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PRODUCTION AND QUALITY OF WARM SEASON PERENNIAL GRASSES AS INFLUENCED BY EXTENDED DAYLENGTH

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Warm-season grasses produce little forage during the fall/winter months from October to February in Florida. Lack of forage production in this time of year places severe restrictions on dairy and beef cattle production. The decrease in grass growth occurs in spite of adequate temperature, moisture, and nutrient availability. It was suggested that the decrease in winter forage production might be associated with dormancy induced by short daylength. The objective of this study was to determine if warm season grass production could be sustained during fall/winter months by subjecting plants to extended daylength.

Procedure

Pure stands of 'Pensacola' bahiagrass, 'Tifton 85' and 'Florakirk' bermudagrass, and 'Florona' stargrass were established in four replicated plots 10' X 100'. Daylength was extended by mounting a 1500-W quartz-halogen lamp 6.8 ft above the soil in each plot. The lamp was positioned about 30 ft in from one end of the plot and the lamp housing was oriented to leave the 30 ft section of plot unexposed to the extended daylength. The remaining 70 ft of plot was subjected to extended daylength of 15 hr. The photosynthetic active radiation (PAR) directly under the light was 29 mol m^{-2} s^{-1}.

Timers turned the lamps on each evening about 0.5 hr before sunset and turned lights off once the overall daylength exceeded about 15 hr. During December and January when days were shortest lights were turned on for about 5.25 hr. The extended daylength was imposed between 20 August and 20 April.

All grasses were mowed back to a 3 in stubble at a 5 wk harvest frequency during the winter period. Harvests were made at nine positions relative to each lamp, however in this paper data were combined to give the mean of two harvest sites for normal daylength (-26 and -13 ft behind the light) and extended daylength (3 and 10 ft in front of light). Prior to initial harvest and immediately after each harvest plots were fertilized with 60 lb N, 30 lb P_2O_5, 60 lb K_2O, 4.5 lb S and 1.5 lb/A Fe, Zn, Mn, Cu, and 0.15 lb/A B. A total of 5.2 in irrigation water was applied over a 2 yr period to avoid drought stress. The insecticide Sevin 10% bait was applied at 10 lb/A on bahiagrass as needed to control mole crickets.

- Results -

Yield

The area of the plot in which the daylength was extended showed a marked increase in plant growth, with a sharp demarcation in plant height between normal and extended daylength. The area of the plot behind the light (normal daylength) showed greatly reduced plant growth.

Pensacola bahiagrass showed the greatest response to the extended daylength producing 2.7 T/A dry matter (DM) (Table 1). The extended daylength increased DM yield 1.5 T/A or 125% over the normal daylength during the fall-winter period.

Tifton-85 bermudagrass also responded to the extended daylength yielding 4.0 T/A DM (Table 1). Extending the daylength during the fall-winter period increased DM yield 1.2 T/A above the normal daylength.

Forage yields of Florakirk bermudagrass (3.3 T/A) and Florona stargrass (3.5 T/A) increased by 0.4 and 0.5 T/A for the extended daylength during the fall-winter period, respectively (Table 1). Grasses released from Ona are always tested during the fall-winter period for short-day production. Therefore stargrasses and bermudagrasses released from the Range Cattle Research and Education Center tend to make increased fall-winter growth averaging about 3.0 T/A without the extended daylength. The bermudagrasses and stargrasses all made more growth during the fall-winter period with normal daylength than Pensacola bahiagrass with extended daylength.

Forage Quality

In vitro organic matter digestion (IVOMD) and crude protein (CP) of most grasses grown with and without lights was very similar. The average IVOMD for Pensacola bahiagrass grown under normal daylength and extended daylength was 56% (Table 2). Digestibility of Florakirk, Florona, and Tifton-85 was 63, 61 and 62% under normal daylength and 61, 61 and 63% under the extended daylength, respectively.

The CP concentration was highest for Florona stargrass ranging from 18.5 (extended daylength) to 18.9 (normal daylength) (Table 2). The concentration of CP was similar for Florakirk and Tifton-85 bermudagrass averaging 16.5 to 17.5% for the extended and normal daylength, respectively. Pensacola bahiagrass exposed to the extended daylength had the lowest forage CP concentration averaging 14.4% compared with 17.9% for the normal daylength forage. The low CP concentration of forage from the extended daylength may be a reflection of the higher yield (Table 1).

These data indicate that Pensacola bahiagrass (1.5 T/A) and Tifton-85 bermudagrass (1.2 T/A) both showed a good response to extended daylength during the fall-winter season. Forage quality generally did not vary greatly between the two daylength treatments. The CP and IVOMD averaged 17.9 and 61% for the normal daylength and 16.5 and 60% for the extended daylength, respectively.

Presently cooperative studies between Ona, Quincy, Gainesville and Tifton, GA are being conducted to develop a new Pensacola bahiagrass that will show improved winter forage production.

Table 1. Total forage yield of grasses exposed to normal and extended daylenght for five harvests averaged over the fall-winter period from 28 October 1998 to 17 March 1999 and from October 1999 to 13 March 2000.†

	2 yr mean			
	Yield			
Grass	Normal daylenght	Extended daylenght	Yield increase	
	---------- T/A ----------			%
Pensacola bahiagrass	1.2	2.7	1.5	125
Tifton-85 bermudagrass	2.0	4.0	1.2	43
Florakirk bermudagrass	2.9	3.3	0.4	14
Florona stargrass	3.0	3.5	0.5	17

†Grasses harvested at a 5wk interval.

Table 2. In vitro organic matter digestion (IVOMD) and crude protein (CP) of four grasses averaged over 5 harvests during the fall-winter period when exposed to normal and extended daylength.†

Daylenght	Florakirk	Florona	Pensacola	Tifton-85
	------------------------------ % IVOMD ------------------------------			
Normal	63	61	56	62
Extended	61	61	56	63
	------------------------------ % CP ------------------------------			

Normal	17.4	18.9	17.9	17.5
Extended	16.3	18.5	14.4	16.5
[†]Grasses harvested at a 5wk interval.				

A REGION-WIDE EFFORT IN BAHIAGRASS BREEDING

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Bahiagrass (*Paspalum notatum* Flügge) improvement is a multi-disciplinary and a region-wide effort in Florida. Recently, University of Florida and USDA-ARS scientists in Georgia and Florida have coordinated their efforts on bahiagrass production and improvement through plant breeding. This team includes forage breeders, animal nutritionists, forage management specialists and a crop physiologist who recognize bahiagrass as a critical crop in the state.

Bahiagrass is the predominant forage grass utilized by the beef cattle industry in southern Georgia, southern Alabama and throughout Florida. Its popularity is attributed to its tolerance of marginal soil fertility, establishment by seed, persistence under grazing, long-lived perenniality and its use as either a forage or sod crop. Bahiagrass is native to South America, but has a remarkable adaptation to the southern Coastal Plain, and particularly to our Florida environment. Acreage of this species is estimated to cover at least 2.5 million hectares throughout the southeastern United States (Burton et al., 1997).

Bahiagrass has a number of other important qualities. Bahiagrass is often used in crop rotation because it suppresses many plant parasitic nematodes and soil-borne diseases. Also, unlike most other forage crops used in the Southeast, bahiagrass is locally grown as a seed crop. There is a very viable bahiagrass seed industry in the region. However, more research is needed to improve seed yield and reduce the hard seed trait because of slow and sometimes unreliable establishment. Breeding efforts targeting improvement of rapid germination and decreased dormancy in the seed are ongoing at the USDA-ARS Crop Genetics and Breeding Research Unit, Tifton and the University of Florida.

