INTELLIGENT DESIGN FOR GRAZING BEEF CATTLE IN SOUTH FLORIDA

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ABSTRACT: This presentation takes the audience through the process of developing a criteria designed Cow-Calf operation in South Florida. The criteria used in the development process are listed below.

1. The operation must be environmentally friendly.
2. It must conform to the land.
3. It must require minimum labor.
4. It must be run as a "low cost producer"
5. Finally and most importantly it must provide a safe, low stress, and healthy environment for the animals.

The process starts with evaluating the land to be used and a complete listing of the soils and plants already on the property. The next step is to decide what stocking rates can be supported in the as-is condition. This gives a basis for evaluation of the alternative strategies used to achieve the overall design optimization. The process continues with the evaluation of the various strategies to be used and the decision process used to achieve maximum potential of the operation while meeting the design criteria.

Intelligent Design

This paper outlines how to incorporate Intelligent Design in the development of a cow-calf operation in South Florida. The concept of Intelligent Design refers to the development of a process to evaluate alternatives to meet certain design criteria. In our case it was how to develop a 1300 acre parcel of land in St. Lucie County, FL into a cow-calf operation that met the following criteria:

- The operation must be environmentally friendly
- It must conform to the land
- It must require minimum labor
- It must be run as a "low cost producer
- Finally and most importantly it must provide a safe, low stress, and healthy environment for the animals
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Following is the step by step process we used to optimize the design to fit the criteria.

Starting Point

The process starts with evaluating the land to be used and a complete listing of the soils and plants already on the property. This is an important step because it allows us to know what is currently there and what plant material is going to thrive in that natural environment. You will also record water sources and existing fencing. We also made a best guess as to the cow-calf stocking rates per acre on the property. You will need this to evaluate the income potential of the property and to properly evaluate any changes you may wish to make.

Property Before Any Changes:

The land was cleared in the 1940's for use as a tomato farm. The property contains hammocks with oak,

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pine and cabbage trees, wetlands and improved and semi improved pastures with Bahia grass and native grasses. The property is relatively flat with drainage coming from N to S with a 9" drop per mile from N to S. Drainage and artesian wells were put in by the farmers as well as tomato rows. The drainage system was designed to use artesian wells to flood the rows and to allow drainage in the wet months (June-October). Other than perimeter fencing there is only one interior fence in poor repair. There are no structures on the property. As the property exists the stocking rates for a cow-calf pair is between 6-7 acres per pair. That rate will include limited protein supplementation in the winter. That would mean a herd of 200 cows.

Areas to look for Change

- Forage Selection
- Breed Selection
- Pasture Design and Management
- Water Management
- Fencing
- Working Pen Design
- Invasive Species Management

Forage Selection

Any selection process for forage has to start with what we cannot control – weather. Our weather in South Florida has some nice annual averages with hostile extremes from drought to hurricanes. You must be able to work within the averages and manage the extremes.

Table 1. Dry Season Weather

	Nov	Dec	Jan	Feb	Mar	Apr
High	80	75	74	75	78	81
Low	64	58	55	55	60	64
Rain	4.23	2.78	3.02	3.37	4.06	2.96

Table 2. Wet Season Weather

	May	Jun	Jul	Aug	Sept	Oct
High	85	88	90	90	88	85
Low	69	73	74	75	74	70
Rain	5.3	6.82	6.33	6.41	8.09	6.29

The averages of 82.4 degree highs and 66 degree lows with an annual rainfall of 60 inches look ideal for most forages. Unfortunately drought conditions during the dry season and hurricanes and tropical storms that can dump 6 – 12 inches of rain in a 24 hour period on flat land can create severe problems. It can take 14-21 days to get that water to a level the grass can survive.

What this is telling us is that we should begin our forage search with a good evaluation of what is already growing there. Fortunately for us, the forages include native grasses and plants growing in the wooded areas and bahia grasses that were planted after the tomato farmers abandoned the area. A complete inventory is shown in Table 3.

