3.3% of total U.S. greenhouse gas (GHG) emissions, cow-calf operations are the largest contributor within the sector due to methane from enteric fermentation. Still, new technologies and practices aim to reduce emissions and improve grazing, water use, and overall sustainability.

Soil carbon sequestration is one promising strategy. It captures atmospheric CO_2 and stores it in the soil in forms that can persist for decades or even longer. Benefits include better soil health, water retention, and crop productivity. Research in Florida has shown that bahiagrass and native pastures act as significant carbon sinks, but how much management can enhance this effect is still debated. Climate, soil type, and management all influence results.

To investigate further, a study at UF/IFAS Range Cattle REC in Ona tested seven conservation practices, including legumes, nitrogen addition via organic and inorganic fertilizer, biochar, and basalt rock. Since 2023, plots have been continuously monitored to assess the effects of the different practices on forage production and nutritive value, greenhouse gas emissions, soil carbon and soil health.

Our results showed that biosolids increased annual CO_2 emissions slightly. Other treatments had no significant effect on GHG fluxes. Nitrogen additions significantly boosted

forage yields (129% increase), while other treatments showed no agronomic benefit. Legume ground cover remained minimal (3-4%).

Preliminary conclusions from this study indicate nitrogen can increase productivity, but most conservation treatments did not reduce GHG emissions. Longer-term research is needed. Economic viability remains uncertain, especially for practices like legumes or native grasses. While conservation practices offer potential environmental and productivity gains, practical and economic considerations must guide adoption. Outcomes like forage and animal production, drought resilience, and soil health may justify costs, but measurable returns are essential for widespread implementation.

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Joao Vendramini, Professor
Forage Management

New Forage Cultivars

Warm-season perennial grasses are the dominant forages used by beef cattle producers in Florida. Forage production, nutritive value, and persistence are the main desirable traits in warm-season perennial grasses. In addition, adaptability is also important due to differences in soils and climatic conditions in distinct regions of the state of Florida. Spodosols are the dominant soil type in South and Central Florida and a large proportion of these soils are poorly drained during the growing season due to the relatively shallow water table and intense rainfall. Limpograss is the most cultivated forage in poorly drained soils in Florida and has several desirable characteristics, such as superior winter growth and digestibility. However, limpograss is propagated by vegetative plant material and there are several limitations of planting vegetative material, such as unpredictable climatic conditions to produce vegetative plant material, logistics of transporting vegetative material between locations, and machines and labor required for planting. The general objective of this project was to evaluate forage production, nutritive value, and persistence of six new seed-propagated warm-season perennial grasses adapted to poorly drained soils in Florida.

During the 2024 growing season, genotype 549 and Llanero had greater forage accumulation than limpograss. Genotype 549 was particularly of interest because it had greater herbage mass than limpograss when harvested at 5 inches stubble height

Fall Fertilization of Different Warm-Season Perennial Grass Species

The main warm-season perennial grass species cultivated in Florida are bahiagrass, bermudagrass, and limpograss, and the majority of the forage production occurs during the spring and summer months due to greater temperature, daylength, and rainfall. However, there are some intrinsic differences among these species that affect the seasonality of forage production and nutritive value. Therefore, timing of fertilization during the fall months may also be an important factor to optimize nutrient use efficiency of warm-season perennial grass species used in Florida. The objective of this project was to evaluate the effects of different fall fertilization dates on forage production and nutritive value of warm-season perennial grass species. Treatments were four forage species (bahiagrass, limpograss, bermudagrass, and brachiariagrass) and four fertilization treatment dates (August 23rd, September 23rd, and October 23rd). The cultivars selected for each species were 'Argentine' bahiagrass, 'Gibtuck' limpograss, 'Mislevy' bermudagrass, and 'Camello' brachiariagrass. The fertilization level was 50 lb nitrogen (N)/acre and the source of N fertilizer ammonium nitrate. Plots were staged to 7 inches and harvested with 8 weeks regrowth interval.

When fertilized on August 23rd, bermudagrass had the least forage production and there was no difference among bahiagrass, limpograss, and brachiariagrass. When fertilized on September 23rd, there was no difference among bahiagrass, bermudagrass, and limpograss; however, brachiariagrass had greater forage production than the other species. Brachiariagrass had the greatest forage production when fertilized on October 23rd, followed by limpograss and bahiagrass, while bermudagrass had the least forage production. As expected, forage production in all species decreased when fertilization date was delayed from August 23rd to October 23rd.