The 'Pensacola' bahiagrass cultivar is believed to have made its way to Pensacola through livestock shipments from South America. Dr. Glenn Burton, located at the Forage and Turf Research Unit at Tifton, Georgia began a bahiagrass breeding program in the early 1960s (Burton, 1982). He used a selection procedure called Recurrent Restricted Phenotypic Selection (RRPS). Applying this procedure to Pensacola bahiagrass, he selected for increased above-ground yield for nine cycles, which lead to the development of 'Tifton 9'. Twenty-three cycles of RRPS selection were conducted at Tifton, and seed has been maintained from each population. This unique seed resource offers valuable genetic variability in its populations that have allowed for further genetic studies and potential variety development.

There are several other traits of bahiagrass that, if improved, would significantly impact the livestock and seed industries of the Southeast. Typically, warm-season grasses are lower in forage quality than cool-season grasses. Bahiagrass is particularly characterized by a seasonal depression in digestibility and increase in fiber

concentration, which results in very low forage quality in late summer. This is further complicated by the lack of improvement in quality through management (Gates et al., 1999). Frequent cutting, for example, provides little opportunity to increase digestibility or reduce fiber concentration. Recent efforts at the USDA-ARS Crop Genetics and Breeding Research Unit, at Tifton, GA have identified individuals with superior IVDMD. Eight cycles of selection for higher IVDMD, utilizing a base population of RRPS Cycle 18 bahiagrass, have resulted in very small, but statistically significant, improvement of mean IVDMD values compared to the unselected population.

Although long-term selection for increased yield of spaced-plants using RRPS has resulted in dramatic increases, it has been accompanied by changes in morphology, which have resulted in more upright plants with less stolon development. A two-year grazing trial at Tifton, using RRPS Cycle 14 bahiagrass, indicated that this upright growth habit impaired stand survival. Another grazing experiment at Tifton, comparing RRPS Cycles 0, 9, 18 and 23, confirmed this response. After one season of intense, continuous grazing, there was a dramatic stand reduction in the 2 most advanced cycles. With Tifton 9 (RRPS Cycle 9), the stands declined measurably, but the change was relatively small, compared to Pensacola bahiagrass (RRPS Cycle 0).

Some of the more recent emphasis on bahiagrass improvement has been in the area of breeding for certain physiological traits, such as photoperiod response and cold tolerance. Low forage production in fall/winter months is a severe limitation for dairy and beef cattle producers in the southeastern U.S. Researchers at Ona and Gainesville hypothesized that short daylengths during these months induce a physiological dormancy in the grass. Recent field experiments conducted at the University of Florida, in conjunction with the USDA-ARS Crop Genetics and Environmental Research Unit, concluded that Pensacola bahiagrass showed especially dramatic increases in forage yield during the fall/winter season when subjected to artificial light to extend the normal daylength. A two-year study with RRPS Cycles 0, 4, Tifton 9 (RRPS Cycle 9) and RRPS Cycle 23 at Quincy, Florida indicated distinct population differences in sensitivity to daylength. It further identified individual plants that exhibited day-neutral behavior and significant cold tolerance to temperatures of 25^{0} F.

Because of the popularity of bahiagrass, several southeastern forage breeding programs are targeting areas for forage improvement including cold tolerance, photoperiod response, rapid stand establishment, seedling vigor and forage quality. This coordinated effort, we anticipate, may further improve the adaptation of bahiagrass to the southern U.S., and more specifically, its seasonal productivity in its area of adaptation. This paper provides an overview of the current research on bahiagrass in the southern Coastal Plain region.

Auburn University:
Edzard van Santen (Forage Breeder)

Auburn University has recently approved the release of "AU Sand Mountain" bahiagrass (*P. notatum* var *saure*). AU Sand Mountain is the result of a natural selection in a plant introduction thought to have been planted at the Sand Mountain Substation (Crossville, AL) some 30 years ago. The variety has narrow leaves, fine tillers and a short inflorescence. In Alabama, bahiagrass is generally grown in the southern part of the state, generally south of I-85. In this region, AU-Sand Mountain has out-yielded 'Pensacola' and 'Argentine' varieties, but yielded less than 'Tifton 9'. In the northern part of Alabama, this new variety has yielded more than Tifton 9 and even out-yielded bermudagrass. Plans for the new release will include testing and marketing in the more northerly regions of the Southeast.

USDA-ARS Crop Genetics and Breeding Research Unit, Tifton, GA:
Wayne Hanna (Research Geneticist) and Roger Gates (Research Agronomist)

The present emphasis at the Crop Genetics and Breeding Research Unit at Tifton involves improvement of bahiagrass stand establishment, increased forage digestibility, and high yielding performance under heavy grazing pressure. Experimentation on improved establishment characteristics is based on plant selection within two populations (derived from Tifton 9 and RRPS Cycle 23) for rapid germination and improved plant persistence. Greenhouse evaluation of germination and emergence indicates that some improvement has been

made to date.

Seed produced from plants of the two populations that survived close, continuous grazing were planted in the greenhouse. In addition to survival under grazing, selections will be evaluated for yield and morphological characteristics, particularly stolon development. If substantial improvement in plant persistence is identified, remaining plants will be multiplied and transplanted to an isolation field for seed increase. Plans to continue this effort will be made in replicated clipping trials, and for persistence, using heavily grazed small plots. Concurrently, selection for increasing IVDMD of bahiagrass is being made to improve its nutritional value.

University of Florida and the USDA-ARS, Crop Genetics and Environmental Research Unit, Gainesville, FL: Ann Blount (Forage Breeder), Ken Quesenberry (Forage Breeder), Paul Mislevy (Research Agronomist), Tom Sinclair (Plant Physiologist), Bob Myer (Animal Nutritionist), Sam Coleman (Animal Nutritionist), Mimi Williams (Research Agronomist), Paul Pfahler (Plant Geneticist), Richard Sprenkel (Entomologist), Jim Rich (Plant Nematologist), and Rex Smith (Molecular Geneticist)

The current effort undertaken at the University of Florida is a multidisciplinary approach to bahiagrass improvement. Strong support from the beef industry sector has prompted a statewide emphasis on bahiagrass variety development. The team approach emphasizes plant improvement in seedling vigor and establishment, cold tolerance, photoperiod response, seasonal distribution of forage production, forage quality, nematode and disease resistances.

Interest in bahiagrass variety improvement in Florida stems from a recent study on the photoperiod response of Pensacola bahiagrass. Findings from the completion of a study in 1997-1999 on the photoperiod sensitivity of several tropical grass species at the University of Florida's Range Cattle Research and Education Center, Ona, Florida, were recently reported at the XIX International Grassland Congress in Brazil (Mislevy et al., 2001). Yields were reported for four grasses, including bermudagrass, stargrass, and bahiagrass, that were subjected to artificial light intended to extend the daylength period in the winter to near normal summer daylength. Swards of the grasses grown under extended daylength were compared to swards grown under natural shortening daylength during the fall, winter, and early spring seasons. Forage yields from that study showed that there were substantial response differences among the grasses to extended daylength. The extended daylength resulted in the greatest forage yield increase for the total fall/winter period in Pensacola bahiagrass (123%, 2- yr average or 1.5 T/A). Tifton 85 bermudagrass was also responsive to the extended daylength with fall/winter forage yield increases of 45%, or a 2- yr average of 1.7 T/A.