Table 3. Plants and Grasses

GRASSES	**WOODIES**	**FORBS / GRASSLIKE**
Carpetgrass	Wax Myrtle	Wrights Nut Sedge
Broomsedge Bluestem	St. Johns Wort	Juncis Sp.
Yelloweyed Grass	Slash Pine	Annual Goldenrod
Wire Grass	Brazilian Pepper	Tropical Soda Apple
Little Blue Maidencane	Cabbage Palm	Matchstick
Maidencane	Carolina Willow	Penny Wort
Smutgrass	Palmetto	Thistle
Torpedo Grass	Live Oak	
Dropseed	Water Oak	
Bahiagrass		

Yellow indicates invasive species

With the exception of Smutgrass all of the grasses are suitable for grazing. During periods of dry conditions and low forage the cows will graze the WOODIES with the exception of Wax Myrtle, Slash Pine and Brazilian Pepper. Looking at the grass population we see the predominate grass is bahiagrass covering about 50% of the acreage. Bahiagrass (*Paspalum notatum* Flugge.), a warm-season perennial, is grown throughout Florida. In southern Florida, growth of bahiagrass pastures slows in October, and many pastures have very little forage after mid-December until the grass starts growing again in early March. This is due primarily to the shorter days and cooler night temperatures. Growth slows significantly when the night temperatures fall below 60 degrees. The grass has a long root structure (up to 7 feet) that allows it to access both water and minerals from the soil in our area. This is very important because it negates the need for fertilizer and gives good dry season survivability. The bahiagrass will continue to grow until it encounters frost or freeze conditions that cause it to go dormant. The grass recovers quickly after the cold season passes and will start to grow rapidly after the soil moisture increases in the wet season. Bahia can be overplanted with Rye grass to supplement winter grazing. With an understanding of the plant inventory we made the decision to leave the grasses as they were and concentrate on managing the forage. We also made the decision to not clear any more land for pasture. There are oaks, pines and palms that provide both shade and shelter for the cows throughout the ranch. These are

essential to animal health during severe weather events and summer high heat and humidity conditions. All of these areas contain native grasses and plants that make the potential loss of grazing acres only about 40% of the wooded acres. They also provide shelter and food for other wild animals that are residents.

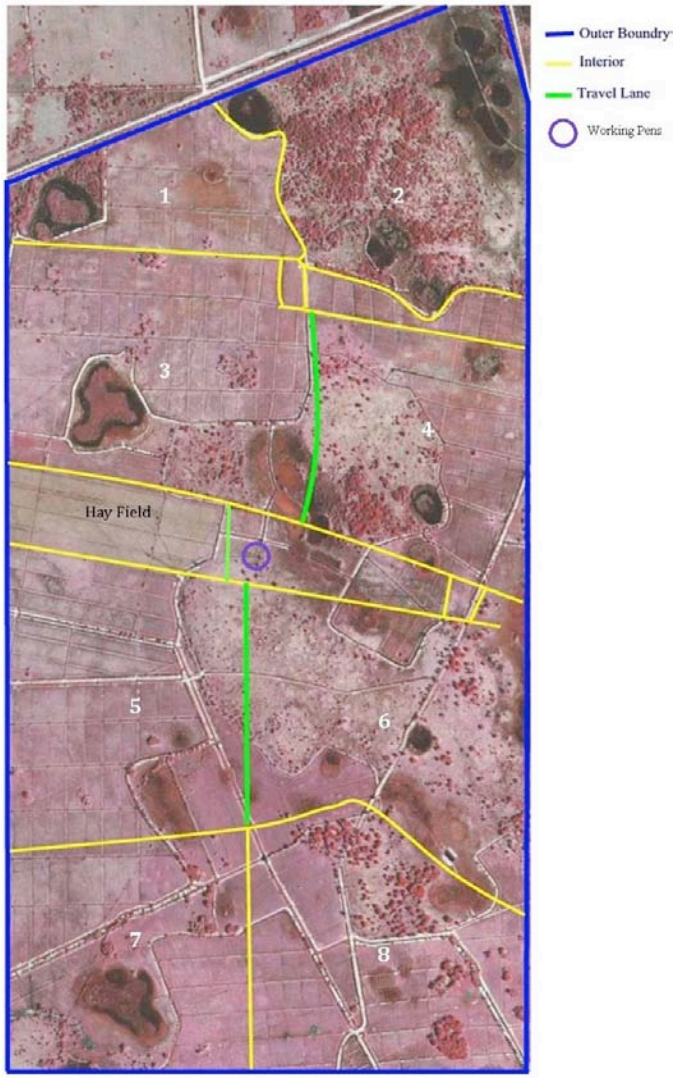
Breed Selection

There are two things that influence the breed selection in South Florida. The first is weather. The high temperatures and humidity of the summer months require heat tolerant cattle. For that reason we must have some Brahman influence in our breeding stock. The second area in breed selection is the market itself. What characteristics are providing the highest prices to the cow-calf operation? It is clear that the driving forces in the market are perceived quality and consistent carcass scoring. The genetics of choice are primarily Angus influence. That in itself is a problem for us. Black hide cattle do not thrive in our heat and humidity without some crossbreeding. The cross that works best for us is ¼ to 3/8 Brahman and ¾ to 5/8 Angus or Hereford. This will produce a black or red hide with good heat tolerance.

