Strategies for Beef Cattle Winter Feeding in the Southeast

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Introduction

The profitability of beef production is as many other production systems, a function of a balance between inputs and outputs. Outputs can be more easily defined than inputs and can be simplified as pounds of beef sold in one way or another: carcass, replacement heifers, yearlings, weaned calves. However, inputs can be more challenging to define and vary greatly with different production systems. In addition, inputs can be present in forms that make it very complicated to put a dollar value to, such as labor cost (especially when we consider our own time, which is often not accounted for!), fertilizer savings due to grazing, and opportunity cost among others. Questions such as: "Should I sell now or should I background them for a while waiting for better prices?" or "Should I precondition my calves this year?" always carry hidden an opportunity cost that is often left out of the equation when making important decisions in beef production.

In the current scenario of volatility in fuel, grain, and fertilizer prices, it is not surprising that the focus of the beef industry has been turning to the inputs side of the equation. Several strategies have been developed to attempt to mitigate the ever raising costs of production and we may be experiencing a shift in paradigms in the beef industry. The developments of feeding strategies that rely on a more efficient use of forages or the increased use of forage varieties that produce well under drought conditions or under reduced soil fertility is proof of that change in paradigms. Perhaps the more recent signal of concerns regarding increasing input costs is the increased interest in the potential for selecting animals based on their residual feed intake (Koch et al., 1963; Herd et al., 2003 and 2009).

Cattle producers know that feed costs represent a major portion of the total costs in a livestock operation, however the exact proportion of the total costs that feed is responsible for varies with the production system and geographic location. Depending on forage availability and the duration and severity of the winter, the feed cost of maintaining a cow in the herd can range from \$120/year in south Florida to \$290/year in North Dakota (Hughes, 2011). The total operating cost of maintaining a cow in the herd (including labor, fuel, interest, etc.) plus all other direct costs excluding feed is less variable and was an average of \$175/year for 2010 (Hughes, 2011). Considering that figure (\$175/year) as the average for all direct costs minus feed, the annual feed cost of maintaining a cow in the herd can represent 41%–62% of the total costs on a yearly basis, depending on location and other factors. In the finishing segment of the beef industry, the proportion of feed costs to total costs of production is even greater because nutrient-dense diets cost more than the diets used in stockers or cow/calf operations.

In the Southeastern U.S. some advantages exists in terms of climate and forage availability when compared with production schemes in the Midwest or Western U.S. Despite those advantages, feeding a cow through the winter in the Southeast continues to be the most costly event in a cow/calf operation because of the simple reason that production systems in this area rely heavily on tropical and subtropical grasses and forage production of these pastures declines greatly during the winter. A further challenge exists when defining Southeast conditions because differences exist in production systems both between and even within states. A classic example of this is the difference that exists in management of winter feeding between North and South Florida. North Florida beef producers can benefit from a relatively longer duration of cooler winter temperatures that can justify planting annual winter forages such as rye, oats, ryegrass or triticale. In contrast the relatively short duration of the winter in South Florida often leads producers to rely more in stockpiling options due to the increasing cost of planting an acre of annual winter pastures.

The relative abundance of certain byproducts in different regions of the Southeast also plays a role in planning winter feeding strategies. The availability of byproducts from the citrus and sugarcane industry in the south can provide unique pricing opportunities for inclusion in beef cattle diets. The increased use of distillers grains in Central and North Florida or peanut and cotton byproducts in the panhandle of Florida are a result of a relatively abundant supply of those commodities. Regardless of geographic location, a common theme in winter feeding strategies in the Southeast is the use of large quantities of forage reserves in the form of hay, haylage, or stockpiling.

The objective of this paper is to review the options for winter feeding in the southeastern U.S. highlighting the challenges and opportunities that each system provides.