Based on the Ona findings, greater differences in the photoperiod response were found in bahiagrass, compared to bermudagrass and stargrass. A new experiment was designed to test if genetic differences exist among individual plants in RRPS Cycles 0, 4, Tifton 9, and RRPS Cycle 23. Seven hundred plants, representing the four cycles, were started in the greenhouse. Plants were split into two 'plantlets'. One set was planted in the field under normal daylength, while its counterpart was planted under artificial lights in the field to maintain a daylength of 15 h. Beginning in August 1999, and continuing through June 2001, measurements on foliage growth, flowering, and stolon development have been, and are currently being, collected. First-year results from this study supported conclusions of the Ona trials that bahiagrass is extremely sensitive to shortening daylengths (Blount et al., 2001). The study also identified some plants that exhibited a day-neutral (no or little influence from the daily duration of sunlight exposure) response, which might be valuable for further genetic and physiological studies.

Along with the photoperiod study at Quincy, a breeding nursery of 20,000 bahiagrass seedlings from RRPS Cycles 0, 4, Tifton 9, and RRPS Cycle 23 was planted and the RRPS procedure was used to select for cold tolerance, late-season forage growth, and good stolon development in the populations. Within the field populations, as well as in the photoperiod study, differences were noted for response to daylength and freezing temperatures.

Plant selections were made in Spring 2000 for high levels of cold tolerance and extremes in behavior for stolon development and top growth. These selections were then planted at Ona and Marianna, FL in Summer 2000 for

further observation. Utilizing the RRPS procedure at Ona and Marianna, rigorous culling of the selections has left a superior population, which will become the basis for the initial breeding program at the University of Florida.

Concurrent with the development of a breeding program for variety development, several physiological studies have also been initiated. Plants, which exhibited extremes in growth response and were identified during the first year of the Quincy study, have been vegetatively propagated and planted under artificial light and natural light in a new field study at Ona and in a controlled greenhouse environment at Gainesville. Data on the comparison of the clonal behavior of the selections are not available at this time. However, similar trends to those observed in the Quincy study are clearly visible.

Another area of related research at University of Florida, in conjunction with the Coastal Plain Experiment Station, is the evaluation of other bahiagrass plant introductions and new *Paspalum* species. Seed of plant accessions from the National Plant Germplasm System, and from other scientists working with *Paspalum* species, have been obtained. Concurrent evaluations of these materials are underway at Ona, Brooksville, Gainesville, Live Oak, Marianna and Tifton. Selection criteria being considered at the various test locations are winter survival, frost tolerance, forage yield, forage quality, and seed production.

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VALUE OF SPRING FERTILIZATION OF BAHIAGRASS

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The fertilization program suggested by the University of Florida for grazed bahiagrass in central and south Florida is 50 lb N/acre applied in spring. This is an important practice to improve the amount and quality of grazing at a critical time of year. With cows coming off winter pastures and onto bahiagrass for a March to May, 90-d breeding season, it helps provide nutrition needed to get lactating cows into a weight-gaining condition to increase their chances of rebreeding. For cows bred in December to February, it provides nutrition to improve lactating ability of cows, hence bigger calves. Whatever the situation, the results of spring fertilization of bahiagrass are dependent on rainfall, which is often very little at this time. Day length and temperature are not limiting factors as they are in winter.

The past 2 yr have been record years for low rainfall, and there is little doubt that cattlemen have not received the full benefit of spring fertilization in years such as these. However, even in the driest years, there is some benefit from spring fertilization. My intent is to quantify the yield and nutritive value resulting from N applied to Pensacola bahiagrass in March under grazing conditions, and to show how the practice is affected by rainfall. The period of interest in this discussion is 15 March to 15 June, which is a critical time when grazeable forage is often limiting in pasture.

Rainfall and Yield

Cattlemen tend to associate spring with drought because there is little rainfall in April to early June. Rainfall during the 15 March to 15 June period has averaged (59 yr) 11.44 in. at the Range Cattle REC, but in 2000 and 2001, rainfall during this period totaled 4.5 and 8.5 in., respectively. Effective rainfall in the March to June 2001 period was much less than 8.5 in. because 4.6 in. (out of the 8.5 in.) was received in one day at the beginning of the period (30 Mar. 2001), and this was the first large rainfall after a 12 mo, 59-yr record low rainfall period at the Range Cattle REC. Because of the limited rainfall in the spring of 2000 and 2001, bahiagrass production is of interest in these years. At the Range Cattle REC, yield, crude protein, and digestibility were measured on three, 28-d intervals in a grazed pasture containing a fertilizer experiment with treatments that included a 50 lb N/acre (applied on 15 Mar. 2000 and 2001) and an unfertilized check.

There was no significant increase in yield in any month as a result of N application during these dry years (Table 1). Grass production declined from April to June in both treatments because water became more limiting. Total yield was marginally (*P*=0.07) improved by 270 lb/acre due to N fertilization.

Table 1. Mean (2 yr) dry matter yields of Pensacola bahiagrass and their differences with and without 50 lb N/acre at three, 28-d periods at the Range Cattle REC. Nitrogen was applied on 15 Mar. 2000 and 2001.

	Month			
Treatment	April	May	June	Total
	---------------------------lb/acre--------------------------			
No N	680	400	310	1390
50 lb/A	780	530	350	1660
Difference	100	130	40	270
Probability	ns	ns	ns	0.07

Recent experience usually has a strong influence on what we perceive to be true, but these past 2 yr are not representative of long-term conditions in central Florida. In the past 59 yr, there have been only 3 yr (5% of the time) when rainfall from 15 March to 15 June was <6 in.; 15 yr when rainfall was <8 in. (25%); and 27 yr when rainfall was <10 in. (46%). There will be years when reduced rainfall lowers or even negates the yield of spring-fertilized bahiagrass, but these years are rare.

Typically, dry matter production from bahiagrass fertilized with N in March should total 2500 to 3500 lb/acre during the April to June period. This amounted to a 980 lb/acre increase (3 yr average) in forage production over unfertilized bahiagrass during this 3-mo period on nine ranches in central Florida (Table 2). Rainfall at the nine ranches was not measured, but if records for April to June rainfall at the Range Cattle REC are used, there is some association in each year between rainfall and bahiagrass yield. When rainfall is closer to the long-term average (12 in.) as in 1988, fertilization resulted in an increase of ~1350 lb/acre over unfertilized grass. As

rainfall decreased (1987 and 1989), the response to spring fertilization decreased.

Table 2. Increase in dry matter yield of Pensacola bahiagrass as a result of 60 lb N/acre applied in March. These values are yields resulting from application of 60 lb N/acre in March minus yield with no N. Mean yield over 9 ranches in central Florida.‡

		Month			
Year	Rain†	April	May	June	Total
	in.	------------ lb/acre------------			
1987	9.6	180	120	330	630
1988	11.4	550	550	250	1350
1989	6.9	350	350	250	950
Avg		360	340	280	980

† Rain from Range Cattle REC records.
‡Sumner et al., 1991. Circular 916. Univ. of Florida, Gainesville.

Bahiagrass is unique among Florida grasses because dew and light rainfall that do not provide enough water for plant growth allow bahiagrass to take-up N and store it in stolons. Bahiagrass will use that N later when rainfall becomes abundant. Greater bahiagrass yield from fertilized grass in July, compared with unfertilized grass, is a result of more N in the plant system (Table 3). Yields in July were 390 and 310 lb/acre greater at Ona and in the 9-county region, respectively, from bahiagrass fertilized in March, compared to grass with no fertilizer.

Table 3. Effect of N-fertilization in March on Pensacola bahiagrass yield in July (~120 d after fertilization).

	Location	
N fertilizer†	Ona	9-county‡
No	740	1230
Yes	1130	1540
	*	

†50 lb/acre in each of 2 yr at Range Cattle REC and 60 lb/acre in each of 3 yr at 9 ranches.

‡Sumner et al., 1991. Circular 916. Univ. of Florida, Gainesville.

*Statistically different at P<0.05.