We must also consider the genetics as it relates to cow size. The optimum cow size for us is between 850 and 950 pounds. Our goal of having cattle able to thrive in our environment is greatly influenced by cow size. Not only does this size cow allow for higher stocking rates but we also do not see the reduction in BCS numbers that you will see in 1200 pound cows during the winter. Calving percentages and weaned weights were almost identical for the two sizes so it made no sense to go with the heavier weight cows. Bull selection allows us to stay within the range. Our heifer selection process also helps us control within these limits. We raise our own replacement heifers so we have better control over the genetics and have cows that have grazing habits that are conducive to the pastures they are grazing. This also gives us the opportunity to make behavioral changes in grazing habits that can be continued generationally.

Pasture Design and Management

Once we have selected both the forage and breed we consider alternatives that maximize the potential of the available grazing and at the same time consider those things that will reduce costs. Some form of rotational grazing would give the most benefit. In order to do that in a way that requires little labor input it is critical for each grazing area to be self sustaining with adequate forage, water and shelter. Additionally, care must be taken to protect sensitive environmental areas such as wetlands. On the practical side our design must include methodology for moving cattle from pastures to working pens and back to pastures with minimal labor. With this in mind we set about designing fencing to support a rotational grazing system and movement system. Each pasture had to be self sufficient. The period of time a particular pasture is grazed varies according to the growth rate of the forage. What we attempted to do was to arrive at a system where grazing was rotational and not intensive. The reason we chose to avoid intensive grazing was the labor requirement and the need to provide water and shelter for the cows. We arrived at a compromise that is a relatively low cost solution.



This is the final compromise design.

- Pasture 1 is primarily bahiagrass and uses an artesian well to supply water. It also contains a wetland with surrounding oaks and pines for shelter.

- Pasture 2 is used primarily for winter grazing and contains oak, pine and palm trees for shelter. The area directly south is a 45 acre bahiagrass pasture that is used in conjunction with pasture 2 for

winter grazing. Cows are fenced out of the northern area until the first heavy frost occurs and wetland plants are dormant. Water is provided by a drainage ditch and pond.

- Pasture 3 is a combination of bahiagrass and native grasses. Shelter is provided by oak and palm hammocks. Water is provided by drainage ditches and a pond.

- Pasture 4 is a combination of bahiagrass and native grasses. Shelter is provided by oak and palm hammocks. Water is provided by drainage ditches and a pond. Next is a fenced area south of pasture 3 containing a 40 acre floralta grass hay field. To the right is another fenced area containing the cow pens, several 2 acre fenced handling areas and a 35 acre pasture with bahiagrass, oaks and palms and water from a pond and drainage ditches.

- Pasture 5 is primarily bahiagrass with some other native species. Shelter is provided by oak and palm trees. Water is from drainage ditches and a pond with some overflow from an artesian well located in the hay field.

- Pasture 6 is primarily native grasses with some bahiagrass. Shelter is provided by oak and palm hammocks. Water is provided by drainage ditches and a pond.

- Pasture 7 is 40% bahiagrass with native grasses and wetlands providing the balance. Oaks and Palm hammocks provide shelter. Water is provided by drainage ditches and a pond.

- Pasture 8 is 65% bahiagrass with the balance being wetlands and native grasses. Oaks and Palm hammocks provide shelter. Water is provided by drainage ditches and a pond.

There are 50 foot travel lanes that go from the cow pens to the intersection of Pastures 1-4 and 6-8. Gates at the intersection provide the ability to go from pasture to pasture or from any pasture to the cow pens. There are other gates located in the fencing design to allow for flexibility.

Cow pens are designed to allow for ease of working and minimum labor input. The design came to us from an Australian rancher and allows us to work 250 cows with calves in a day with four people. This includes all vaccinations and neutering of bull calves as well as parasite and fly control. The secret to the design is there are no corners. The cows follow the round working areas and do not hesitate to move ahead since they cannot see any obstacles.

The covered area contains a rounded working chute, squeeze chute with scales and a calf table. Five way parting is available. Our control system is based on the EID tags with supplemental flap tags on all the cows. All records are based on EID identification. This saves a lot of time since you don't have to stop to read flap tags.