Winter grazing options

Despite the continued increased in fertilizer prices, planting of winter annuals continues to be a very appealing strategy for winter feeding. Perhaps the greatest single factor behind the decision of winter grazing vs. hay feeding (often along with supplement feeding) is labor. Finding qualified labor to work in animal agriculture continues to be one of the top challenges of our industries and as a result, decisions that involve savings in labor and becoming more and more important. Winter grazing can be a great complement of row crops if irrigation is available, and the beneficial effects of rotating cattle with annual crops have been well documented and continue to be researched (Katsvairo et al., 2006). However, while the planting of winter annuals in dryland can represent a significant risk as it leaves any grazing potential at the mercy of the weather, there are options for winter grazing such as triticale and rye that are more drought tolerant than oats or ryegrass. Figure 1 shows the yield of dry matter (DM) of different winter forages grown in dryland conditions.

Because of the initial investment that winter grazing requires, grazing management to maximize pasture production and quality becomes essential. Overgrazing should be avoided by allowing sufficient herbage mass before each grazing event and by removing cattle from the pasture as needed to allow regrowth. Herbage allowance is the amount of forage than a pasture offers at a given time and it is typically measured as lb of forage DM per lb of cattle body weight (BW). Sollenberger and Moore (1997) recommended a minimum herbage allowance of 1 lb of forage DM per lb of BW to avoid limiting animal performance when grazing is the sole feed source. This figure can be used to calculate the necessary stocking rate and to decide when to pull animals from the pasture.

The use of rotational grazing as a means to increase the efficiency of pasture utilization has been extensively documented; however, its benefits have to be weighed against the increased labor needed. The advantage of rotational grazing is that by grazing paddocks with a high stocking density for a short period (can vary from 3 to 28 days) there is less selection and trampling. In addition cattle rotational grazing constantly consume the pasture regrowth which has typically much greater nutrient quality than more lignified portions of the forage.

Stockpiling

Stockpiling can be an alternative to reduce input costs and maximize forage utilization. Forages with desirable characteristics for stockpiling are those in which the rate of quality decline as maturity approaches is slower. Some of the best forages for stockpiling in the Southeast are tall fescue and limpograss, however little fescue is used in Florida beef cattle systems. Limpograss is the stockpiled forage of choice, especially in South Florida because of its excellent productivity and because it contains greater total digestible nutrients (TDN) concentration than other warm-season grasses at late maturity during the fall and winter (Vendramini and

Arthington, 2010). Forage digestibility and crude protein concentrations can be around 48% and 4.8%, respectively, for a limpograss pasture stockpiled to graze in November (Sollenberger et al., 1988). While this may not be sufficient to support high levels of productivity, especially in terms of protein nutrition, those values represent a slight decline from the nutrient content of the limpograss if grazed in July.

Winter grazing vs. hay and supplement: Results of a NFREC study

A constant dilemma that beef producers face every year is whether to plant winter forages or use any other feeding strategy that relies on supplementation of hay or grain byproducts. In order to determine the effects of different winter feeding strategies on beef cattle performance and winter feeding economics, a study was conducted at the North Florida Research and Education Center during November of 2010 and April of 2011.

A total of 48 crossbred heifers (weighing on average 734 ± 34 lb) and 12 dormant bahiagrass pastures (3 acres each) were used in the study and each pasture contained a total of 4 heifers for a total of 4 pastures per treatment. Experimental treatments were:

1. SUP = Heifers received ad libitum access to bahiagrass hay plus a supplement of 50:50 mixture of soybean hulls:corn gluten feed pellets fed 3 times/week at a rate of 1% of their body weight/day

2. T+RG = Heifers continuously grazed a pasture planted with 85 lb/acre of Trical 342 triticale + 15 lb/acre of ryegrass (cv. Diamond R).

3. R+RG = Heifers continuously grazed a pasture planted with 70 lb/acre of FL401 rye + 15 lb/acre of ryegrass (cv. Diamond R).