Nutritive Value of Bahiagrass in Spring

Crude protein in N-fertilized bahiagrass in April is ~2 to 3 percentage units greater than that found in unfertilized grass (12-15% for fertilized vs. 9-12% for unfertilized grass). The lower the rainfall, the higher the crude protein concentration in leaves because yields are lower and protein is more concentrated. By June the difference in crude protein concentration between fertilized and unfertilized grass is minimal (both will be ~8-10%) . Across the April to June period, crude protein in the total mass of grass produced during this period averages 1 to 2 percentage units greater with N fertilization. Total digestible nutrients (TDN) in bahiagrass will be increased by N fertilizer applied in March, but only by 1 to 2 percentage units.

Economic value

More than at any other time, late March through May is when available forage is most critical and when the demand for good nutrition is high. On most ranches cattle inventories are probably not low enough to allow unfertilized grass to produce sufficient forage to maintain satisfactory cow condition. Each year, cattlemen need to determine the number of acres they need to fertilize. Fertilizing bahiagrass with N in spring is a business decision that should be based upon the economic return of the input. The economic value of N fertilization in spring lies in a composite of the replacement value of the extra grass produced and the impact of that forage on cattle performance. Because of the complexity and variation among ranching operations, there is no single value. Our objective is to show you a process you could use to make your own decisions.

To approach the decision based on replacement value, some assumptions need to be made. Assume the rancher fertilized 1 acre for each cow and applied 50 lb N/acre. Bahiagrass yield is increased by 1000 lb DM/acre, and its nutritive value is increased to12% crude protein and 55 % TDN. If the cattlemen did not fertilize, replacement of the extra grass could take two forms. First, it could be replaced with lower quality, less expensive hay at $80/ton and supplemented with a 16% crude protein molasses - urea mixture ($128.40/ton) fed at 5 lb/head/day. At 15% moisture, the cost of 1000 lb of DM would be $47 plus 32¢/day for the molasses. If the 1000 lb of hay were fed over a 60-day period, the replacement cost could be $66.20/cow. A second replacement option, although it may not be practical, is 1000 lb of premium-quality hay having 12% crude protein and 55% TDN. The value of the additional premium quality hay purchased to replace 1000 lb of spring-fertilized bahiagrass is $83/cow assuming a market price of $140/ton at 15% moisture content.

The impact that 1000 lb of high quality bahiagrass has on cow performance is less straight-forward in its determination than the replacement value. The value of spring fertilization of bahiagrass for cattlemen with an early breeding season (December-February) will not be as great as that for cattlemen with a traditional March to May (spring) breeding season. In both cases, the added forage is needed to maintain cow condition and sustain a higher level of milk production, which increases weaning weights. With a spring breeding season, conception rates can be included as a direct result of fertilizer use in the spring. Poor cow nutrition lowers conception rates and return to estrus, which directly affects calf-weaning weights. One skipped 21-day estrus cycle translates into calves that are ~ 42 lb lighter at weaning or $42 /cow annually (with $100/cwt calves). A 5% increase in calving percentage will translate into $23 /cow annually given 450 lb weaning weights and $100/cwt calves.

Determining the economic value of spring nitrogen application is complex. The bottom-line value lies in a composite of the value of the forage itself and the impact of that forage on cattle performance. Overall, the response to N fertilizer application in March to bahiagrass is worth between $66 and $83/acre (cow) if just replacement value is taken into consideration, and $131 and $148/acre (cow), if both replacement value and the impact of that forage on cattle performance are included.

UPDATE ON THE USE OF NEMATODES TO CONTROL PEST MOLE CRICKETS ON BAHIAGRASS PASTURE

or more information, E-mail:

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A nematode product patented for use by the University of Florida to provide long-term control of pasture mole crickets will be commercially available next spring from MicroBio, a subsidiary of Becker Underwood, Ames, Iowa. This product, known as Nematac S, will be highly beneficial for a wide range of consumers including ranchers, golf course and playground managers and homeowner lawns.

In the 1980's University of Florida scientists, Dr. Grover Smart Jr. and Dr. K. B. Nguyen imported a nematode from Uruguay, South America. In 1990, they formally described and released this nematode as *Steinernema scapterisci* and showed that it killed 100% of tawny and southern mole crickets and 75% of short-winged mole crickets without adversely affecting other insects. Additionally, the nematodes reproduced within dead mole crickets and released a new generation of nematodes that infected other mole crickets. This makes the nematode an effective, permanent method of controlling pest mole crickets.

From fall 1992 through 1995, the nematode was produced commercially by a US company in Australia but marketed locally as Proactant Ss by Biocontrol Inc., Tampa, Florida. A statement by Mr. Cameron McCaskill of Biocontrol Inc. in 1995 at the 17th Annual Report of then Mole cricket Research states: "Biocontrol is very pleased with the results of Proactant Ss during our first three years of business. Our company sold less than 100 acres of product during the fall of 1992, and now sells thousands of acres per year. We would like to thank the University of Florida and its researchers for all the work they have put into *steinernema scapterisci,* the mole cricket nematode." Later in 1995, that US company ceased nematode production, Biocontrol Inc. struggled for a while trying to produce its own nematodes in Florida, but went out of business in early 1996. In late 1996, there was a severe outbreak of mole crickets on pasture in Polk, Desoto, Hardee and neighboring counties causing large scale decline in bahiagrass pastures.

In 1997, one of the responsibilities of an extension agronomist, hired at Ona, was to investigate reasons for bahiagrass decline and possible solutions. Supported by the South Florida Beef and Forage Program, "pitfall" traps were installed at 10 sites distributed over 6 counties (Polk, Hardee, Desoto, Manatee, Pasco and Highlands) to monitor seasonal distribution of mole crickets on bahiagrass pastures. For logistical reasons, traps were maintained weekly at 7 sites from July 1997 through December 1999 and some results are summarize in Table 1 and Figure 1. Peak activity of immature mole crickets on pasture began with the early heavy summer rains and continued between June and September, but the adults which are most susceptible to the mole crickets nematodes, were most abundant in October and November and the spring. Overwintering adults showed very little activity on pasture. We also tested the efficacy of Prozap (Sevin) bait in 1998 and 1999 for the control of mole crickets in Polk county but found it not to be cost-effective in the long term.

Mole cricket nematodes have not been commercially available since 1997. Three things happened in 1999 that advanced the course to re-establish commercial production of *Steinernema scapterisci* for mole cricket control in Florida: 1) Coming on board of Dean Bill Brown and Norm Leppla as the IPM coordinator, 2) Agreement by the Office of Technology and Licensing of the University of Florida to negotiate minimal advance payments and royalties based on sales for the licensed use of this nematode and 3) Formation of partnerships among the research, technology and clientele groups - State Mole Cricket Task Force.

Research: (To determine if mole cricket nematodes are effective at reduced rates of strip-application)

Early in 2000, the Mole Cricket Task Force arranged for the importation of 8 billion Ss nematodes form the remnants of the defunct Australian company with a First Florida Initiative grant. In March and September, 2000, the Aussie nematodes were received and applied to bahiagrass pasture in strips to cover 1/8, 1/4,and ½ of 1-acre plots vs. a zero control treatment. The standard application rate of nematodes for complete field coverage was approximately one billion/A. The March 2000 nematode application coincided with a record-

breaking drought and failed to establish. Preliminary data obtained in spring 2000 from the September 2000 nematode application is shown in Table 2. Nematode infection level in captured mole crickets was 80% or higher at ½ area strip application, 60% at the 1/4 rate, 50% at the 1/8 rate and even 33% at 0 rate. The early conclusion from that experiment was that nematodes have been spread by infected mole crickets throughout the 24-acre site where the experiment was conducted in less than a year. Mole cricket population density is on a gradual decline since nematodes were applied in 2000 (Figure 2). Pasture has shown only slight recovery because of weed invasion in damaged areas. These results showed that the rate of 1 billion nematodes/A used on golf courses at $200/A can be drastically reduced to about $30/A using strip application on pasture.