This is an overhead of the working pens.

The fencing design required the addition of 8.1 miles of fence and 30 gates as well as the addition of 4 quarter acre ponds and 3 half acre ponds that are excavated to a depth of 12 feet. Under severe drought conditions the water table will drop 5 feet which will leave the drainage ditches dry with sufficient water available in the ponds.

We manage the cow operation with four herds. Two of the herds are mature cattle. The third is a purebred herd and the last is comprised of heifers and first calf cows.

The rotational design gives the heifers and first calf cows the best pastures while the other cows have fairly equal grazing conditions. This gives the younger cows and heifers the additional nutrition they require without having to compete with mature cows.

The numbers in each herd vary but the total remains between 400-450 cows with a 500 cow limit. The limits are defined by the desire to graze 12 months a year with some protein supplementation during winter. This is also complicated by the fact that we manage for calf sales in April and November-December. Approximately half the herd will have calves at their side during winter while the rest will be calving in March-April. It is always a

question of too much grass in the summer and too little in the winter.

Weather patterns for the winter are the determining factor when it comes to maximizing herd size. We may have winters with little or no frost and sufficient rainfall from cold fronts for the grasses to continue to grow slowly during the winter. On the other hand we can have early frost in October followed by occasional freezes and little rainfall. That combination will assure the grasses will go dormant and will not start growing again until May or June depending on rainfall and soil moisture.

We can mitigate this somewhat by the use of bailed hay from our hay field. Normal production for the field is about seven hundred 600 pound round bales. These can either be fed to supplement grazing forage or sold if not required.

Invasive Species Management

We all have a way of evaluating what comes under the classification of pest. Ours is very simple. If the cows will graze it and it presents no health risk then it comes under the heading of forage. In our area most of the plants usually under the pest classification are invasive species. Our invasive species include Smutgrass, Torpedo Grass, Brazilian Pepper, and Tropical Soda Apple (TSA). Torpedo Grass grows only in wet areas that will not support stands of Bahia. It does compete with native plants in the wetlands. We have found that our cows will aggressively graze the torpedo grass during the dry season allowing the native plants to better compete. So in this case selective grazing is complementary to wetland protection. As a result of this grazing behavior we do not consider Torpedo Grass as a pest. Smutgrass can be controlled by mowing. Brazilian Pepper is a very aggressive pest and over time to totally dominate other plants in the area. They can be controlled by mechanical removal and burning and spraying where needed. They are of absolutely no use to the cattle. The last plant on the list is TSA. This plant came to us in the late 1970's or early 80's. It probable came from South America and found an environment where it can flourish without any natural predator. The plant will crowd out any competing vegetation and the cows will not graze it either because it is unpalatable or because of the thorns on the stems. Fortunately for us we were able to be a test site for a biological control for the TSA. The tests were successful and within two years we had achieved a biological balance between the TSA and the beetles used to create the balance. If we get plants growing in areas where we absolutely don't want them they are sprayed, otherwise the TSA and beetle population have achieved an acceptable level of balance.

Getting It Done

Getting from where we were to where we are today was no simple task. I was not born into a ranching family so I had to learn where to go to get good information. My first attempts at lining up the cowboys and asking their opinions yielded answers that were sometimes polar opposites. I soon realized that their opinions were based mostly on their individual experience and their interpretation of what they experienced. Fortunately the State of Florida has ample resources for agricultural clients. It was through the University of Florida and the USDA and NRCS that I was able to get the quality of information and assistance to make the changes necessary. They provided assistance both through consulting and financial assistance through the EQIP program. This led us to the Florida Grazing Lands Coalition (FGLC) which is comprised of producers and assisted by virtually every agricultural, educational and environmental organization in Florida.

Where We Are Today

As with any changes there is still an opportunity for continuous improvement. The changes we have made to date have given us the opportunity to raise our gross revenues by going from a 200 cow operation to a herd of 400-500 cows. Our labor cost was reduced by 50% and all of this was done with an investment of less than $100,000.

All of this was done within our design parameters:

- The operation must be environmentally friendly
- It must conform to the land
- It must require minimum labor
- It must be run as a "low cost producer"
- Finally and most importantly it must provide a safe, low stress, and healthy environment for the animals

What this really shows us is that with a logical approach to evaluating what you have you can change it and make it more efficient and cost effective.

When people ask me what I do I always respond by saying "I am a grass farmer". Without the grass we can't raise cattle.