All winter grazing pastures were planted on November 9 and 10, 2010 directly into a dormant bahiagrass sod using a no-till planter. All winter grazing pastures were fertilized on December 2, 2010 with 50 lb/acre of N (NH_4NO_3) and 20 lb/acre of S and again on January 4, 2011 with 50 lb/acre of N (NH_4NO_3) and 10 lb/acre of S. Cattle started grazing on January 26, 2011 (d 0 of the study) after obtaining an initial shrunk body weight, when pastures reached 8 to 10 inches in height, and the study ended on April 20, 2011 (d 84 of the study). Cattle were individually weighed every 28 days after a minimum of 16 h fast (no feed/pasture or water) and at this time blood samples were taken to be analyzed for blood urea nitrogen (BUN) to provide an idea of the protein nutrition of the heifers.

Cattle average daily weight gain (ADG) was computed both for each 28-day weight interval and cumulative from d 0 to each weight date. Every 28-day, when heifers were weighed forage samples were obtained from each pasture by grass clippings inside and outside of exclusion cages (total of 3 per pasture). All exclusion cages were rotated to different places in the pasture every 28 day after samples were taken. In addition, one hand-pluck sample per pasture was taken in each 28-day period to be analyzed for nutritive value.

For the economic analysis of cost of gain, all variables were considered including cost of supplements, labor cost of feeding, seed, fertilizer, fuel cost of supplement deliveries, hay, etc.

The results of the study are shown in Tables 2 and 3, and Figures 1 and 2.

In terms of cost of gain, triticale + ryegrass showed a significant advantage over the other treatment options, with a total cost of gain of $1.06 per lb of BW gained. This was largely due to the high ADG rates observed with triticale (Table 3 and Fig. 1) when compared with the other treatments. Supplementing heifers with 1% of their BW three times per week with a 50:50 mix of soy hulls and corn gluten feed pellets led to rates of weight gain in the order of 1.2 lb/day. This was not sufficient to dilute the high costs associated with feed purchase and delivery as well as hay feeding costs. Because of the poor weight gains in the heifers grazing rye + ryegrass, this treatment showed the highest total cost of gain ($1.99/lb).

Conclusions

The cost of winter feeding continues to be the largest single cost in a beef cattle operation. Price volatility in grain byproducts, fertilizer and fuel has shifted the paradigm of production to place more emphasis on the inputs costs of an operation. Stockpiling of forages such as limpograss can be an excellent alternative for cattle operations in the southeast, especially in South Florida. Developments in terms of forage varieties have provided cattle producers with more options for winter forages and blends of species to be able to produce enough quality and quantity of forage to support high rates of weight gain. Grazing a blend of triticale and ryegrass was shown to be a promising strategy to reduce the cost of winter feeding.

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Table 1. Yield of forage for different winter annual pastures in Southeastern U.S.

Forage	Forage yield (lb of DM/acre)	Duration of season	Source
Ryegrass (Jumbo)	10,454	120 days	Vendramini and Arthington (2008)
Stargrass	9,469	120 days	Vendramini and Arthington (2008)
Wheat (GA Gore)	4,794	140 days	Glass and Van Santen (2008)
Triticale (Trical 342)	5,752	150 days	Myer et al. (2009)[1]
Rye (Wrens Abruzzi)	6,149	140 days	Glass and Van Santen (2008)
Oat	3,694	150 days	Myer et al. (2009)[2]

[1]Average of plot trials conducted in Georgia, Florida and Alabama.
[2]Replicated small plot trial conducted in North Florida in 2008.

Table 2. Herbage mass accumulation rate and total herbage mass produced during an 84-day winter feeding study conducted at NFREC.