Research/Demonstration:(Evaluate the 1/8 and 1/4 rate of strip application over extended area)

In June 2000, the University of Florida re-issued an exclusive licence to produce nematodes to MicroBio to produce and sell the nematode. The company received foundation stock of both nematode and bacteria from UFs Entomology and Nematology Department in June 2000 and spent the greater half of that year on the company's internal production research and development regarding suitable fermenters to use, storage, packaging, quality control and marketing outlays. Additionally, 16 billion nematodes from their first batch of production were donated to the Mole Cricket Task Force for trials on bahiagrass pasture with additional donations going to golf courses and parks. The pasture consignment was injected on bahiagrass pastures at 1/8 and 1/4 area-strips over 92 acres in Hardee, Desoto, Pasco and Polk counties in spring 2001 (Table 3) to test the efficacy of the first product. Early results in May and June 2001 indicated that between 30 and 50% of captured mole crickets were infected with nematode across both treatments. Further assessments are planned for this fall when the new generation of mole crickets mature.

Demonstration: (Area-wide demonstration that the mole cricket nematode works on pasture at reduced rate of strip application)

The most recent development is a state legislature budget allocation of $300,000 to the University of Florida through FDACS-DPI for a Mole Cricket State Program. Most of that money understandably is going to nematode testing on pasture since the Florida Cattlemen's Association played a key role in its solicitation. In fall 2002, 12 billion nematodes will be purchased at a significantly reduced cost ($40 per billion) from MicroBio's new production facility and distributed (1/8 area coverage) to 12 additional sites as outlined in Table 4. County extension faculty will schedule separate workshops to coincide with field application of nematodes. We expect to extend the demonstration phase of the program to include more counties in spring 2002 as more nematodes become available on the market.

Summary

1. **MicroBio, a division of Becker Underwood, is our new mole cricket nematode producer.**
2. **Their product named Nematac S will be marketed next spring.**
3. **Product has a short shelf life (2-3 months even under refrigeration). Therefore, orders placed through selected local vendors will be shipped directly from Becker Underwood to customers for field application.**
4. **Application rigs will be calibrated at 1 billion nematodes per acre but actual injection will be done in strips to cover 1/4 to 1/8 the area of treated pasture.**
5. **Timing and method of application are critical issues: adequate soil moisture, injection in the top 1 inch of soil, and abundance of adult mole crickets are essential.**
6. **Classical biological control is a slow process since it takes several years for the agent to become permanently established.**

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Table 1. The effect of bahiagrass pasture site on 3-yr mean weekly pest mole crickets captured/trap and corresponding pasture damage.

			Damage estimate		
County	Ranch	Mole cricket count/trap	Green	Yellow	Dead/weeds
		No.	--------------- % cover ---------------		
Polk	A. D. Combee	10.1	45	4	51
Polk	George Clark	12.4	50	12	38
Manatee	Harlee Farm	11.2	28	10	62
Pasco	Mary Nutts	11.0	51	37	12
Hardee	RCREC-71A[1]	0.7	98	1.5	0.5
Hardee	RCREC-87[1]	1.7	85	5	10
Desoto	Steven Houk	1.6	97	2	1.0
	LSD *P* = 0.05	5.7	12	8	10

[1] Range Cattle Research and Education Center, pastures 71A and 87.

Table 2. Percentage of trapped mole crickets infected with Ss nematodes on 4/21/01 and 5/18/01 following nematode application on 9/27/00 at A. D. Combee Ranch, Polk County.

	-------------------- 4/21/01-------------------

Strip treatment	# trapped mole crickets	# mole crickets infected with Ss nematodes	% infection
1/2 area coverage	21	18	86
1/4 area coverage	19	16	84
1/8 area coverage	20	12	60
0 coverage	17	7	41
	-------------------- 5/18/01-------------------		
Strip treatment	# trapped mole crickets	# mole crickets infected with Ss nematodes	% infection
1/2 area coverage	5	4	80
1/4 area coverage	7	3	43
1/8 area coverage	4	2	50
0 coverage	6	2	33

Table 3. Research/Demonstration Sites treated between March and May 2001

In March-May 2001, 16 billion nematodes were donated by MicroBio and applied in strips that covered 0, 1/8 and 1/4 of the treated areas. Treatments were applied on a total of 92 acres. Each bahiagrass plot was 4 acres in size and there were mostly two replicates. The distribution of ranches, counties, acreage, treatments, replicates and application dates were as follows:

Ranch	County	Acreage	Treatments	Replicates	Date
Helen Keller	Hardee	16	1/8 & 1/4	2	3/8/01
Peace River	Hardee	16	1/8 & 1/4	2	4/19/01
Luther Bryan	Hardee	16	1/8 & 1/4	2	5/29/01
William Wise	Desoto	16	1/8 & 1/4	2	3/15/01
AlBar	Pasco	8	1/8	2	3/29/01
Mary Nutts	Pasco	4	1/4	1	3/29/01

Hughes Combee	Polk	16	1/8 & 1/4	2	5/23/01

Table 4. Demonstration Sites to be treated from September to October, 2001

Ranch	County	Acreage	Treatments	Replicates
E & E Cattle, Hooker Browning	Desoto	8 + 4	1/8 & 0	1
Turner Cattle Co., Phil Turner	Desoto	8 + 4	1/8 & 0	1
Bill Keating	Hardee	8 + 4	1/8 & 0	1
John Smoak	Highlands	8 + 4	1/8 & 0	1
John Payne	Highlands	8 + 4	1/8 & 0	1
To Be Determined	Hillsborough	8 + 4	1/8 & 0	1
Marvin Taylor	Manatee	8 + 4	1/8 & 0	1
Tom Kibler	Manatee	8 + 4	1/8 & 0	1
Yates Ranch	Orange	8 + 4	1/8 & 0	1
Barbara Ranch	Orange	8 + 4	1/8 & 0	1
Deseret Cattle & Citrus	Osceola	8 + 4	1/8 & 0	1
Enclote River Ranch, J.B. Starkey	Pasco	8 + 4	1/8 & 0	1