Bahiagrass pastures should be fertilized no later than late August to be grazed or harvested in early fall, but it is important to mention that the forage may have limited digestibility, and supplementation may be needed to meet the cow's nutritional requirements. Limpograss and brachiariagrass can be fertilized in late September or October; however, delaying the fertilization to October would decrease forage production.

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Figure 1. Bahiagrass, limpograss, brachiariagrass, and bermudagrass plots fertilized at different dates in the fall at Ona, FL.

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Hannah Baker, State Specialized Extension Agent II
Beef Cattle and Forage Economics

Costs of Limpograss Establishment

At the time of writing this in late April, forages have started greening up and herbage mass will hopefully start increasing by the time this is published in June, given we get some rain. The summer months are when we can rely on warm season perennials to supply most of the nutrients our cows need without providing too much extra supplement. These months are also the time to start planning how to meet nutritional requirements in the fall and winter months. One option is to graze stockpiled Limpograss. While stockpiled Limpograss is not an adequate protein source, digestibility remains high as the plant matures. Knowing this, the main focus can be on supplementing the protein deficiency. In contrast, feeding Bahiagrass or Bermudagrass hay likely involves correcting both energy and protein deficiencies which becomes costly and complex.

It is recommended to plant Limpograss during the rainy season (June-August) to achieve full establishment by the subsequent spring. So, planting Limpograss this year will not provide adequate herbage mass for this fall and winter but will be ready to stockpile by next year.

Figure 1 compares the long-term costs per cow of supplementing when either grazing stockpiled Limpograss or providing Bahiagrass hay. For Limpograss, the cost of establishment is included in year one along with the fertilizer recommendation of 50 pounds of nitrogen/ acre after pulling cows off in mid-September to early October. Establishment costs are estimated at $440 per acre or $572 per cow if the stocking rate is 1.3 pairs/acre. It is important to note that fixed costs are not included as these vary greatly across operations. In the analysis, cows grazing Limpograss receive 3 lbs/hd/d of 32% liquid feed with 60% TDN for 90 days. Cows given Bahiagrass hay receive 4 lbs/hd/d of 24% liquid feed with 72% TDN for 90 days. The goal is to show that investing in establishing Limpograss may be a feasible option to influence future profitability.

We know that input costs vary from year to year, but for the purpose and simplicity of this analysis, the costs of fertilizer, hay, and supplement are assumed to remain the same all five years. After 5 years, grazing stockpiled Limpograss ends up providing roughly $58 in savings per cow, or an average of $11 per cow per year. At face value, this does not seem like incentive enough to invest in establishing a Limpograss pasture. However, it is worth noting the year-to-year difference after establishment of roughly $150 per cow. With high returns being projected for the next couple of years, it may be feasible to invest in establishing a Limpograss pasture now to reap the benefit of reduced supplementation costs later. Additionally, labor could be reduced as not as much hay would need to be stored and fed during the winter months. Making management decisions like this one involve penciling out which decision would positively influence future production and profitability.

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Figure 1. Supplement costs for grazing stockpiled Limpograss or feeding Bahiagrass hay						
Costs	**Year**					
Stockpiled Limpograss	**1**	**2**	**3**	**4**	**5**	**Total Per Cow After 5 Years**
Establishment	$572.00	-	-	-	-	
Fertilizer[1]	-	$31.53	$31.53	$31.53	$31.53	
32% Supplement[2]	-	$54.00	$54.00	$54.00	$54.00	
Hay	$180.00	-	-	-	-	
24% Supplement	$63.00	-	-	-	-	
Total	$815.00	$85.53	$85.53	$85.53	$85.53	**$1,157.00**
Bahiagrass Hay						
Hay[3]	$180.00	$180.00	$180.00	$180.00	$180.00	
24% Supplement[2]	$63.00	$63.00	$63.00	$63.00	$63.00	
Total	$243.00	$243.00	$243.00	$243.00	$243.00	**$1,215.00**

[1] *Nitrogen cost: $0.82/pound X 50 pounds = $41/1.3 pairs = $31.53*
[2] *Does not include delivery; 32% liquid feed: $400/ton; 24% liquid feed: $350/ton*
[3] *Hay: $150/ton x 1.2 tons per cow*