	Treatment herbage mass accumulation rate, lb of DM/acre			Treatment
Day of study[1]	Triticale + ryegrass[2]	Rye + ryegrass[3]	SEM[4]	*P*-value
d 28	36	56	21.2	0.14
d 56	62	82	-	-
d 84	63	86	-	-
Total herbage mass produced during the study, lb of DM/acre	4,504	5,915	944	0.34

[a,b,c]Row means with different superscripts differ, $P < 0.05$.
[1]No day effect ($P = 0.34$), treatment effect ($P = 0.14$), or day × treatment interaction ($P = 0.99$).
[2]85 lb/acre of Trical 342 triticale + 15 lb/acre of ryegrass (cv. Diamond R).
[3]70 lb/acre of FL401 rye + 15 lb/acre of ryegrass (cv. Diamond R).
[4]Pooled standard error of treatment means, n = 4 pastures/treatment.

Table 3. Cumulative data of beef cattle performance under different winter feeding strategies in a study conducted at NFREC.

	Treatment				Treatment
Item	Triticale + ryegrass[1]	Rye + ryegrass[2]	Supplemented control[3]	SEM[4]	*P*-value
Initial body weight, lb	736	735	732	46.3	0.981
Final body weight, lb	869	809	832	33.8	0.102
Average daily gain, lb					
d 0 to 28	0.78	0.73	0.99	0.265	0.596
d 0 to 56	1.16	0.75	0.99	0.194	0.103
d 0 to end	1.57[c]	0.88[a]	1.18[b]	0.181	0.001

[a,b,c]Row means with different superscripts differ, $P < 0.05$.
[1]85 lb/acre of Trical 342 triticale + 15 lb/acre of ryegrass (cv. Diamond R).
[2]70 lb/acre of FL401 rye + 15 lb/acre of ryegrass (cv. Diamond R).
[3]Heifers in the supplemented control treatment received a supplement of a 50:50 mixture of corn gluten feed:soybean hulls 1% of their body weight daily and ad libitum access to bahiagrass hay.
[4]Pooled standard error of treatment means, n = 4 pastures/treatment.