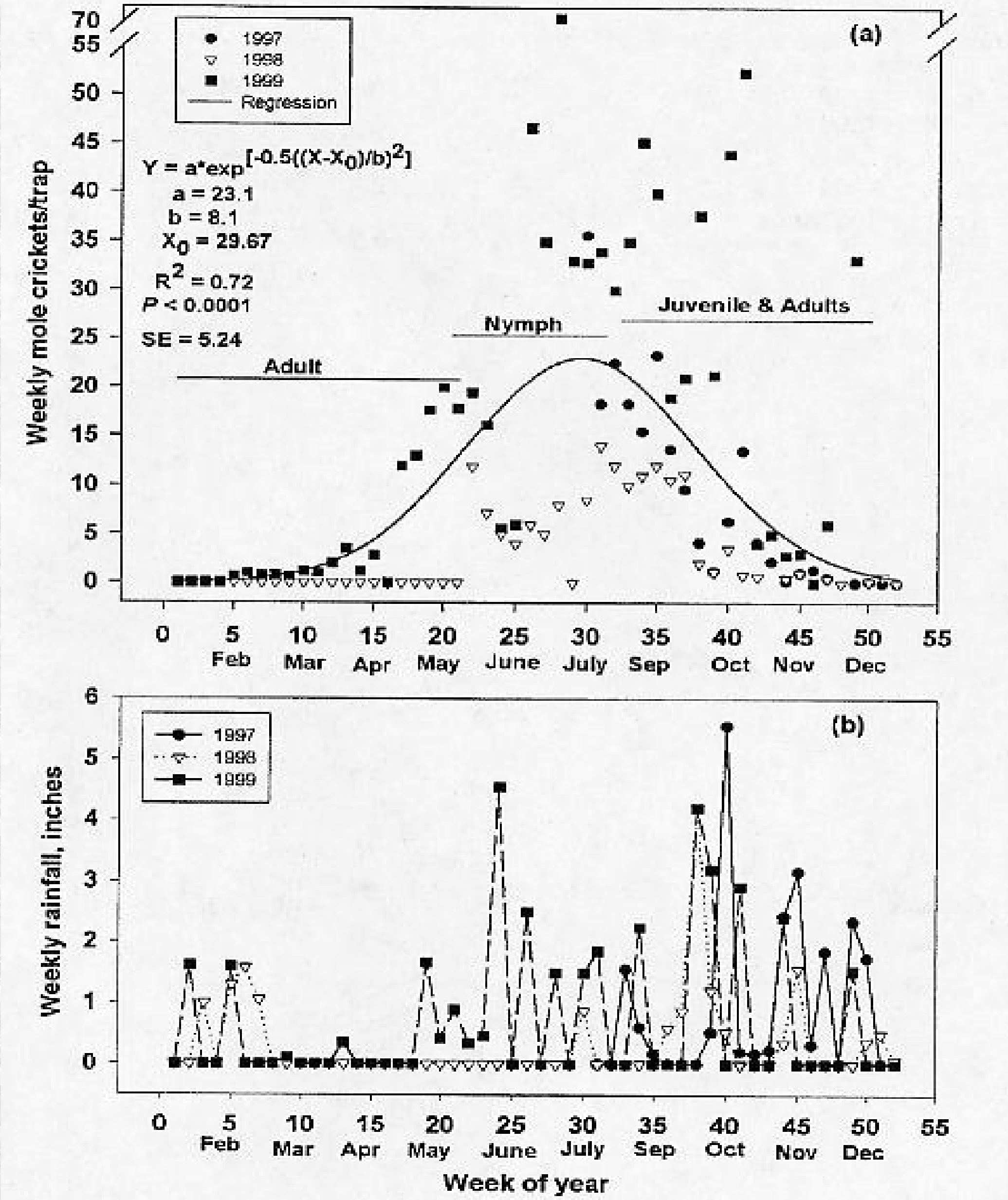

Figure 1.Seasonal changes in numbers of mean weekly trapped immature mole crickets on bahiagrass pasture in south-central Florida (a) and associated weekly rainfall distribution.

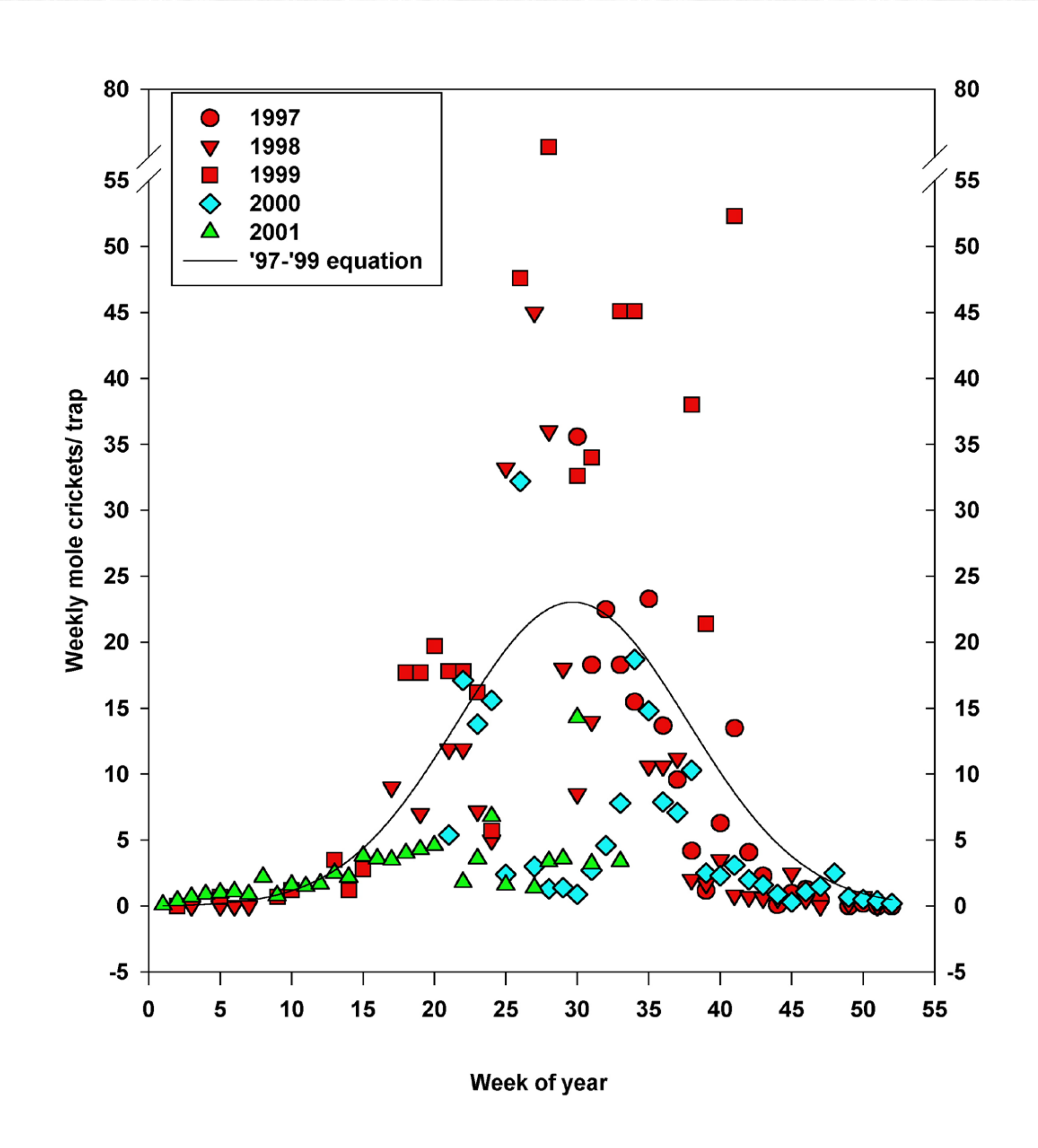

Figure 2.Relative abundance of immature mole crickets before (red symbols) and after (blue & green symbols) the strip application of Ss nematodes to mole cricket-infested bahiagrass pasture in south-central Florida.

ALTERNATIVE CATTLE MARKETING STRUCTURES AND THEIR FINANCIAL IMPLICATIONS

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Over the past few years, new marketing schemes have become available to cattlemen. Most notable are the different beef alliances and retained-ownership programs. Each of the programs is designed around capturing additional value for the cattleman from his/her cattle. More recently, there have been companies attempting to

contract production of cattle in a sense more similar to the hog or poultry contract production models. What I will present to you is an overview of the basic differences between these different marketing schemes and what they could mean for Florida cattle producers.

In order to better understand the differences, some terminology definitions will be necessary. You may have heard of vertical integration or even vertical coordination. Both of these terms have been used with the hog industry's recent developments while the poultry industry has been associated entirely with vertical integration. Both terms refer to the structure by which transactions occur between stages of production. A traditional, open market generally has no vertical coordination. Items are sold to whomever will purchase them at the going rate. In the open market, one individual controls only one stage of production e.g. cow-calf operation. *Vertical integration* **is at the other end of the spectrum where one firm controls all stages of production of an item. In the cattle industry, the integrator would control cow-calf, backgrounding, finishing, slaughter, and even potentially retail sale of the final product.** *Vertical coordination* **covers both ends of the spectrum and thereby is a much more encompassing concept. It can occur at many levels. Forward contracts are a form of vertical coordination. In some way, there is a link made between two or more stages of production that goes beyond the open market.**

What are the advantages of vertical coordination? There are several reasons why vertical coordination is being used in today's economy. There is the certainty of a market. A producer involved in vertical coordination knows who his client is going to be. Risk allocation can be more efficient in a vertically coordinated market. I'll delve into this a bit more later. There are potentials for increased returns for the coordinator. Communication between stages of production can be more efficient. Through the more efficient communication, the incentives of producers can be better aligned with the desires of the consumer.

What about risk? Think of a stock portfolio. It is not likely that you would have the same portfolio as your neighbor. Why? Risk preferences are different from individual to individual. Risk simply is the variability associated with income. In general, there is an upside and a downside to every investment or business opportunity. If a venture is more variable and hence more risky, it should have a higher expected return when compared to a less risky venture.

What vertical integration did for poultry producers in the 1970's and '80's was take away a large portion of the market risk to which they were subject. The contracts ensured they would have a market for their product. However, they gave up ownership of the animals, potentially higher returns in good years, and lower returns in not-so-good years. As a result, poultry producers' incomes have stabilized. In the hog industry, a similar result occurred although in a slightly different manner. Ultimately, the production and price risk was shifted to the packers who could better absorb the risk.

Vertical integration is not without its drawbacks. First off, the integrator must find a way to make sure that the producers are acting in the integrator's best interest. Thus, there is a need for monitoring. In addition, there are other costs associated with contracting that make it difficult to contract with many small operations. This is why we have seen the large consolidations in the poultry and pork industries. It is inefficient for integrators to contract with many small producers when they can accomplish the same goal with a few larger producers.

So, where do the cattle alliances fit into the picture? These are a form of vertical coordination. In many cases, they are similar to a cooperative. However, while the poultry model is a top-down model where packers own the animals and contract with producers to feed animals, the alliance is more of a bottom-up model. In most cases, a facilitator, the cooperative or licensing organization, organizes the marketing of cattle for a group of producers. The goal is to obtain additional production value for the producer. Most of the added value is accomplished through pricing grids. These grids are in most cases based on quality grades, yield grades, or both. From our discussion earlier on risk, we know that we would expect the higher returns then to come with higher risk or variability of returns. So, what is the reality of the alliance?

First of all, there are several different types of alliances, but they can be broken down into three basic groups: closed cooperatives, specialty product corporations and cooperatives, and branded product licensing organizations or cooperatives. The closed cooperative is producer owned. To participate, a producer must have

either purchased or leased stock in the cooperative. The stock comes with certain rights and obligations. The perk to ownership in the closed cooperative is that premiums are paid for cattle that grade well. The specialty product corporation or cooperative generally sets a strict set of guidelines on how cattle are to be bred, fed, vaccinated, and finished out. Cattle meeting those guidelines are guaranteed a market and receive premiums based on the pricing grid. The branded product alliance works mostly on a name. The organization or cooperative licensing the branding of the cattle works to establish a recognition for the brand and creates an associated level of quality for which consumers are willing to pay a premium. The result is that well performing cattle meeting the licensing standards get premiums above the market. In most cases across these alliances, cow-calf producers can and do retain ownership of the cattle up to the point of slaughter. However, it is not a necessity. The longer the cattle are owned however, the greater the potential returns, and correspondingly, the greater the exposure to downside or upside risks.

It is clear that in the case of the Corn-belt producer, there are gains to be made, and the risks are greater. However, the pricing grids tend to be favorable to high quality grading cattle. So, what about the potentials for the Florida cattle producer? It is important to understand the pricing grids and match the grids to your cattle. If the cattle do not grade favorably, the likelihood exists that the alliance would end up providing lower returns when compared to the open market. Yield grading grids could be more favorable to cattle that are leaner and produce less prime and choice grade meat.

Since alliances are new, we know relatively little about their true impact. However, researchers have tools to allow them to simulate the business cycle of different enterprises. Such research has found that the significant impact of alliances is in the ability to obtain financing. This research has found potential significant improvement in the financial ratios of Corn-belt producers participating in alliances. By improving the financial ratios, a producer has the ability to obtain better financing and potentially increase returns through expansion. This result is significant given the increased variability of the returns due to the pricing grids. What is notable is that the returns have increased significantly as to allow for a lower probability of low to negative returns.

Vertical integration offers the potential for reduced risk. The expected returns will in turn be less than the open market scenario. However, ownership of the cattle is not with the producer. In the vertical integration contract, the producer is only a facilitator in the production of beef.

In general, a producer must determine what his/her objectives are in determining whether to participate in an alliance. Potential gains exist, but there is a price. What remains untested is the potential for reduction in risk though intensive genetic management. The alliances allow producers to obtain performance data on carcasses and track the genetics of the cattle in ways that have not been available in the past. The result is a new set of information which can allow the producer the potential opportunity to increase returns and reduce risk. However, it should be understood that more intensive management will come at additional costs. At this early stage in the adoption process, it is unclear what might be the actual impact of genetic management and its added value to the risk-return relationship.

Overall, alliances provide potential for producers to increase returns. However, the decision to join an alliance must be carefully planned. Joining an alliance that is not well suited to the composition and performance of the herd could result in lower returns and a very dissatisfied producer. Additionally, producers must be willing to undertake more intensive genetic management practices and understand the financial implications of the program of choice.

Beef Industry Alliances*

American Salers Angus America	Gelbvieh Alliance Hi Pro Producers Edge

Angus GeneNet
Beef Charolais
Beef Works
Cenex Land O'Lakes
Certified Angus Beef
Certified Hereford Beef
Coleman Natural
Decatur Beef
Farmland Supreme
Laura's Lean Beef
Lean Limousin
Maverick Ranch
MFA Alliance Advantage
Michigan Beef Alliance
Monfort Integrated Genetics
Moorman's Value Trac
Nebraska Corn Fed Beef
Oregon Country Beef
Precision Beef Alliance
Premium Gold Angus Beef
Red Angus Feeder Calf Certification
U.S. Premium Beef
Western Beef Alliance

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* This list should not be considered comprehensive by any means.

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THE USE OF COMBINED LIMPOGRASS / BAHIAGRASS GRAZING

IN SOUTH FLORIDA

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First extensively evaluated in 1974, 'Floralta' limpograss is the most widely utilized of the available limpograss varieties in south Florida. This tropical grass originates from the Limpopo River in the Republic of South Africa. Floralta is a stoloniferous perennial tropical grass that was specifically selected for persistence under grazing conditions. Common to the limpograsses, Floralta produces very little seed and is therefore established vegetatively.

The need to identify forages that will provide adequate dry matter yield in the winter months is of major importance to south Florida cattlemen. A 1998 survey of south Florida cattlemen revealed that 79% of beef operations did feed stored forage in the winter months (1998 Survey of Beef and Forage Practices - South Florida Beef-Forage Program). Floralta has superior winter yield compared to other warm season perennial grasses. In south Florida, limpograss can be expected to produce as much as 30 to 40 % of its annual growth in the winter months. One distinct characteristic of Floralta is the ability to maintain appreciable levels of TDN at later stages of maturity. As shown in Table 1, limpograss maintains nearly 59 % TDN, even after 10 weeks of regrowth. Compared to bahiagrass, Floralta limpograss provides appreciable dry-matter yield and is highly palatable. Floralta holds considerable potential as a fall/winter stockpiled pasture forage for south Florida cattlemen.

Table 1. Effects of maturity on forage quality of bahiagrass and limpograss [a].