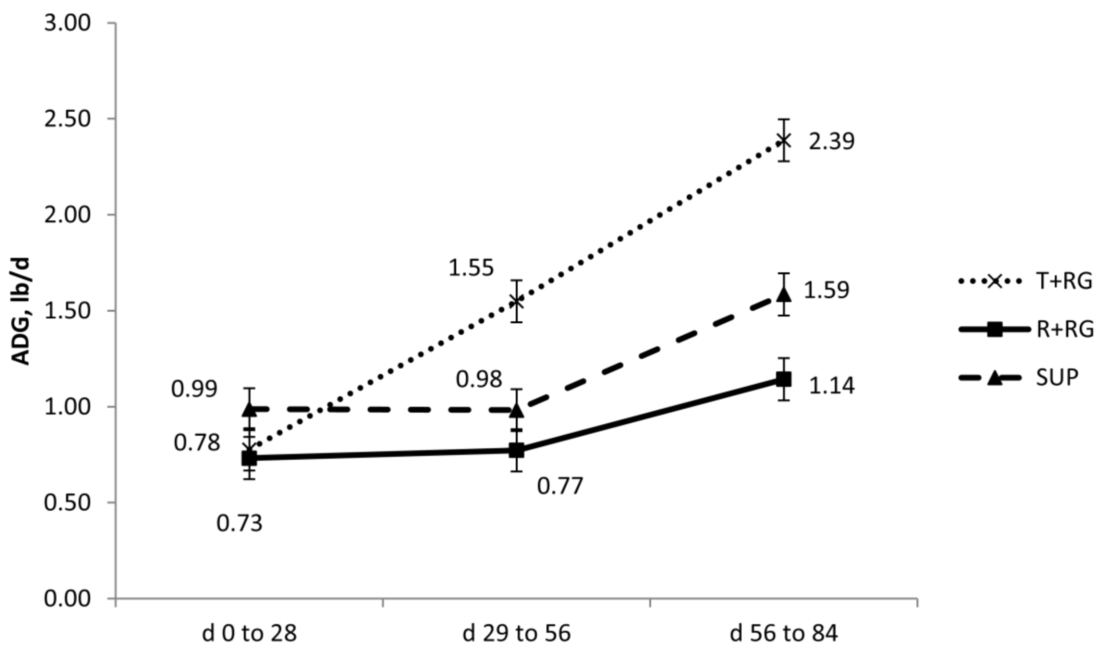

Figure 1. Partial average daily gain (ADG) of heifers throughout the study, under different winter feeding strategies. Treatment x day interaction observed ($P = 0.003$). T+RG = heifers grazing a pasture planted with 85 lb/acre of Trical 342 triticale + 15 lb/acre of ryegrass (cv. Diamond R); R+RG = 70 lb/acre of FL401 rye + 15 lb/acre of ryegrass (cv. Diamond R); SUP = Heifers supplemented with a 50:50 mixture of corn gluten feed:soybean hulls at 1% of their body weight daily and with ad libitum access to bahiagrass hay.

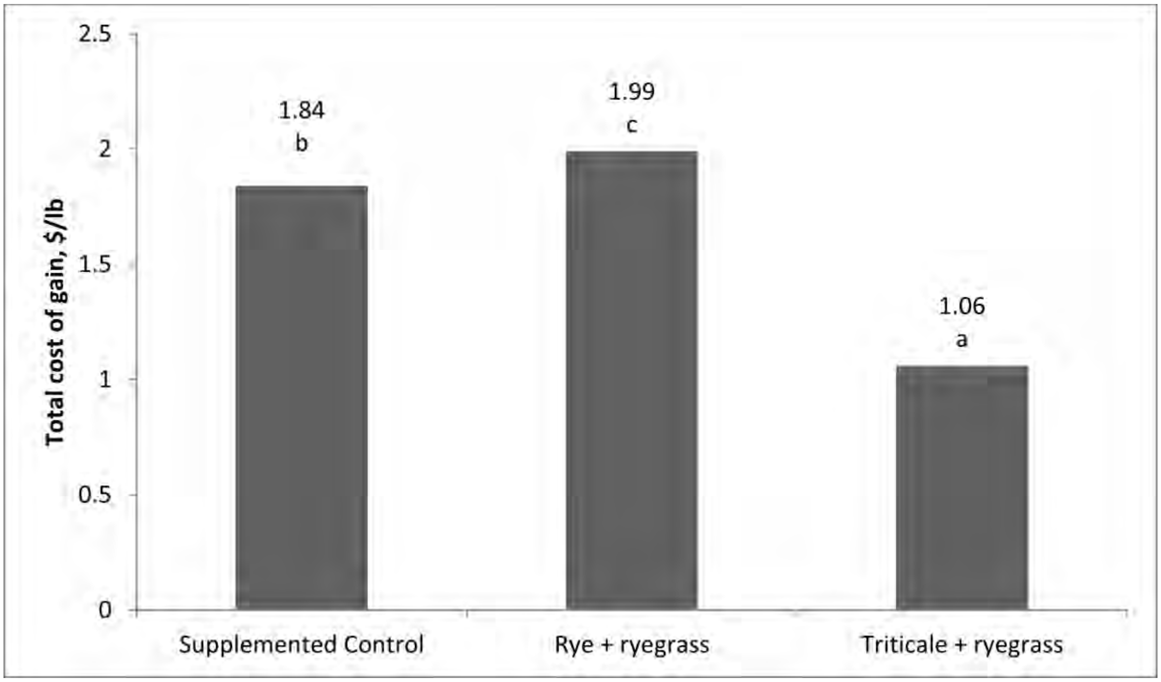

Figure 2. Total cost of gain ($/lb of BW gained) under different winter feeding strategies in an 84-day study conducted at NFREC during Nov-April of 2010-11 in yearling heifers (average initial weight = 734 lb). Means without common superscript differ ($P < 0.05$).