	Bahiagrass[b]		Limpograss[c]	
Regrowth, wk	**TDN, %[d]**	**CP, %[d]**	**TDN, %[d]**	**CP, %[d]**
4	59.5	10.3	60.4	9.6
6	58.2	8.6	59.9	10.2
8	54.6	6.8	59.3	5.0
10	54.6	7.0	58.7	4.5
Decrease, %	*8.2*	*32.0*	*2.8*	*53.1*

[a] Data taken from Chambliss et al., 1999.

[b] Bahiagrass grown during the summer.

[c] Limpograss grown during the fall.

[d] Total digestible nutrients (TDN) or crude protein (CP) expressed as a percent of dry matter.

A 1981 grazing study, conducted at Gainesville by Dr. Quesenberry, compared the carrying capacity of Floralta versus Pensacola bahiagrass. In this study, bahiagrass supported 1.20 animals per acre versus 1.63 animals per

acre for Floralta. Additionally, the Floralta paddocks were ready to graze 6 weeks earlier, while continuing to produce forage 4 weeks longer than bahiagrass. Even though ADG was similar for animals grazing both forages, the increased carrying capacity combined with the extended grazing season resulted in nearly a two-fold increase in total gain per acre for the Floralta paddocks.

Dr. Sollenberger (University of Florida - IFAS) completed two studies comparing animal performance and pasture carrying capacity in steers grazing Floralta limpograss versus Pensacola bahiagrass. In the first study, steers were stocked continuously and grazed to achieve a targeted stubble height of 6 and 12 inches for bahiagrass and limpograss, respectively. In this study, no differences in animal ADG were noted. In the second study, steers were rotationally grazed to achieve a targeted stubble height of 3 and 9 inches for bahiagrass and limpograss, respectively. Although ADG was not different between grasses, limpograss pastures supported a higher stocking rate. From these results, the authors concluded that limpograss pastures might carry more animals and therefore produce greater gains per acre compared to bahiagrass.

These initial results suggest that limpograss yield is the contributing factor in its potential application to south Florida grazing systems. The longer growing season in south Florida, compared to Gainesville (central Florida) should support improved Floralta dry matter yield over a longer period of time. Although forage yield is attractive, animal performance may be limited by the low crude protein content commonly associated with limpograss. In many instances, crude protein concentration of limpograss may be less than 6 %. A two-year study conducted in Gainesville, revealed that steers grazing summer Floralta pastures responded to supplemental protein. In this study, steers were rotationally grazed over an 82-d summer grazing period. Treatments consisted of 1) no supplemental protein (NP), 2) a 21% crude protein supplement (LO), or 3) a 50% crude protein supplement (HI). Supplements were delivered in a corn-urea mixture and were formulated to provide a total dietary crude protein concentration of 9 and 12% for LO and HI, respectively. When compared to steers receiving no supplemental crude protein, supplemented steers experienced an 80 and 100% increase in seasonal ADG when consuming LO and HI protein treatments, respectively.

To investigate the effect of supplemental protein on animals grazing Floralta pastures in south Florida, Dr. Bill Brown (University of Florida - IFAS) completed a series of studies at the Range Cattle Research and Education Center using growing heifers. His initial results suggest that heifers, rotationally grazing Floralta pastures, respond to protein supplementation only following a killing frost (Table 2). These results suggest that both Floralta yield and nutritive quality is likely different when grown in south Florida versus Central or North Florida. As well, to date there have been no reported studies on investigating the ability of stockpiled limpograss to support lactating cows during the winter months. Therefore, we have begun a multi-year investigation to study the effect of combined limpograss and bahiagrass grazing versus bahiagrass alone, with winter hay feeding, on measures of cow and calf productivity.

Table 2. The effect of timing of protein offer and protein source on the performance of heifers rotationally grazing winter Floralta limpograss pastures [a].

Year	**Supplement[b]**	**Oct. 1 to 1st Frost**	**ADG, lb/d Frost to May 1**	**Oct. 1 to May 1**
1	Urea	1.06	0.90	0.89
	Urea - FM	1.04	1.40	1.11
	P =	*0.92*	*0.006*	*0.10*
2	Urea	0.63	1.17	0.89
	Urea - FM	0.75	1.39	1.05

	P =	*0.47*	*0.01*	*0.01*
[a] Heifers (n=6) were rotationally grazed on five 1.25-acre paddocks using 1 week of grazing followed by 4 weeks of rest.				
[b]Molasses based liquid supplements offered at 6 lb/hd/d. Urea treatments consisted of 93% molasses + 7% urea. Urea-FM treatments consisted of 83% molasses, 2% urea, and 15% feather meal.				

Sixty acres of limpograss were established in the summer of 1999. These pastures will be used in a combined bahiagrass / limpograss rotational grazing strategy. Each animal unit assigned to this treatment (2 replicates, n=40 / replicate) will be offered 0.75 A of limpograss and 1.50 A of bahiagrass in a modified rotational grazing system. Each replicate contains 6, 5-A limpograss pastures and 6, 10-A bahiagrass pastures. Cows assigned to bahiagrass alone (Control, 2 replicates, n=40 / replicate) will be offered 1.80 A of bahiagrass in a 6-pasture rotational.

All pastures will be spring fertilized with 60 lb N/A using a complete N, P, and K fertilizer source. Limpograss pastures will receive a fall application of fertilizer (60 lb N/A). During September, October, and November, cows assigned to the combination grass treatment will be grazed primarily on bahiagrass alone allowing the limpograss to stockpile for winter utilization.

Results of Year 1

Cows grazing winter limpograss pastures were provided with no winter hay compared to 1235 lb / head, provided to each cow in bahiagrass control pastures. Stored forage was offered for a period of 77 d, which ended in April, 2001. Change in cow body weight and body condition and sex-adjusted calf weight was similar for both treatments (Table 3).

These initial data were collected on the driest year on record (59 years) at the Range Cattle REC, Ona. Initially, it appears that grazing strategies that incorporate stockpiled limpograss could be economically effective for fall calving beef cattle in south Florida. Continued data collection will occur over the next three production cycles. During this time a comprehensive evaluation of the program's economics will be considered. As well, attempts to better utilize the summer limpograss growth will be investigated. Even though limpograss has appreciable winter yield, the majority of growth occurs during the summer rainy season. This year, cows assigned to the limpograss/bahiagrass treatment spent much of June and August exclusively grazing limpograss. Limpograss may limit calf growth compared to bahiagrass, as calves on the limpograss treatment gained 16 less than those grazing bahiagrass (April 24 to Aug. 1).

Table 3. Effect of pasture management system on cow and calf performance - Winter 2000-2001[1].

	Sept., 2000		**April, 2001**		**Change**		**April Calf Wt., lb**
Pasture[2]	**Wt., lb**	**BCS[3]**	**Wt., lb**	**BCS[3]**	**Wt., lb**	**BCS[3]**	**(sex-adjusted)**
Limpograss/ Bahiagrass	1134	5.6	1032	4.8	-102	-0.8	335
Bahiagrass + winter hay	1093	5.6	1014	4.9	-78	-0.7	325
[1] Cows assigned to limpograss / bahiagrass combination were offered grass hay supplementation during							

winter months. All cows were supplemented with molasses (16% CP) at a rate of 5 lb/hd/d during winter months.
[2] Limpograss / bahiagrass combination provided .75 A of limpograss (6, 5-A pastures) and 1.50 A (6, 10-A pastures) of bahiagrass per cow. Bahiagrass treatment provided 1.80 A of bahiagrass (6, 12-A pastures) per cow.
[3] All cows were scored on a 9-point scale (1=emaciated and 9=obese). A final score was obtained from the average of two common technicians.

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